The Current Proposals on the Transfer of Climate Technology in the International Climate Negotiations

An Assessment

Christiane Gerstetter
Dominic Marcellino

16 November 2009

Ecologic Institute, Washington D. C.
www.ecologic.eu/washington

Report details

This policy brief is a result of the project "Delivering Technology Transfer for Climate Change: Recommendations for a Deal in Copenhagen", funded by the Doris Duke Charitable Foundation.

The brief can be downloaded from http://ecologic.eu/2998. A more extensive and updated version of this paper will be published in January 2010.

Authors:

Christiane Gerstetter (christiane.gerstetter@ecologic.eu) is a fellow at the Ecologic Institute, Berlin.

Dominic Marcellino (dominic.marcellino@ecologic-institute.us) is a fellow at the Ecologic Institute, Washington D. C.

Acknowledgements

The authors would like to thank Ilka Wagner, Thomas Brewer, Omar El-Arini, and Manish Shrivastrava, who served as reviewers and provided essential comments and suggestions. (Please note: Ms. Wagner's comments were made in her capacity as a policy advisor for the German Ministry for the Environment and not in her role as an EU issue leader on technology in the UN negotiations.) Their participation should not be considered endorsement of any of the findings or recommendations in the document, and the authors assume full responsibility for any errors or inaccuracies.

We would also like to gratefully acknowledge the invaluable research support of Elena von Sperber, Michael Perry, Michael Marble, and Thomas Opp.

About Ecologic Institute

The Ecologic Institute is a private not-for-profit think tank for applied environmental research, policy analysis and consultancy with offices in Berlin, Brussels, Vienna, and Washington DC. An independent, non-partisan body, the Ecologic Institute is dedicated to bringing fresh ideas to environmental policies and sustainable development. The Ecologic Institute's work program focuses on obtaining practical results. It covers the entire spectrum of environmental issues, including the integration of environmental concerns into other policy fields. Founded in 1995, the Ecologic Institute is a partner in the network of Institutes for European Environmental Policy. The Ecologic Institute acts in the public interest; donations are tax-deductible.

Summary

This policy brief summarizes the current state of international climate negotiations relating to technology transfer and draws on an assessment of pertinent research to develop recommendations for participants at the upcoming climate negotiations in Copenhagen.

Proposals geared towards the establishment of a new body responsible for technology in a future climate agreement and enhanced strategic planning and cooperation on technology matters currently enjoy broad support. By contrast, the issue of intellectual property and the notion of establishing a specific technology fund remain controversial.

Drawing on the results of our survey of proposals and relevant research, we provide a series of recommendations for negotiators, which are not based on any single country's (or group of countries') position.

Recommendations for negotiators

1. Current technology finance is inadequate and must be increased. **Public funds should leverage private investment** and also **fund technology at the research, development and demonstration stages,** and when market incentives are insufficient.
2. Although they contribute to the wider use of climate technologies in developing countries, **market-based mechanisms must be complemented by other measures** that address underfunded stages of the technology cycle and cover all countries.
3. **Intellectual property is not currently a barrier** to North-South technology transfer and should not be treated as a major concern in the negotiations.
4. **Any new technology body** should be well integrated into the overall international governance architecture and the UNFCCC structure.
5. **Strategic planning is essential**. If a technology-related fund is established under a future climate change agreement, funding should only be approved on the basis of prior strategic planning at the country level and should follow established and transparent criteria.

1 Introduction

In the context of the current international negotiations under the United Nations Framework Convention on Climate Change (UNFCCC), this brief focuses on proposals for technology transfer in a future agreement. Technology development and transfer is one the four "building blocks" of a future climate change agreement identified in the Bali Action Plan (BAP). The international negotiations on this issue are based on a broad conceptual understanding of what constitutes transfer of technology. The Intergovernmental Panel on Climate Change (IPCC) defines technology transfer as 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'.[1] Negotiations have focused on all stages of the technology cycle, i.e. the research and development (R&D), deployment, and diffusion of climate technologies.

In this brief, we present the results of an extensive review of party as well as non-party submissions to the UNFCCC Ad-Hoc Working Group on Long-Term Cooperative Action (AWG-LCA), the body that has been mandated to conduct the technology negotiations under the BAP.* All relevant party submissions in the last two years,[2] numerous NGO proposals, and relevant contributions and proposals from outside the UNFCCC process were reviewed.[3] We have also analyzed the most recent negotiating draft on technology issues.[4]

Based on this analysis, we have identified main technology related proposals and controversies. These proposals and controversial positions have been assessed against existing studies on mechanisms and triggers for successful transfer of technology. This assessment leads us to formulate recommendations for the negotiations, based on a determination of their effectiveness in increasing the availability and diffusion of climate technologies, especially to developing countries. This policy brief focuses predominantly on what can be achieved in the negotiations in light of the negotiating text and party positions and proposals. It does not address measures and efforts outside the climate negotiations and does not include a discussion of financing options, though it does consider some areas where governmental actions are particularly necessary to increase private finance and investment for technology transfer. Because several large emerging economies, such as China, India, and Brazil, now develop and export cutting edge clean technologies, technology transfer has ceased to be a matter purely concerning the relationship of North and South. However, the focus of the current negotiations on technology is predominantly on the North-South dimension. This dynamic is reflected in the current policy brief.

Section 2 provides an overview of the negotiations, including party submissions and proposals from NGOs and other organizations. Following a close analysis of the current

---

* *Please note: in the interest of readability, the extensive references this assessment is based on have been included in endnotes below.*

negotiating text, we highlight areas of agreement and disagreement. Section 3 investigates several areas of disagreement as well as current proposals, assessing positions and proposals on the basis of experience in other fields and evidence from the academic literature. Section 4 concludes with recommendations for negotiators on which proposals to focus in the future negotiations.

2 Technology transfer in the climate negotiations

The following section contains an overview of the negotiations conducted so far on technology transfer,[5] as well as proposals made by non-governmental organizations.[6] It takes account of the non-paper on technology which serves as the current negotiation draft text.[7] Areas of emerging agreement and remaining controversies are each described. In addition, we provide an overview of developments in the broader negotiations on adaptation and mitigation which will likely have an impact on technology transfer, even though they are not conducted in the context of technology in the negotiations.

2.1 Areas of Agreement

A consensus on the following elements of a future deal appears to be emerging, as reflected in the negotiation text and party positions:

Establishment of a technology body: It seems likely that parties will agree on the establishment of some type of technology body in a future climate agreement. The exact structure, mandate, and name of the mechanism, as well as its funding, remain undecided. The creation of a technology body has been supported in particular by developing countries. Specifically, the G77/China have proposed the establishment of a technology mechanism, comprising an Executive Body and a Multilateral Climate Technology Fund (MCTF), both subsidiary bodies to the COP. [8] The idea that a separate body for technology transfer *within* the UNFCCC framework should be created has been re-iterated by a number of developing countries,[9] even though their proposals are sometimes less specific than that of G77/China or the proposed mechanism is given a different name.[10] Some submissions are more specific than that by the G77/China. For example, China, in an individual submission, made it clear that the decision-making within a future body should be consensus-based.[11]
NGOs have also supported new institutions. Some propose a mechanism dealing specifically with technology,[12] while others propose a general mechanism for mitigation, adaptation and technology-related measures, including funding.[13] Among NGOs that have expressed a position on this issue there seems to be wide agreement that such mechanisms should include bodies where – varying between proposals – scientific experts, government, business, NGOs, and other stakeholder are represented.[14]

Enhanced strategic planning on technology: Strategic planning will likely be part of the technology body's portfolio under the UNFCCC. In particular technology action plan(s) feature prominently in the draft negotiation text. Such plans would describe inter alia, the current state of development of technology, barriers to technology deployment and diffusion,

and priority technologies. NGOs have also emphasized a need for more strategic planning and suggested that the future bodies should decide on technology goals and plans.[15]

Improving cooperation: Clauses stipulating general obligations by all or some parties to support cooperative action in the technology field are part of the current draft. In particular, the proposal to establish regional, cooperative innovation centers has met with some consent.

Creating enabling environments for private investment: The idea that policy reforms and enabling environments are of prime importance is reflected in several clauses of the draft text. In the negotiations, this position has been supported more vigorously by developed countries,[16] but some developing countries[17] and NGOs[18] concur in principle.[19] Business associations have also highlighted the importance of favorable investment conditions.[20] What this precisely entails is, however, controversial.

2.2 Controversial issues

At the same time, several areas of disagreement remain, particularly between developing and developed countries, and these differences create challenges for reaching an agreement.

The role and treatment of intellectual property stands out in particular. In the current non-paper negotiation draft, several non-consensual options are listed. In the negotiations, developing countries have consistently held that the practice of and framework for intellectual property rights (IPR) in the area of climate technologies need attention. In particular, they maintain that solutions are needed to enable developing countries to access technologies protected by IPR; additionally, some propose keeping relevant technologies outside the current IPR system.[21] Proposed solutions include: compulsory licensing,[22] an international agreement similar to the Doha Declaration on Public Health for the climate sector,[23] or placing the "fruit of public financing for technology innovation and development" in the public domain.[24]

By contrast, intellectual property is only mentioned infrequently in developed countries' submissions, and the focus is completely different. When mentioned, intellectual property is usually considered an incentive for further technology development, rather than a potential barrier to technology transfer.[25] In general, developed countries have given matters of technology transfer less formal consideration than developing countries.[26] Most, though not all, NGO proposals agree that intellectual property is a potential obstacle to technology transfer and hence some form of action needs to be taken concerning intellectual property, and they suggest various solutions.[27] Business representatives, in turn, advocate the establishment of appropriate institutional frameworks and strong protection of IPR.[28]

Though IPR receives significant attention, there are several other key areas of contention:

- Developing countries have stressed the need for *additional* financial and other resources to be provided by developed countries for technological support geared towards adaptation and mitigation measures.[29] Also, developing countries have highlighted the insufficiency of current mechanisms.[30] This position has received moderate support from some developed countries, while others have been more skeptical and have expressed doubt about whether additional mechanisms and resources are really needed.[31]
- A broad range of mechanisms to facilitate the deployment and transfer of climate technology have been suggested, including voluntary technology agreements,[32] R&D collaboration (both North-South and South-South), and joint-ventures for developing and diffusing technology.[33] Developing countries, in particular, have stressed that measures should address the full technology cycle, i.e. R&D, deployment, and diffusion.[34]
- While the establishment of some kind of technology body seems to be agreeable for many parties, a fund to finance technology measures is less consensual. Developing countries have supported it throughout the negotiations.[35]
- Again, developing countries have highlighted the importance of mechanisms for measuring, reporting on and verifying compliance with obligations concerning technology transfer, including the use of performance indicators.[36] They have also emphasized that a compliance mechanism should be created that also covers technology-related issues.[37] In contrast, matters of compliance do not play a major role in developed countries' submissions on technology transfer.[38]

2.3 Other negotiation issues with impact on technology

While negotiations touch upon technology as one of the four elements specified in the Bali Action Plan, other elements of a future climate regime currently under negotiations will likely be equally important for the future rate of technology transfer:

- There is a consensus in the negotiations that the Clean Development Mechanism (CDM) should continue to exist under a future agreement, even though there is controversy on how precisely it should be reformed and what activities it should cover.[39]
- Sectoral approaches are also a likely element of a future agreement. They are considered an instrument for developed countries to fulfill their obligations with regard to technology transfer.[40]
- Lastly, it is very likely that a future agreement will contain a section on so-called Nationally Appropriate Mitigation Actions (NAMAs) by developing countries. The latest draft negotiation text reflects the understanding that (financial) support for NAMAs is a method for developed countries to comply with their obligations on technology transfer.[41]

While the related party submissions have not been reviewed in-depth, the following assessment covers these mechanisms, albeit briefly.

3 Assessment of the proposals and open questions

The above analysis of party proposals and the current draft negotiation text reveals that several proposals hold particular prominence in the negotiations. There are also a few key outstanding and controversial issues. In the following section, we identify these proposals and issues and assess each of them in the light of pertinent research. In the case of proposals that are more or less consensual, this leads us to an assessment on the likely effectiveness of the proposed mechanisms; in the case of continuing controversies, we indicate where the focus of future negotiations should be to ensure an effective outcome.

3.1 Current mechanisms and levels of technology support

With respect to technology transfer, the first and most fundamental question that needs to be addressed in the UNFCCC negotiations is whether current investment flows and institutional and financial mechanisms have sufficient scale to meet the technology investment required. This issue is somewhat controversial, in particular between developing countries that demand scaled up funding and improved mechanisms for technology transfer, and some of the developed countries that have, in their proposals, expressed some caution in this regard. To address this issue, we first look at estimates of the needed financial flows and then compare current levels with estimates of the scale needed to make up the shortfall.

Estimating the financing needs for technology transfer to developing countries presents several challenges, including a lack of data. The need for particular financing for technology transfer cannot be divorced from considerations of total financing needed for mitigation and adaptation. To stabilize atmospheric levels of greenhouse gases, the Stern Report estimates the additional cost to be up to 1% of global GDP by 2050.[42] An estimate of additional investment flows to developing countries ranges from $95-150 billion between 2010 and 2020 – $15-30 billion annually for adaptation and $80-120 billion for mitigation.[43] For technology transfer in particular, a partial estimate of resources needed for overcoming just some market barriers would require US$ 1.9 billion in the next five years,[44] and estimates of some capacity building and technical assistance needs start at $300 million.[45] Several NGO and party proposals suggest total annual climate financing of up to US$ 55 billion, of which a proportion would go to technology transfer. [46]

Current capital flows fall short of these estimated needs. The main current mechanisms and funding sources for technology transfer are:

- Public sources: official development assistance (ODA), CDM, and funding by multilateral development banks and export credit agencies, Joint Implementation (JI) and the Global Environmental Facility (GEF).[47]
- Private sources: domestic and international investment, including foreign direct investment (FDI).[48]

In terms of present levels of financing, yearly technology transfer financing is estimated to be less than US$ 2 billion per year;[49] private sources supply over 60 per cent of the financing, with the public sector providing the rest (mostly directly from national governments). Direct efforts can be overwhelmed by the scale of total investment. For example, the GEF contributed over $1 billion to climate-related energy projects from 1997 to 2005, yet this made up only 1.6% of multilateral and bilateral financing for energy projects over that period.[50] Further, the UNFCCC has evaluated the functioning and contributions of its own mechanisms for technology transfer. Accordingly, the current mechanisms contribute less than 5 per cent of the total funding for technology transfer, support less than half of the needed technologies, require better coordination, and provide only limited support in the vital "valley of death" demonstration and deployment stages. [51]

Thus, significantly larger (and targeted) funding and investment with specific attention to technology transfer is required to achieve the needed scale.

3.2 Public actions to harness private investment

Even though there is a general consensus that technology transfer at scale requires efforts from the public and private sectors, party submissions reflect slightly different views on the appropriate roles for both. While many developing countries contend that developed countries should providing them with additional funds, developed countries emphasize the role of the market and the need for states to create enabling regulatory environments.

Regardless of party positions, the scale of financing needed for mitigation and adaptation – and by default for technology development and transfer – far exceeds the means of public budgets. Foreign direct investment (FDI), the CDM, carbon markets, and other means of private investment will have to provide the vast majority of financing. However, public funds and public policy have a vital role to play, especially in the case of overcoming market barriers and leveraging private investment.[52] Clear and long-term public commitment, in terms of policies and financing, are vital.[53]

Some market barriers will exist even with price signals from robust carbon markets, meaning the private sector will under-invest. Market barriers include: asymmetrical information, principal-agent problems, bounded rationality, and path dependent process that force unsustainable practices.[54] In addition to actions – both policies and direct investment – to address these market barriers to technology transfer, the public sector can provide incentives for private sector investment in technology transfer by opening and creating markets.[55]

1. *Jumpstart markets*: Public funds should be used for fundamental research and development and demonstration.[56] The literature indicates that public investments in the initial stages[57] of R&D encourage subsequent private investment in the later stages of development.[58] Public procurement[59] directed toward emerging climate-friendly technologies can create markets[60] and foster technology pull. Governments should work toward bilateral or multilateral agreements for the removal or reduction of

tariff and non-tariff barriers to the trade of climate-friendly technologies,[61] while at the same time ensuring that such trade liberalization does not have any negative sustainable development effects.[62]

2. *Support capacity building and enabling environments:* Developing countries need human, organizational, and monitoring capacity[63] to successfully utilize technology, and, more importantly, to develop technologies of their own.[64] The private sector alone will not supply sufficient capacity building,[65] and projects lacking proper capacity tend to fail.[66] Public funding will be necessary.[67] Further, some developing countries need assistance to develop enabling environments of regulations, policies, and institutions.[68] Lack of enabling policies, investment stability, and institutional support were three barriers to technology transfer experienced under the Montreal Protocol.[69] The IPCC and other studies underscore this need.[70]

3. *Change policies to overcome market barriers, especially for energy efficiency*: Substantial mitigation options with negative cost at today's energy prices have been identified empirically,[71] though myriad barriers, especially for building efficiency,[72] restrict investment. Studies have suggested that even a carbon price of US$ 40/ton could not overcome these barriers.[73] Changes in policy can address many issues.[74] Two examples: A municipal-level change to apartment rental laws allowing building owners to accrue benefits from efficiency investments; on the national scale, long-term and firm policy commitment to reduce uncertainty and induce long-term investment.

Beyond establishing the framework for technology adoption through policies and capacity building, there may also be cases where technology investments will only occur with the help of public institutions and with public funding.[75] In developing countries, some examples include technical assistance grants and guarantees or insurance to mitigate investment risk.[76] Small market size and lack of financial wherewithal in some countries are also barriers to investment. Additionally, the literature identifies patent pools[77] and prizes,[78] especially in the context of least developed countries, as areas of potential public sector involvement.

3.3 Assessing the effectiveness of a new technology body

Developing countries are demanding a new technology body within the UNFCCC framework – reflected in the G77/China proposals and in the latest draft negotiation text. Developed countries have, in contrast, tended to focus on existing institutions and channels for technology transfer. The question is whether, and under what conditions, establishing such a body under the UNFCCC will speed up technology transfer to developing countries.

To measure effectiveness, the key criterion is determining the ability of an institution (or institutional framework) to achieve a specific end – in the present case, enabling and enhancing the diffusion of climate technologies. Effectiveness is always inherently contextual, making the measurement of effectiveness methodologically complex. In international relations scholarship, there are few publications that single out specific

institutional factors for the effectiveness[79] of different international organizations.[80] In spite of these complicating factors, the following observations can be made:

- Institutions, including their organizational arrangement, matter for effectiveness. However, the effectiveness of a specific international regime depends on a large number of factors. Therefore, it is difficult to "tailor" institutions to be effective.[81]

- The openness of institutions to non-state actors tends to increase the effectiveness of environmental regimes or institutions.[82] A feature of the Montreal Protocol that has been assessed as contributing to its success was the establishment of a Technology and Economic Assessment Panel and Technical Option Committees. These bodies had competent members from industry and were allowed to publish their reports without governments' approval. Their reports were not based on published, peer-reviewed scientific literature exclusively, but also contained more visionary statements.[83]

- Failures of coordination and coherence resulting from the proliferation of institutions contribute to the lack of effectiveness of the international environmental governance system.[84]

An important lesson from this for the climate negotiations is that any new body must be coordinated with existing mechanisms.[85] A future mechanism should thus have built-in interfaces with other funding mechanisms and bodies to avoid overlap and duplication of work.[86] This is also true for mechanisms that already exist within the UNFCCC framework, such as the Adaptation Fund. Moreover, channels for feeding-in expertise from non state-actors should be part of a future institutional structure.

3.4 Creating a technology fund – a viable option?

Developing countries have several times proposed the establishment of a technology fund, and this proposal is also reflected, though not without controversy, in the current non-paper negotiation text.

To assess the potential of a fund and develop a sense of how it could be structured, the examples of existing technology-related funds in the climate field, e.g. the World Bank's Climate Investment Funds (CIFs), particularly the Clean Technology Fund, and the Montreal Protocol's Multilateral Fund (MLF), are instructive.

The CIFs, including the Clean Technology Fund (CTF), were created in 2008 in a process driven mainly by developed countries.[87] The CIFs are administered by the World Bank; regional development banks are involved in their implementation. The CTF finances demonstration, deployment and transfer of low-carbon technologies for greenhouse gas reductions; it does not fund research and development.[88] Both states and private entities may submit proposals, which have to fit into country-level CTF Investment Plans, which are drawn

up by recipient countries in cooperation with multilateral development banks (MDBs).[89] The CTF Trust Fund Committee that oversees the operations and activities of the CTF is composed of an equal number of representatives from recipient and contributing countries with decision-making power.[90] Voting is by consensus. A "Partnership Forum", comprising a broad range of stakeholders, including MDBs, UN organizations, the GEF, UNFCCC, the Adaptation Fund, bilateral development agencies, NGOs, and the private sector, will meet annually for discussion on "the strategic directions, results and impacts of the CIF".[91] By January 2009, the 12 contributing countries had pledged $4.1 billion to the CTF.[92] CTF will disburse funds in the forms of grants, loans, and guarantees.[93]

The relatively short operation period of the CTF does not allow for an in-depth assessment of its functioning, in particular because the CTF is just starting to distribute funds. However, some preliminary observations can be made. First, criticism of the CTF is wide-spread, stemming in large part from the fact that the CTF finances "clean" coal technologies.[94] Moreover, its incorporation into the World Bank structure has been assessed negatively, inter alia with respect to a perceived lack of transparency in the Fund's decision-making structure.[95] In addition, the fact that CTF financing partially comes in the form of loans has lead to criticism that the CTF will force poor countries to pay for climate change, a problem predominantly created by developed countries.[96] Observers have also warned of some overlap between the funding areas of the CTF and the GEF.[97] Finally, a review of three CTF Investment Plans concludes that they give only a varying degree of attention to improving institutional capacities and the regulatory environment,[98] a formal assessment of which is required by the relevant guidelines.[99]

The performance of the Montreal Protocol, in contrast, has been evaluated positively. Moreover, its financial mechanisms, the MLF and the GEF,[100] are credited with being critical to the Protocol's success.[101] The MLF finances activities undertaken by developing countries in order to comply with their obligations under the Montreal Protocol to phase out the use of ozone-depleting substances at an agreed schedule. It operates within the Montreal Protocol framework and is governed by an Executive Committee comprised of an equal number of developed and developing countries. Voting procedures prevent either of the two country groups from dominating the decision-making. The MLF received US$ 2.34 billion in funds from 1991 until July 2009.[102] Implementation is in the hand of various UN agencies and the World Bank.[103] Financing is generally made in the form of grants,[104] which is distributed on the basis of country programs for the phase-out of ozone-depleting substances.[105]

Several features of the MLF seem to have been instrumental for the Montreal Protocol's positive track record of technology transfer from developed to developing countries. First, developed nations committed to covering the incremental costs associated with technology transfer and compliance. Second, the mechanism offers flexibility to also fund non-listed incremental costs to meet the goals of the program. Third, duplicate activities are avoided as all projects related to the Montreal Protocol have to go through the Executive Committee. Fourth, all party members are equally represented. Finally, and arguably most importantly, the fund itself goes through a replenishment process that takes into account current projects, future projects and goals for three year periods, and consequently provides developing countries with a high degree of confidence that funding for projects will come through.[106] Moreover, the governance framework (including project guidelines, preparation of periodic

progress reports, tracking of project delays and finances) has also contributed to the Fund's effectiveness.[107]

Several core lessons can be learnt from these examples for a technology fund under the UNFCCC:

- Decision-making bodies should be composed of the same number of developed and developing country representatives; voting procedures should ensure that both groups have equal influence in the decision-making structure.

- Funding should only be approved on the basis of prior strategic planning at the country level, and should follow established and transparent criteria. The body itself should also have a mandate for strategic planning.

- Defining what technologies will be funded is essential. Funding the "wrong" technologies is not only likely to decrease environmental effectiveness, but also might undermine support for a future fund.

3.5 Intellectual Property Rights

One of the most contentious debates in the technology negotiations concerns intellectual property rights (IPR) for climate technologies. Developing countries tend to advocate changes and exceptions to existing IPR rules to encourage technology transfer, and developed countries mostly emphasize the role that current IPR frameworks have for encouraging and rewarding innovation and creating a predictable investment environment. NGO and industry proposals mirror this debate. However, the degree of concern seems overdone in light of actual evidence on the role of IPR in the climate field and the clear need to remove other unequivocal barriers to technology transfer.

Empirical research indicates that intellectual property is not currently a major obstacle to the transfer of climate technologies to developing countries.[108] Research has found that in many cases non-patent protected technologies are available. In particular, relevant technologies are not protected by patents in the majority of developing countries.[109] Even in cases where patents are held, intellectual property protection for climate technologies does not increase prices significantly.[110] A corresponding conclusion can be drawn from the experience under the Montreal Protocol, where technologies to replace ozone-depleting substances were successfully diffused without IPR imposing any major restrictions in this regard.[111] Moreover, major developing countries hold increasing numbers of patents in climate-relevant technologies.[112]

There are reasons for this comparative lack of relevance of IPR in the climate sector. Unlike in the pharmaceutical sector, for example, a broad range of alternatives exists in the climate field, especially for electricity generation; moreover, the fundamental concepts (e.g. the functioning of windmills) tend to be widely known[113] and many technologies are off-patent.[114] Even where patents exist, patent holders are likely to license their patents in the face of

competition.[115] However, the cost of licensing technology will remain an issue especially for least developed countries.[116]

Some parties and NGOs have proposed the use of compulsory licensing where IPR are a barrier to the diffusion of technologies in developing countries.[117] However, there seem to be no empirical studies on whether states so far have used compulsory licensing on climate technologies in a cross-border context, and only very few estimates exist on the effect of using it in the climate sector. One study warns that tacit knowledge plays a larger role in the climate sector than in the pharmaceuticals sector; consequently, it expects that compulsory licensing would be less effective in the climate than in the pharmaceutical field.[118] Lastly, compulsory licensing is only a solution where firms have the capacity to manufacture the technologies.[119]

A peripheral discussion centers on a proposal for an international agreement (akin to the WTO Declaration on TRIPS and Public Health[120]) regulating compulsory licensing. However, that Declaration has not proven to be a very successful instrument so far. Only a third of WTO countries have adopted changes to the TRIPS Agreement resulting from the Declaration,[121] and only two countries have indicated so far that they plan to make use of the mechanism. Further, the assumption that an agreement on compulsory licensing adopted within the framework of the UNFCCC will fail to foster technology transfer is supported by its highly questionable legal effect, as such an agreement would not directly modify the norms of the WTO TRIPS Agreement which allow compulsory licensing only under narrow circumstances.

While IPR do not seem to present an obstacle to technology transfer, the evidence is mixed as to whether they necessary to foster innovation and foreign direct investment. Some studies find a positive correlation between strong intellectual property protection and levels of FDI.[122] Evidence that imported technology is more sophisticated in countries with strong IPR protection also exists.[123] However, trade flows to the poorest countries have not responded to stronger patent protection;[124] in these cases, IPR are, at most, one factor among many influencing investment decisions. Other important factors are the size and certainty of markets, the rate of turnover, and the number of competitors.[125]

The evidence related to IPR does not seem to match the prominence this issue has achieved in the negotiations. At this time, there does not seem to be a need to change existing rules on intellectual property to increase technology transfer in the climate field. Other efforts - capacity building, R&D, innovation centers in developing countries, and creation of enabling environments[126] - demand priority. Compulsory licensing is currently not the most urgent element for a future climate agreement. As with the Montreal Protocol, provisions on funding to cover the cost of licensing, in particular for the poorest developing countries, should be part of a future deal if and where licensing is an issue.

3.6 CDM and other market-based mechanisms

Negotiations on technology transfer have not focused directly on the CDM; however, the current negotiation text on flexible mechanisms reflects an understanding broadly shared among negotiators that the CDM will continue to allow developed countries to fulfill their obligations on technology transfer set forth in the UNFCCC. The same is true for sectoral mechanisms. It is therefore important to know if these market-based mechanisms may be generally expected to promote better access to climate technologies in developing countries.

Recent studies have suggested that the CDM (with about 4700 projects registered to date)[127] is presently the strongest mechanism for technology transfer under the UNFCCC, contributing to the transfer of both equipment and know-how.[128] Studies on technology transfer in CDM projects have estimated that technology transfer is occurring in 36%,[129] 44%[130] and 46%[131] of the projects surveyed.[132]

Factors that have been singled out as decisive for the technology-transfer relevance of CDM projects are: the project's size, the particular technology, a country's general institutional framework, and a country's capability to adopt new technologies or produce them domestically.[133] Accordingly, developing country subsidiaries of companies headquartered in developed countries were the most likely to develop projects with technology transfer.[134] Moreover, it has become clear that some countries are seeing the bulk of CDM projects, with India, Brazil, and China being the most important host countries.[135] And finally, CDM projects do not contribute to the R&D of new technologies. Experts have thus recommended that the CDM be complemented with other mechanisms.[136]

Strictly from the viewpoint of technology transfer, the CDM should be continued, consolidated and expanded.[137] Sectoral approaches building on similar mechanisms as the CDM may be expected to have a similar positive effect on technology transfer. However, these mechanisms need to be complemented by other measures, as only a limited number of countries are currently benefitting from the bulk of CDM projects, and the CDM's role in the early stages of the technology cycle is negligible.

4 Recommendations

In this brief we present the results of an extensive analysis of party submissions and outside proposals on technology transfer relating to the ongoing climate negotiations. On this basis, the following recommendations can be made:

- Current resources for technology support fall far short of estimated needs. Additional funding from both the public and private sector are needed. Developed countries should recognize this, and act accordingly. While state measures alone will not suffice, states have a role in funding technology at the R&D and demonstration stages and when market incentives are not sufficient.

- Although there are positive indications that market-based mechanisms under the Kyoto Protocol, notably the CDM, have fostered technology transfer to developing countries, those benefits have been selective and are limited to the later stages of the technology cycle. The CDM and future sectoral approaches must therefore be complemented by other measures to address those areas.

- Intellectual property does not, currently, seem to be a major factor influencing the transfer of climate technologies either positively or negatively in a North-South context, and should therefore not be given prominent attention in the negotiations.

- A new technology body under the UNFCCC should be soundly integrated into the overall international governance architecture and act in coherence with other UNFCCC mechanisms. Channels for feeding in external expertise are vital and should be institutionalized; developed and developing countries should have equal weight in decision-making.

- Strategic planning is essential. Experience under the MLF demonstrates that funding should only be approved on the basis of prior strategic planning at the country level and should follow established and transparent criteria.

5 Endnotes

[1] IPCC (2000) Methodological and Technological Issues in Technology Transfer: A Special Report of Working Group III of the Intergovernmental Panel on Climate Change – Summary for Policy Makers, p. 4, http://www.ipcc.ch/pdf/special-reports/spm/srtt-en.pdf

[2] Submissions made until before the Bangkok session in October have been reviewed.

[3] This research project was comprised of an assessment of party, NGO, and academic proposals, as well as a review of the academic literature in order to assess certain aspects (see Part 3). The non-UNFCCC literature and proposals reviewed exceed 100 items.

[4] AWG-LCA Contact Group on Enhanced Action on Development and Transfer of Technology, Non-paper No. 47 of 6 November 2009, http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/awglcattnp47061109.pdf

[5] This section is based on the official submissions by parties to the UNFCCC AWG-LCA. When a party has submitted more than one paper on its position concerning technology issues, usually only the most recent one has been taken into account. Submissions included relate directly to technology issues; submissions that deal primarily with other issues, such as adaptation or funding, that are indirectly linked to technology issues have not been systematically reviewed. This policy brief takes account of all developments until after the conclusion of the AWG-LCA 7 meeting in Bangkok in October 2009 and the draft negotiation text resulting from the Barcelona sessions in November 2009.

[6] The sections on NGOs are is based on an analysis of the submissions of organizations that have UNFCCC observer status to the UNFCCC and some outside proposals. Submissions by intergovernmental organization with UNFCCC observer status are not mentioned here, because our review has shown that these hardly ever contain any specific proposals on technology transfer.

[7] AWG-LCA Contact Group on Enhanced Action on Development and Transfer of Technology, Non-paper No. 47 of 6 November 2009, http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/awglcattnp47061109.pdf

[8] G77/China, A Technology Mechanism under the UNFCCC, p. 6-9, in FCCC/AWGLCA/2008/MISC.5

[9] Argentina, p. 17, China, p. 66, Columbia, p. 77, Ghana, p. 97, Guyana, p. 102, India, p. 115, Indonesia p. 121 in FCCC/AWGLCA/2009/MISC.4 (Part I); Nicaragua on behalf of Guatemala, Dominican Republic, Honduras, Panama and Nicaragua, p. 36, 41, Saudi Arabia, p. 83, in FCCC/AWGLCA/2009/MISC.4/ (Part 2); Brazil, p. 30, in FCCC/AWGLCA/2008/MISC.5; Cuba p. 29, in FCCC/AWGLCA/2009/MISC.1

[10] The group of LDCs, for example, has proposed establishing a “Technology Committee” and a “Technology Panel”, p. 16 in FCCC/AWGLCA/2009/MISC.6; China has proposed a “Subsidiary Body for Development and Transfer of Technology”, p. 22 in FCCC/AWGLCA/2009/MISC.1

[11] China p. 22, in FCCC/AWGLCA/2009/MISC.1

[12] APRODEV (2009)

[13] Meyer et al. (2009) propose a “Copenhagen Climate Facility”; APRODEV (2009)

[14] Meyer et al. (2009); APRODEV (2009); WWF (2008)

[15] Meyer et al. (2009); CAN – International (2009); WWF (2008)

[16] New Zealand, p. 46, United States, p. 105, in FCCC/AWGLCA/2008/MISC.5; Australia, p. 91, Canada, p. 110FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I); United States, p. 74, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part II)

[17] Alliance of Small Island States, p. 39, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I); Bolivia, p. 105, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I)

[18] Staley and Freeman (2009)

[19] Alliance of Small Island States, p. 39, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I); Bolivia, p. 105, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I)

[20] U.S. Chamber of Commerce (2009); Japan Business Federation (2009); ICC (2009)

[21] Argentina, p. 18, Bangladesh, p. 29, China, p. 66, Guyana, p. 102, Indonesia, p. 119 in FCCC/AWGLCA/2009/MISC.4 (Part I); Bolivia, p. 9, LDCs, p.15 in FCCC/AWGLCA/2009/MISC.6; Brazil, p.

29, in FCCC/AWGLCA/2008/MISC.5; Alliance of Small Island States, p. 38, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I); China p. 29, in FCCC/AWGLCA/2009/MISC.1; Ecuador, p. 38, in FCCC/AWGLCA/2009/MISC.1

[22] Brazil, p. 29, in FCCC/AWGLCA/2008/MISC.5; Pakistan, p. 47, in FCCC/AWGLCA/2009/MISC.4 (Part II); China p. 23, in FCCC/AWGLCA/2009/MISC.1

[23] Pakistan, p. 47, in FCCC/AWGLCA/2009/MISC.4 (Part II)

[24] Bolivia, p. 104, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I)

[25] United States, p. 74, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part II); Japan, p. 46, in FCCC/AWGLCA/2009/MISC.1

[26] Japan, p. 42 in FCCC/AWGLCA/2008/MISC.5

[27] Meyer et al. (2009); APRODEV (2009); CAN-International (2009).

[28] U.S. Chamber of Commerce (2009); Japan Business Federation (2009); ICC (2009).

[29] Algeria on Behalf of the African Group, p. 12, Ecuador, p. 96 in FCCC/AWGLCA/2009/MISC.4 (Part I) Bolivia, p. 9, in FCCC/AWGLCA/2009/MISC.6; Nicaragua on behalf of Guatemala, Dominican Republic, Honduras, Panama and Nicaragua, p. 34, in FCCC/AWGLCA/2009/MISC.4/ (Part 2); China, p.34, FCCC/AWGLCA/2008/MISC.5

[30] India, p. 114 in FCCC/AWGLCA/2009/MISC.4 (Part I); Brazil, p. 29, in FCCC/AWGLCA/2008/MISC.5; Panama on Behalf of Costa Rica, El Salvador, Honduras, Nicaragua, Panama, p. 78, in FCCC/AWGLCA/2008/MISC.5

[31] See for example New Zealand, p. 61, in FCCC/AWGLCA/2008/MISC.5: "Parties … should consider… whether additional financing or institutional structures are required."; Australia, p. 92, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I)

[32] France on behalf of the European Community and its Member States, supported by Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia, Montenegro, Serbia and Turkey, 14 November 2008, p. 8-11, in FCCC/AWGLCA/2008/MISC.5/Add.1

[33] Argentina, p. 10 in FCCC/AWGLCA/2009/MISC.1; Alliance of Small Island States, p. 39, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I)

[34] Argentina, p. 10 in FCCC/AWGLCA/2009/MISC.1; China, p.36, FCCC/AWGLCA/2008/MISC.5; Cuba, p. 29, in FCCC/AWGLCA/2009/MISC.1

[35] See in particular the proposal by G77/China, "A Technology Mechanism under the UNFCCC", p. 6-9, in FCCC/AWGLCA/2008/MISC.5., supported in later submissions inter alia by India, p. 114 in FCCC/AWGLCA/2009/MISC.4 (Part I); Brazil, p. 29, in FCCC/AWGLCA/2008/MISC.5; Panama on Behalf of Costa Rica, El Salvador, Honduras, Nicaragua, Panama, p. 78, in FCCC/AWGLCA/2008/MISC.5

[36] Algeria on Behalf of the African Group, p. 13, China, p. 66, India, p. 115 in FCCC/AWGLCA/2009/MISC.4 (Part I); Alliance of Small Island States, p. 38, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part I); Ecuador, p. 38, in FCCC/AWGLCA/2009/MISC.1

[37] Algeria on Behalf of the African Group, p. 14, Columbia, p. 74 in FCCC/AWGLCA/2009/MISC.4; Indonesia, p. 121 (Part I)

[38] An exception is Japan, p. 23, in FCCC/AWGLCA/2008/Misc.5/Add.2 (Part II)

[39] UNFCCC, Contact Group on Other Issues (Mechanisms) - Non-paper by the chair of the contact group: Compilation of proposals for elements of draft CMP decisions on emissions trading and the project-based mechanisms, 9/10/09, http://unfccc.int/files/kyoto_protocol/application/pdf/awgkpmexnonpaper091009.pdf

[40] UNFCCC, Non-paper No. 49 - 06/11/09, Contact Group On Enhanced Action On Mitigation And Its Associated Means Of Implementation - Subgroup on paragraph 1 (b) (iv) of the Bali Action Plan (Cooperative sectoral approaches and sector-specific actions), http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/awglca1bivnp49051109.pdf

[41] UNFCCC, Non-paper No. 51 - 6/11/2009, Contact Group on Enhanced Action on Mitigation and Its Associated Means of Implementation - Subgroup on paragraph 1 (b) (ii) of the Bali Action Plan: Nationally appropriate mitigation actions by developing country Parties - Non-paper by the facilitator http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/awglca1biinp51061109.pdf

[42] Stern Review: Executive Summary (2005) p. xiii

[43] Kaminskaite-Salters, Romani et al. (2009); also Project Catalyst (2009) whose estimates are reported in Euro -- €65-100 billion total for developing countries, €10-20 billion for adaptation and €55-80 billion for mitigation. Converted to US$ using an exchange rate of 1.5 dollars to 1 Euro.

[44] UNFCCC (2009) p. 37-8, referring to this report: "Thoughts concerning technical assistance and capacity building to support the transfer of climate technologies: possible activities and their potential impact", http://unfccc.int/resource/docs/2008/smsn/igo/027.pdf

[45] UNFCCC (2009) p. 38

[46] In Meyer et al. (2009) a consortium of NGOs put forward their best estimate as to financial commitments required to meet the objectives of a new climate deal. Funding would be set at an annual rate of US$160 billion of which US$55 billion would go directly towards mitigation and technology. These were starting numbers with expenses expected to increase past 2017. See p. 50.

[47] UNFCCC (2009)

[48] Domestic investment in developed countries makes up by far the largest share of private investment in technology transfer. Source: UNFCCC (2009)

[49] UNFCCC (2009) p. 6

[50] UNFCCC (2007) pp. 164-165

[51] UNFCCC (2009) p. 62

[52] For a recent discussion of this issue, see Kaminskaite-Salters, Romani et al. (2009).

[53] Kaminskaite-Salters, Romani et al. (2009)

[54] Unruh (2000) p. 818 cited in Best, Mehling et al., (2009) (forthcoming) p. 17. See both for a longer a deeper discussion of market failures specific to climate change technology investment.

[55] See Brewer (2009) for detailed discussion of frameworks to overcome barriers.

[56] Hattori (2007) and IEA (2001).

[57] This situation may be especially acute in the case of investment in R&D for energy technologies. Abbott (2009) underscores that R&D in energy technologies seem low basing this on the fact that R&D investment in energy technologies is only a fraction of investment in pharmaceutical research. Increased public subsidies for research may be necessary (p. 23).

[58] Toole and Turvey (2007) tested the common position that public investment in the beginning stages of development is followed by private investment. Dividing the investment into two stages, Toole found that public support was most successful in Phase 1 and that larger support during Phase 1 made it more likely that venture capital and other private support would follow in Phase 2. Drawing on lessons from the non-energy sector, Avato et al., (2008) call for cooperative investment in R&D with private investment continuing the development of technology after initial research. See also Seligsohn et al. (2009)

[59] IPCC (2000); Tomlinson et al. (2008)

[60] Copenhagen Economics (2009) note that small market size in developing countries is also a barrier to technology transfer.

[61] See, for example, Diringer (2009) and Seres (2008). Drawing from experience of technology transfer under the Montreal Protocol, Andersen et al., (2007) identify a series of barriers to technology transfer that can be addressed by changes in the public sector (especially since these barriers are often caused directly by the sector). These barriers include: tariff laws; banking system delays; uncertain import duties; high or uncertain inflation; interest rates and tax policies; and transaction costs.

[62] See, for example, Diringer (2009) and Seres (2008). Drawing from experience of technology transfer under the Montreal Protocol, Andersen et al., (2007) identify a series of barriers to technology transfer that can be addressed by changes in the public sector (especially since these barriers are often caused directly by the sector). These barriers include: tariff laws; banking system delays; uncertain import duties; high or uncertain inflation; interest rates and tax policies; and transaction costs.

[63] IPCC (2000) p. 5. The report identifies three elements to technology transfer: absorptive capacity, enabling environment, and mechanisms for transfer. The private sector is expected to participate broadly only in the third of these elements.

[64] See for example Copenhagen Economics (2009) pp. 15-16 and de Coninck et al. (2007); Keller (1996)

[65] In the context of the Montreal Protocol, Andersen, et al. (2007) p. 266 provide examples of how capacity issues were addressed. Issues with lacking skills and capacity were addressed by capacity-building projects sponsored by implementing agencies, as well as training provided by technology suppliers, which was

financed by Global Environment Facility and the Multilateral Fund. UNEP assisted with addressing information-based barriers. Diringer (2009) p. 47 suggests a new fund of public money to build developing country capacity.

[66] Burleson (2009)

[67] The EU has proposed €5-7 billion between 2010-2012 for fast start financing and capacity building. See also Project Catalyst (2009).

[68] IPCC (2000) underscores this need.

[69] See Andersen et al. (2007). Some suggestions for improvements include: the streamlining of permitting and licensing procedures; changes to regulatory policies to expedite the agency approval of projects; addressing institutional corruption; and general attention to improved governance (Andersen (2007)

[70] IPCC (2000); ICTSD (2008); Hutchison (2006); Tomlinson et al. (2008); Park and Lippoldt (2008); Cosbey et al. (2008)

[71] McKinsey (2009)

[72] Houser (2009)

[73] The World Business Council estimated that a willingness to accept a 10-year pay-back period on energy efficiency investments at today's energy prices would yield 52% of the reductions sought from the building sector. Adding a carbon price of US$ 40/ton increased the achieved reductions from 52% to 55%.

[74] For a longer discussion see Unruh (2000).

[75] Andersen et al. (2007) provide successful examples from experience under the Montreal Protocol.

[76] Kaminskaite-Salters, Romani et al. (2009) Introduction p. 4.

[77] See Reichman et al. (2008) and Correa (2007). Cannady (2009), however, questions the effectiveness of patent pools in light of asymmetric relationships between developed and developing country participants.

[78] Love (2007); Reichman et al. (2008)

[79] Effectiveness of an international environmental regime is frequently defined in terms of output, outcome and impact. 'Output' refers to rules, programs and regulations emanating from the regime, while 'outcome' refers to behavioral change in the desired direction, by key target groups, as a result of the regime. Impact, finally refers to the environmental improvements in the relevant issue-area following from the regime in question (Andresen et al., 2007). Using this framework, "outcome" is the variable that is of relevance concerning technology transfer in this study.

[80] Biermann and Bauer (2004)

[81] Underdal (2002); Wettestad (1999).

[82] Kaasa (2007) p. 124; Biermann and Bauer (2004)

[83] Andersen et al. (2007) p. 300-303

[84] Najam et al. (2006), Inomata (2008)

[85] This is especially true with regard to the newly founded International Renewable Energy Agency (IRENA). IRENA has the promotion of renewable energies worldwide as its mandate. Even though renewable energy technologies are only one category of climate technologies and IRENA's performance is still unclear, the fact that an international focal point for renewable energies has been created would lead to some overlap with a future technology body under the UNFCCC.

[86] A similar recommendation is made by Staley and Freeman (2009).

[87] CRS (2008)

[88] Herz (2009)

[89] World Bank (2008)

[90] World Bank (2008a) paragraph 19

[91] World Bank (2008a) paragraph 31

[92] World Bank (2009)

[93] World Bank (2008a) paragraph 11

[94] Herz (2009); Rooke (2009)

[95] Nakhooda (2009)

[96] Rooke (2009)

[97] Porter et al. (2009)

[98] Nakhooda (2009)

[99] World Bank (2008)

[100] The GEF was used to provide financial support to countries with an economy in transition (CEITs), as they were not eligible to receive MLF. It functioned in a similar way as the MLF; including exhibiting the flexibility to fund a broad range of projects. See Anderson et al. (2007).

[101] Andersen et al., (2007)

[102] MLF (2009a)

[103] MLF (2009b)

[104] MLF (2009c) Section Concessional Loans, p. 58

[105] MLF (2009c) Section VIII. Country Program

[106] All points taken from Anderson et al. (2007)

[107] Kelly (2004), paragraph 15

[108] Abbott (2009); Barton (2007a); Danish Church Aid (2008); Copenhagen Economics (2009);Dechezleprêtre et al. (2008)

[109] Dechezleprêtre et al. (2008)

[110] Copenhagen Economics (2009)

[111] Negotiations through the GEF and the Multilateral Fund initiated the transfer of protected technology, and there were only two instances where a patent owner refused to license, see Andersen, et al. (2007).

[112] Barton (2007a); Copenhagen Economics (2009)

[113] Abbott (2009); Harvey (2008); Danish Church Aid (2008)

[114] Barton (2007a)

[115] Abbott (2009)

[116] Harvey (2008)

[117] See above Section 2.2. For other options of using TRIPS flexibilities, see Meyer-Ohlendorf and Gerstetter (2009).

[118] Danish Church Aid (2008)

[119] Nanda (2009)

[120] WTO (2003)

[121] WTO (2009)

[122] See Park and Lippoldt (2008); Kanwar and Evenson (2003)

[123] Maskus (2004)

[124] Hutchison (2006)

[125] Tomlinson et al. (2008)

[126] Recent documents underscore this need, e.g., Lee et al., (2009), Cannady (2009), WRI/E3G (2009).

[127] This number is given by UNEP and includes projects in the course of registration, see http://www.cdmpipeline.org/overview.htm.

[128] Schneider et al. (2008)

[129] Seres (2008)

[130] Dechezleprêtre, Glachant and Ménière (2007)

[131] de Coninck, Haake and van der Linden (2007)

[132] Differences in outcome likely are a result of slight differences in methodologies and in the number of projects reviewed.

[133] Schneider et al. (2008)

[134] See, for example, Dechezleprêtre et al. (2008) or Schneider et al. (2008)

[135] Seres (2008)

[136] Schneider (2008)

[137] This is not to be read as a statement about the performance of the CDM in broader terms with a view. In particular, there is strong evidence that the contribution of the CDM to sustainable development at large is limited. See, for example Schneider (2007), Olsen (2007).

6 Bibliography

Abbott, Frederick (2009). “Innovation and Technology Transfer to Address Climate Change: Lessons from the Global Debate on Intellectual Property and Public Health.” ICTSD Intellectual Property and Sustainable Development Series, Issue Paper No. 24, Geneva.

Andersen, Stephen O., K. Madhava Sarma, and Kristen N. Taddonio (2007). Technology Transfer for the Ozone Layer: Lessons for Climate Change. Earthscan: London, Sterling, VA.

Avato, Patrick and Jonathan Coony (2008). Accelerating Clean Energy Technology Research, Development, and Deployment: Lessons from Non-energy Sectors.” World Bank Working Paper No. 138.

APRODEV (2009) .“The United Nations Climate Fund - An equitable financial mechanism under the UNFCCC.” http://unfccc.int/resource/docs/2009/smsn/ngo/161.pdf

Barton, John (2007a). “Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuels and Wind Technologies.” ICTSD Trade and Sustainable Energy Series, Issue Paper No. 2, Geneva.

Best Aaron, Michael Mehling, Dominic Marcellino, Michael Perry, and Katharina Umpfenbach (2009). “Transforming Economies through Green Investment: Needs, Progress and Policies.” Ecologic Institute. (forthcoming)

Biermann, Frank and Steffen Bauer (2004). “Assessing the effectiveness of intergovernmental organizations in international environmental politics.” Global Environmental Change Vol. 14:2, pp. 189-193.

Biermann, Frank and Bernd Siebenhüner (2009). “The Influence of International Bureaucracies in World Politics: Findings from the MANUS Research Program.” In: Biermann, Frank and Bernd Siebenhüner (eds) (2009) Managers of Global Change – The Influence of International Environmental Bureaucracies. MIT Press, Cambridge, Massachusetts.

Brewer, Thomas L., (2009). “Technology Transfer and Climate Change: International Flows, Barriers and Frameworks”. In: Lael Brainard and Isaac Sorkin (eds), *Climate Change, Trade, and Competitiveness.* Washington, DC: The Brookings Institution.

Burleson, Elizabeth (2009). “Energy Policy, Intellectual Property, and Technology Transfer to Address Climate Change.” Transnational and Contemporary Problems, vol. 18.

Busch, Per-Olof (2009). “The Climate Secretariat: Making a Living in a Straitjacket.” In: Biermann, Frank and Bernd Siebenhüner (eds): Managers of Global Change – The Influence of International Environmental Bureaucracies, MIT Press, Cambridge, Massachusetts.

Climate Action Network (CAN) – International (2009). “Submission to UNFCCC Ad Hoc Working Group on Long-Term Cooperative Action Regarding Technology Cooperation and Sharing.” http://unfccc.int/resource/docs/2009/smsn/ngo/130.pdf

Cannady, Cynthia (2009). “Access to Climate Change Technology by Developing Countries: A Practical Strategy.” International Centre for Trade and Sustainable Development, Issue Paper No. 25. http://ictsd.org/downloads/2009/11/access-to-climate-change-technology-by-developing-countries-cannady.pdf

Chien, Colleen (2003). “Cheap Drugs at What Price to Innovation: Does the Compulsory Licensing of Pharmaceuticals Hurt Innovation?” Berkeley Technology Law Journal, vol. 18, no. 3. http://www.law.berkeley.edu/journals/btlj/articles/vol18/Chien.web.pdf

Copenhagen Economics A/S and The IPR Company ApS (2009). “Are IPR a Barrier to the Transfer of Climate Change Technology?” http://trade.ec.europa.eu/doclib/html/142371.htm

Corfee-Morlot, Jan, Bruno Guay and Kate M. Larsen (2009). “Financing Mitigation Support: Towards a Framework for Measurement, Reporting and Verification.” Organisation for Economic Co-operation and Development and International Energy Agency.

Correa, Carlos (2007). “Intellectual Property in LDCs: Strategies for Enhancing Technology Transfer and Dissemination.” UNCTAD, The Least Developed Countries Report 2007, Background Paper No.4.

Cosbey, Aaron, Jennifer Ellis, Mahnaz Malik and Howard Mann (2008). “Clean Energy Investment: Policymakers’ Summary.” International Institute for Sustainable Development, http://www.iisd.org/PUBLICATIONS/pub.aspx?id=998.

CRS (Congressional Research Service) (2008). “The World Bank’s Clean Technology Fund (CTF).” http://digital.library.unt.edu/govdocs/crs/permalink/meta-crs-10826:1

Danish Church Aid (2008). “Climate change and transfer of technology: Are patents part of the problem or part of the solution?” http://www.danchurchaid.org/content/download/19943/168753/file/PatentsAndClimateChange_fullReport.pdf.

Dechezleprêtre, Antoine, Matthieu Glachant, Ivan Hascic, Nick Johnstone, and Yann Ménière (2008). “Invention and Transfer of Climate Change Mitigation Technologies on a Global Scale: A Study Drawing on Patent Data.” Final Report. CERNA, Mines ParisTech.

Dechezleprêtre, Antoine, Matthieu Glachant, and Yann Ménière (2007). “The North-South Transfer of Climate-Friendly Technologies through the Clean Development Mechanism.” CERNA, Ecole des Mines de Paris. http://www.cerna.ensmp.fr/Documents/AD-MG-YM-ReportMDM.pdf

de Coninck, H., F. Haake and N.H. van der Linden (2007). “Technology transfer in the Clean Development Mechanism.” Energy Research Centre of the Netherlands.

de Morais, Rafael Pinho Senra (2009). “Compulsory Licensing of Drugs, Parallel Imports and Price Controls.” Getulio Vargas Foundation. http://www.econ.puc-rio.br/pdf/seminario/2009/article3.pdf.

Diringer, Elliot (2009). “Technology Transfer in a New Global Climate Agreement.” http://www.brookings.edu/papers/2009/~/media/Files/rc/papers/2009/09_climate_change_poverty/09_climate_change_poverty_diringer.pdf

Haites, Erik, Maosheng Duan, und Stephen Seres (2006). “Technology transfer by CDM projects.” Climate Policy 6, no. 3: pp. 327-344.

Hattori, Keisuke (2007). “Policy and Product Differentiations Encourage the International Transfer of Environmental Technologies.” MRPA Paper. http://mpra.ub.uni-muenchen.de/6334/

Helm, Carsten and Detlef Sprinz (2000). “Measuring the effectiveness of International Environmental Regimes.” Journal of Conflict Resolution, vol. 44, no. 5, pp. 630-652.

Herz, Steve (2009). “The Clean Technology Fund and Coal: A Cautionary Tale for Copenhagen.” Sustainable Development Law & Policy IX, no. 3, pp. 21-24.

Houser, Trevor (2009). “The Economics of Energy Efficiency in Buildings.” Peterson Institute for International Economics: Washington D.C. Policy Brief, No. PB09-17.

Hutchison, Cameron (2006). “Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?” University of Ottawa Law & Technology Journal, vol. 3. http://ssrn.com/abstract=1019365

ICC (International Chamber of Commerce) (2009). “ICC Submission on the Review and Assessment of the Effectiveness on the implementation of Article 4, Paragraph 1(c) and 5, of the Convention.” http://unfccc.int/resource/docs/2009/smsn/ngo/126.pdf

ICTSD (International Centre for Trade and Sustainable Development) (2008) “Climate Change, Technology Transfer and Intellectual Property Rights.” Background Paper to Trade and Climate Change Seminar, June 18-20, 2008, Copenhagen, Denmark.

Inomata, Tadanori (2008). Management Review of Environmental Governance Within The United Nations System. UN Joint Inspection Unit, Geneva.

IEA (International Energy Agency) (2001). “Technology without borders: Case studies of successful technology transfer.” UNEP and Climate Technology Initiative. http://www.iea.org/textbase/nppdf/free/2000/ctifull2001.pdf.

IPCC (Intergovernmental Panel on Climate Change) (2000). “IPCC Special Report: Methodological and Technological Issues in Technology Transfer – Summary for Policymakers.” Special Report of IPCC Working Group III. http://www1.ipcc.ch/ipccreports/sres/tectran/index.htm

Japan Business Federation (2009). “Japan Business Federation (Nippon Keidaren)’s Views on the Review and Assessment of the Effectiveness on the implementation of Article 4, Paragrpah 1(c) and 5, of the Convention. http://unfccc.int/resource/docs/2009/smsn/ngo/125.pdf

Kaasa, Stine Madland (2007). “The UN Commission on Sustainable Development: Which Mechanisms Explain Its Accomplishments?” Global Environmental Politics. vol. 7, no.3.

Kaminskaite-Salters, Giedre, Mattia Romani et al. (2009). “Meeting the Climate Challenge: Using Public Funds to Leverage Private Investment in Developing Countries.” Grantham Institute for Climate Change and the Environmenta at the London School of Economics. http://www2.lse.ac.uk/granthamInstitute/MeetingtheClimateChallenge.aspx

Kanwar, Sunil and Robert Evenson (2003). “Does intellectual property protection spur technological change?” Oxford University Press. Oxford Economic Papers 55, pp. 235-264.

Keller, Wolfgang (1996) “Absorptive capacity: On the creation and acquisition of technology in development.” Journal of Development Economics, Vol. 49. 199-227.

Kelly, Lauren (2004). “The Multilateral Fund for the Implementation of the Montreal Protocol - Addressing Challenges of Globalization: An Independent Evaluation of the World Bank’s Approach to Global Programs - Case Study.” World Bank, Washington D. C.

Lee, Bernice, Ilian Iliev and Felix Preston (2009). “Who Owns Our Low Carbon Future?: Intellectual Property and Energy Technologies.” Chatham House. www.chathamhouse.org.uk/files/14699_r0909_lowcarbonfuture.pdf

Love, James (2007). “The Big Idea: Prizes to Stimulate R&D for New Medicines.” Knowledge Economy International Research Paper 2007:1

Maskus, Keith (2004). “Encouraging International Technology Transfer.” UNCTAD-ICTSD Projects on IPRs and Sustainable Development. Issue Paper No. 7.

McKinsey & Company (2009). “Pathways to a Low-Carbon Economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve.”

Meyer, A. et al., (2009). “A Copenhagen Climate Treaty Version 1.0: A Proposal for a Copenhagen Agreement by Members of the NGO Community” http://unfccc.int/resource/docs/2009/smsn/ngo/157.pdf

Meyer-Ohlendorf, Nils and Christiane Gerstetter (2009). “Trade and Climate Change - Triggers or Barriers for Climate Friendly Technology Transfer and Development?” Dialogue on Globalization

Occasional Papers No 41. Friedrich Ebert Stiftung: Berlin. http://library.fes.de/pdf-files/iez/global/06119.pdf

Mildford, Lewis, Daniel Dutcher, Todd Baker (2008). “Climate Choreography: How Distributed and Open Innovation Could Accelerate Technology Development and Deployment.” Clean Energy Group. http://www.cleanegroup.org/Reports/Climate_Choreography_July08.pdf

Miles, Edward (2002). “Environmental regime effectiveness.” MIT Press: Cambridge, Massachusetts.

MLF (2009a). “Multilateral Fund to the Montreal Protocol: Achievements.” http://www.multilateralfund.org/achievements.htm

MLF (2009b). “Multilateral Fund to the Montreal Protocol: Implementing Agencies.” http://www.multilateralfund.org/implementing_agencies.htm

MLF (2009c). “Multilateral Fund for the Implementation of the Montreal Protocol: Policies, Procedures, Guidelines and Criteria (As at July 2009).” http://www.multilateralfund.org/files/Policy58.pdf

Najam, Adil, Mihaela Papa and Nadaa Taiyab (2006). “Global Environmental Governance – A Reform Agenda.” IISD: Winnipeg.

Nakhooda, Smita (2009). “Catalyzing Low Carbon Development? The Clean Technology Fund.” Working Paper. World Resources Institute: Washington, D.C. http://pdf.wri.org/working_papers/catalyzing_low_carbon_development.pdf

Nanda, Nitya (2009). “Diffusion of Climate Friendly Technologies: Can Compulsory Licensing Help?” Journal of Intellectual Property Rights, vol. 14, no. 3: pp. 241-246.

Nanda, Nitya and Nidhi Srivastava (2009). “Clean Technology Transfer and Intellectual Property Rights.” Sustainable Development Law & Policy, vol. 9, no. 3.

Olsen, Karen Holm (2007). “The clean development mechanism’s contribution to sustainable development: a review of the literature.” UNEP Risø Centre: Roskilde. www.cd4cdm.org/Publications/CDM&SustainDevelop_literature.pdf

Park, Walter and Douglas Lippoldt (2008). “Technology Transfer and the Economic Implications of the Strengthening of Intellectual Property Rights in Developing Countries.” OECD Trade Policy Working Papers, No. 62, OECD Publishing.

Porter, Gareth, Nanki Kaur, Leo Peskett, and Neil Bird (2008).”New Finance for Climate Change and the Environment.” World Wildlife Fund/Heinrich-Böll-Foundation: Washington, D.C.

Project Catalyst (2009). “Scaling up Climate Finance: Finance briefing paper, September 2009.” http://www.project-catalyst.info/images/publications/climate_finance.pdf

Reichman, Jerome, Arti Rai, Richard Newell and Jonathan Wiener (2008). “Intellectual Property and Alternatives: Strategies for Green Innovation.” Chatham House. Energy, Environment and Development Programme Paper: 08/03.

Rooke, Anna (2009). “Doubling the Damage: World Bank Climate Investment Funds Undermine Climate and Gender Justice.” Policy Paper. Heinrich-Böll-Foundation. http://www.genderaction.org/images/2009.02_Doubling%20Damage_AR.pdf

Schneider, Lambert (2007). “Is the CDM fulfilling its environmental and sustainable development objectives? - An evaluation of the CDM and options for improvement.” Öko-Institut: Berlin. www.oekoinstitut.de/oekodoc/622/2007-162-en.pdf

Schneider, M., A. Holzer and V. Hoffmann (2008). “Understanding the CDM’s Contribution to Technology Transfer.” Energy Policy. 36: pp.2930– 2938.

Seres, Stephen (2008). “Analysis of Technology Transfer in CDM Projects.“ Prepared for the UNFCCC Registration & Issuance Unit CDM/SDM

Shelton, Dinah (ed.) (2000). “Commitment and Compliance: The Role of Non-binding Norms in the International Legal System.” Oxford University Press: New York.

Staley, Britt Childs and Casey Freeman (2009). “Tick Tech Tick Tech: Coming to Agreement on Technology in the Countdown to Copenhagen”. WRI Working Paper. World Resources Institute: Washington D.C. http://www.wri.org/publication/tick-tech-tick-tech

Stern Review: Executive Summary (2005). “Stern Review: The Economics of Climate Change.” http://www.hm-treasury.gov.uk/d/Executive_Summary.pdf

Stokke, Olav Schram, Jon Hovi, and Geir Ulfstein (ed.) (2005). “Implementing the Climate Regime.” Earthscan: London, Sterling, VA.

Tomlinson, Shane, Pelin Zorlu and Claire Langley (2008). “Innovation and Technology Transfer: Framework for a Global Climate Deal - Executive Summary.” E3G and Chatham House. http://www.e3g.org/images/uploads/E3G_Innovation_and_Technology_Executive_Summary.pdf

Toole , Andrew and Calum Turvey (2007). “How does initial public financing influence private incentives for follow-on investment in early-stage technologies?” Journal of Technology Transfer, 34: 43-58.

Underdal, Arild (2002). “Conclusions – Patterns of Regime Effectiveness”. In: Edward Miles (ed): “Environmental regime effectiveness.” MIT Press: Cambridge, Mass.

UNFCCC (2007). “Investment and Financial Flows to Address Climate Change.” http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/background_paper.pdf

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/INF.2

Unruh, Gregory J. (2000). “Understanding Carbon Lock-in.” Energy Policy, vol. 28, issue 12. p. 817-830.

U.S. Chamber of Commerce (2009). “U.S. Chamber of Commerce’s Global Intellectual Property Center and Institute for 21st Century Energy submission to the UNFCCC.” http://unfccc.int/resource/docs/2009/smsn/ngo/124.pdf

Wettestad, Jørgen (1999). “Designing effective environmental regimes.” Edward Elgar Publishing: Cheltenham, UK.

Wettestad, Jørgen (2005). “Enhancing Climate Compliance – What are the Lessons to Learn from Environmental Regimes and the EU? “ In: Stokke, Hovi, Ulfstein (eds.) “Implementing the Climate Regime: International Compliance.” Earthscan: London.

Wiser, Glenn M. (1999). “Compliance Systems Under Multilateral Agreements: A Survey for the Benefit of Kyoto Protocol Policy Makers.” Center for International Environmental Law, Washington, D.C.

World Bank (2008). “Clean Technology Fund: Guidelines for Investment Plans.” The World Bank. http://siteresources.worldbank.org/INTCC/Resources/GuidelinesInvestmentPlansDec1_08.pdf

World Bank (2008a). “Governance Framework for the Clean Technology Fund.” The World Bank. http://siteresources.worldbank.org/INTCC/Resources/CTF_Governance_Framework_jan.pdf

World Bank (2009). Climate Investment Funds "Climate Investment Funds, Financial Status as of January 26, 2009." The World Bank.
http://siteresources.worldbank.org/INTCC/Resources/CIF_Financial_Status_Jan_26_2009.pdf

World Business Council for Sustainable Development (2009). "Energy Efficiency in Buildings: Transforming the Market."
http://www.wbcsd.org/DocRoot/E1erYPqD60xOaOlAdV5V/91719_EEBReport_WEB.pdf

WRI/E3G (2009) (Seligsohn, Deborah, Lutz Weischer, Shane Tomlinson and Pelin Zorlu). "Key Functions for a UNFCCC Technology Institutional Structure: Identifying Convergence in Country Submissions." World Resources Institute and E3G Working Paper, November 2009.
http://pdf.wri.org/working_papers/key_functions_for_a_unfccc_technology_institutional_structure.pdf

WTO (World Trade Organization) (2003). "Implementation of paragraph 6 of the Doha Declaration on the TRIPS Agreement and public health, Decision of the General Council of 30 August 2003." World Trade Organization. http://www.wto.org/english/tratop_e/trips_e/implem_para6_e.htm

WTO (World Trade Organization) (2009). "Members accepting amendments of the TRIPS Agreement." World Trade Organization.
http://www.wto.org/english/tratop_e/trips_e/amendment_e.htm

WWF (2008) (World Wildlife Fund and E3G). "Technology Action Programs as a way forward."
http://unfccc.int/resource/docs/2009/smsn/ngo/133.pdf