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Editor's note

Post-Kyoto

Technology Transfer Bonus

With the first meeting of the *Ad Hoc Working Group on Long-term Cooperative Action under the Convention* (held in Bangkok, 31 March - 4 April 2008), a first formal step has been taken to convert the *Bali Action Plan* into a formal post-Kyoto climate policy regime. At this early stage of the negotiation process, I would like to explore how and to what extent the eventual agreement (to be decided upon at COP-15 in Copenhagen in 2009) may differ from the current Kyoto Protocol regime.

To start with, there are a number of important elements in the Bali-text of 15/12/2007 that may be helpful in achieving a breakthrough. Firstly (in 1.b.i and ii), it says that (*italics* are mine): "The COP…decides to launch a comprehensive process…in order to adopt a *decision*…, by addressing, inter alia…Enhanced national and international action on mitigation of climate change, incl., inter alia, *consideration of*: measurable, reportable and verifiable nationally appropriate mitigation *commitments or actions*, incl. QELROs, by *all* developed country Parties, while ensuring the *comparability* of efforts among them, taking into account differences in their national circumstances; [and]… measurable, reportable and verifiable nationally appropriate mitigation *actions* by developing country Parties in the context of sustainable development, and *supported by technology and enabled by financing* and capacity-building".

In other words, the UNFCCC principle of *common but differentiated responsibilities* is now expressed in the distinction between the goal to agree on preferably quantifiable, verifiable and comparable *commitments or actions* for all industrialized Parties on the one hand, and (only) *actions* for developing country Parties on the other hand. The latter, however, must be *supported* by technology and *enabled* by financing.

This delicate distinction in the wording between what is expected from *all* (!) industrialised Parties versus what is expected from developing countries obviously raises several interpretation issues. For instance: what the difference is between commitments and actions; how to interpret comparability; or, what 'to support' and 'to enable' means when it comes to developing country actions? Moreover, whether the wording 'verifiable' in 1.b.ii (when it comes to developing countries' mitigation action) relates to developing country actions only or also to activities to support those actions does not seem to have been settled completely.

Secondly, in 1.b.iii the Bali Action Plan contains the phrase "…consideration of: …positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries…" In other words, the phenomenal problem of CO_2 emissions related to tropical deforestation/ forest degradation and land use has become a topic of current negotiations. This may allow for demonstration projects, international support and other incentives for countries that typically face such problems on their territory. An obvious question is whether and how activities to halt deforestation and forest degradation could eventually become creditable in the future system in one way or another.

Thirdly, in 1.c.i, "International cooperation to support urgent implementation of adaptation actions…taking into account…needs of developing countries that are particularly vulnerable…" has been announced. In other words, the Adaptation Fund, which was already foreseen under the Kyoto Protocol, will become operational and governed by a Board of 16 members. Its main funding comes from CDM project levies and projects can be submitted with specific attention to vulnerable developing countries. In general, however, many aspects

In this issue

regarding the role of adaptation in the next climate regime still need to be sorted out.

Finally, in 1.d and 1.e, respectively, the text mentions "Enhanced action on technology development and transfer to support action on mitigation and adaptation" and "…on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation…" as needs to be addressed in the final Agreement. These paragraphs show negotiators' right intention to add more substance to UNFCCC Art. 4.5 ("…to promote facilitate, and finance as appropriate the transfer of, or access to, environmentally sound technologies and know how to…particularly Developing Country parties to enable them to implement the provisions of the Convention") than under the Kyoto Protocol where North-South technology transfers are mainly limited to the CDM.

The next main hurdle is probably the most important one: under what conditions would developing countries, and notably the rapidly industrialising countries among them, be prepared to take mitigation action? The discussion may well be narrowed to the question whether and to what extent developing countries might want to take such actions *without full (or at least very significant) external technical and financial support*. There could be two opposing views. On the one hand, industrialised countries could argue that one could hardly speak of mitigation (or adaptation?) *action* of a country if the same country would only be prepared to take such action on the condition that it is based on full (or at least very considerable) compensation from elsewhere. On the other hand, developing countries could argue that such compensation would be the logical impact of the principle of common but differentiated responsibilities, and, for that matter, the text of the Bali Action Plan. How to reconcile such opposing views?

Conference center Bangkok for AWGLCA & AWG sessions

photo:
By courtesy of IISD/Earth Negotiation Bulletin

Although the G-77&China tried to establish a Technology Transfer Fund, next to the Adaptation Fund, during the Bali negotiations, one finally had to accept that only a Technology Leverage Programme is carried out to list financing needs and opportunities for climate friendly technologies and to develop performance indicators to, among others, assess effectiveness of technology transfers.

How to achieve a breakthrough?

The next question is if the Bali text offers enough to achieve a quick breakthrough towards a new global climate regime. Most experts agree that any post-Kyoto regime is of fairly limited mitigation value if the USA is not on board in a way comparable to the EU and Japan, and if the rapidly industrialising countries are not action wise involved. Seen from that perspective, the wording of the Bali Action Plan seems promising.

Probably, the answer is to look for positive externalities and share the benefits. The good thing about externalities is that they provide a welfare bonus that seemingly does not have to be paid for. And they are everywhere. For example: the USA could help *e.g.* China retrofit coal-based power production, which would serve the future export interests of US industry whereas China would benefit from reduced local air pollution as a bonus. Japan could support *e.g.* Mexico in setting up new solar systems with Japanese companies generating extra jobs, whereas Mexico could spend less on oil imports, *etc*. India could let European firms partly finance the upgrading of its boilers in a specific region and use this experience to successfully implement the same technology elsewhere in the country, *etc*. In other words, the best way to get both the USA and industrialising developing countries on board with meaningful participation is to look for opportunities that provide sufficient net positive externalities for both sides to go along with substantial next steps.

If this view is correct, the next climate regime probably requires a much stronger focus on incentives and conditions for low-carbon technology transfers, including measuring their short- and long-term, direct and indirect sustainable development impact than in the Kyoto Protocol. Technology transfer, in that view, would have to count as a commitment (or action) for both sides, as well as provide benefits for both (both economically and environmentally).

Strikingly, research on the true welfare impact (*i.e.* mitigation effect and present and future externalities) of introducing specific new low-carbon technologies has been fairly limited. In fact, the CDM process neither prescribes such an extensive technology impact assessment. Under the CDM, the main focus has thus far been on precisely measuring the direct mitigation impact of projects for a limited period while leaving the sustainability test (including technology transfer and implementation benefits) to the host country government with no guidance from the CDM EB.

Obviously, it could be argued that a climate regime based on technology transfer and implementation action is much less exact than what we have been used to under the Kyoto regime. This may be a scary idea for those who want exact numbers for their credit bookkeeping systems. But would we not be better off if we were less precise on relevant issues than precise on the less relevant ones? In other words, should technology transfers and their mitigation impact play a more substantial role under 'Bali' than under 'Kyoto', one will have to accept that commitments or committed actions will be less easily quantifiable (in fact, for compliance purposes one could consider distinguishing between commitments/actions that can be quantified fairly exactly as with the current CDM, on the one hand, and 'best-professional-judgement-based-qualified' commitment/action, on the other hand).

Enabling environment

A major advantage of a larger focus on technology transfer as a compliance element is that it needs action from both the technology supplying country and the 'recipient' country. Literature on technology transfer shows that the introduction of relatively new technologies into a country (or system) can only be successful if there is an enabling environment in terms of policy conditions, administrative capacity, stakeholder involvement and commitment, *etc*. In fact, development co-operation experience has shown that in the absence of careful preparation, well-intended technology transfer programmes easily turn into 'white elephants' because the preparedness of the recipient countries to effectively and efficiently use such technologies in the local circumstances has insufficiently been assessed beforehand. This has recently been supported by the EU-funded ENTTRANS study (which has systematically addressed for five developing countries which factors need to be considered for successful technology transfers; see pp. 4-6 in this issue).

Therefore, should a strong focus on technology transfer as a compliance tool for both the transferring Party (providing the technology and learning devices) and the recipient Party (ensuring that the technology can be implemented successfully) become a core element on the path towards 'Copenhagen-2009', it is important to develop methods to help countries assess their energy service needs, select sustainable low-carbon technologies suitable for meeting those needs, and subsequently streamline implementation chains for these technologies. It would also require rules to avoid international 'dumping' of non-sustainable technologies.

In conclusion, a future climate regime based on low-carbon technology transfer goals (commitments) would require *actions* from both technology supplying and recipient countries. It is important that the work programme discussed in Bangkok for 2008-2009 for AWGLCA and AWG negotiations will enable countries to eventually combine the GHG mitigation impact of low-carbon technology transfers with the sustainable development bonus that such transfers would bring, in an effective and globally fair manner.

Catrinus Jepma
Chief editor

Report of Negotiations in Bangkok

A summary and report of the first session of the *Ad Hoc* Working Group on Long-Term Cooperative Action and the fifth session of the *Ad Hoc* Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol, held in Bangkok (Thailand) on 31 March - 4 April of this year, has been prepared by the *Earth Negotiations Bulletin*, International Institute for Sustainable Development (IISD), Vol.12, No. 362, Monday 7 April 2008, Available at http://www.iisd.ca/climate/ccwg1/

ENTTRANS

Promoting Sustainable Energy Technology Transfers to Developing Countries through CDM

In December 2007 the EU FP6 activity "Promoting Sustainable Energy Technology Transfers to Developing Countries through the CDM" (ENTTRANS) was completed. The ENTTRANS study was carried out by a 10-partner consortium during 2006-2007. In earlier JIQ issues, there were reports on the intermediate results of the study. This article discusses the overall findings.

Aim of the study

The main aim of ENTTRANS was to explore how the CDM could help support transfers of low-carbon, sustainable energy technologies to developing countries. The starting point for the analysis was to address the energy service needs and priorities of five case study countries (Chile, China, Israel, Kenya, and Thailand), the low-carbon technologies to fulfill these needs and priorities, and which sustainable development benefits these technologies would deliver. These assessments were managed by partners from each country and in consultation with country stakeholders (see below).

Methodology

For this analysis, a questionnaire was developed and used in interviews with stakeholders (about 30 in each country). Each question could be answered by giving ranks from 1 (low priority, suitability, *etc.*) to 5 (very high priority, suitability, *etc.*). Respondents were also asked to justify their ratings. The ranking method used is a cardinal interval scale, which means that respondents were not asked to rank services in order of priority (as with ordinal scale), but to give their opinions in terms of how important a particular energy service is for the country or how suitable they think a particular technology would be. In order to facilitate stakeholder assessments, the ENTTRANS consortium also prepared 38 descriptions of sustainable energy technologies which stakeholders could use as background material while filling out the questionnaire.

The interviewees were compiled from stakeholder lists developed in conjunction with country partners and were selected to include representatives from: government departments with responsibility for energy, environment and development; local governments; representative national and international companies or bodies in other GHG intensive sectors; companies, industry and financial institutions involved in the manufacture, import and sale of environmentally sound technologies; international organizations and donors; NGOs involved with the promotion of environmental and social objectives; institutions that provide technical and scientific support to both governments and industry, *e.g.*, academic organizations, industry R&D, think tanks, consultants, local community representatives, *etc.*

This survey was also grounded in a country-context analysis conducted by the ENTTRANS team which described the countries' economic and energy sector situation and its medium to long-term development strategy.

During the second year of ENTTRANS (June-August 2007), national workshops were held in the countries (see picture on p.6) to provide feedback to national stakeholders and to explore how the CDM could support development needs and priorities in the medium to long run using a market mapping approach[1]. The workshops also provided an opportunity to analyze technology transfer systems for a number of simulation projects to see which steps are needed throughout the implementation chains within the countries to successfully implement sustainable, and in several cases new technologies.

General observations

Given the range of technologies to meet the energy service needs presented to respondents, it was obvious from the interviews in all countries that there were technologies with potential for low-carbon application in the country which were being given a low score and therefore did not appear in the lists of preferred technologies. Consideration of the factors influencing these scores from the interviews showed that there is a range of factors influencing the assessments made:

- **Awareness**: There were large gaps in people's awareness of a range of potentially useful

[1] Albu M. and A. Griffith, 2005, Mapping the Market: A framework for Rural Enterprise development policy and practice, Practical Action report, available at: http://practicalaction.org/?id=mapping_the_market

technologies. Some respondents had never heard of some technologies or did not know anything about specific technologies, *e.g.* what it could deliver and whether it was available. Consequently, a bias was identified due to low scores caused by a lack of information on which to make an assessment. Discussions with respondents indicated that even if they knew something about the new technologies, they would need to see a project technology type actually up and running in the context of their own country before they could commit to considering it for future implementation.

- **Perception of costs:** There also seemed to be an automatic assumption for developing countries that technologies which had not been used in their context before were more expensive than existing technologies and presented more risk. These technologies were therefore again not rated highly for that reason.
- **Historic experience:** If a new technology had been badly implemented for whatever reason, then this created an automatic bias against it for some respondents.
- **Power in the market and resistance to innovation:** Many existing systems tend to be grid electricity oriented and employ power engineers who are used to this system. As a result, the ENTTRANS team has found that the power engineers and those concerned in existing large energy supply companies are usually unwilling to consider decentralised energy production and may feel threatened by it. Conversely, respondents in the solar industry tend to bias their replies towards solar.
- **Cultural aspects** are also important in the success of technology transfer. For example, in Kenya it was found that a solar cooker pilot programme was not a success because people did not like to cook outside. They did not want others to see what they were cooking and there were problems of dust and dogs, *etc*. Also people usually eat in the evening, so the timing of the availability of solar cooking technology is not compatible with their lifestyles.

ENTTRANS recommendations

The results indicate that for establishing a CDM project with an optimal combination of GHG emission reduction and transfer of technologies to fulfill host countries' energy service needs and priorities, due attention has to be paid to the existing country energy context. This can be seen in the contrast between stakeholders in China and Kenya in terms of interest in different technologies. For China, the priority technologies are determined by the existing emphasis on coal power stations to meet energy needs, but in Kenya priority technologies cover a much broader range and are also more concerned with poverty alleviation. Energy efficiency in industry is recognized as a priority across all countries.

The experience with the CDM has shown an uneven distribution of projects among developing countries so far. It is clear from the analysis that opportunities to move to a low-carbon energy service supply are missed. This lack of confidence in the practicality and affordability of low carbon technologies in the country context and in the necessary timescales presents a major barrier for a low carbon future.

In order to improve countries' ability to adopt low-carbon energy technologies and host CDM projects, the approach developed by ENTTRANS helps countries identify which technologies would be most suitable for their sustainable development objectives and improve the implementation chains for such technologies. With this approach policy makers and stakeholders in developing countries can be assisted in increasing awareness of the different ways of satisfying the various energy services required such as heat, electricity, light, cooking, *etc*., as not everything should

Box 1. ENTTRANS Consortium partners

1 Foundation Joint Implementation Network	JIN	The Netherlands
2 University of Edinburgh	UEDIN	UK
3 Asian Institute for Technology	AIT	Thailand
4 Public Power Corporation S.A.	PPC	Greece
5 ICTAF - Tel Aviv University	ICTAF	Israel
6 EPU-National Technical University of Athens	EPU-NTUA	Greece
7 Intermediate Technology Development Group East Africa	ITDG EA	Kenya
8 Cambio Climático y Desarollo Consultores	CC&D	Chile
9 Energy Delta Institute	EDI	The Netherlands
10 Kunming University of Science and Technology	KUST	China

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or need be supplied by electricity generated with 30-40% efficiency.

The ENTTRANS study results indicate that widening the technology experience of decision makers could be assisted by more programmes of low-carbon energy demonstration projects in the country contexts coupled to more support activities for technology transfer including formation of networks. These would improve awareness and trust in new low-carbon technologies and could provide opportunities for the many barriers and blockages in the country systems to be worked through with concerted action from all the market actors.

An important role for the CDM in this respect could be that it could show the working of new technologies through the implementation of projects through which unfamiliar technologies could be demonstrated within a host country. This would improve the process of new knowledge being fed into countries' decision-making process. In particular, since financing small-scale projects is not an easy process, as they do not conform to large-scale investment criteria under the CDM, small-scale activities could be bundled as programmes.

If the focus for CDM projects is turning more to the delivery of sustainability benefits, then the implementation strategy for a project is key to the delivery of those benefits. Under these conditions there is much more alignment with the aims of development agencies. It is therefore worth considering that additional finance, especially for the implementation strategies of small-scale project programmes, could be obtained from a marriage of CDM with development initiatives.

This is normally considered unacceptable under the financial additionality criterion, which says that projects must be additional to ODA. However, projects would still be additional to ODA, as ODA funding would be used for the implementation package associated with the project technology and not for the project itself.

Another idea is to determine the additionality of GHG emission reductions from CDM projects in a more positive way by linking additionality status to the additional funding needed for implementation activities, *e.g.*, participation, training, infrastructure, *etc.*

The problem of a more equitable distribution of projects is rooted in the need to have more projects including more small-scale projects in the less developed countries in Africa and Asia and Latin America. The suggestions above are designed to help the policymakers in the country look at the delivery of energy services and appropriate technologies to develop portfolios of CDM project technologies set within an energy service low carbon strategy for the country taking account of contribution to sustainable development. The CDM could then move countries forward in line with their development strategies and needs, rather than the CDM being a random set of arbitrary projects with no coherent direction or delivery of real benefits.

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By Lennard de Klerk*

Methodological Approach Towards Incremental Cement Production

In many developing countries and countries with economies in transition (EIT), cement demand has increased significantly over the years. This requires the construction of new ('greenfield') cement factories or the extension of existing cement plants. In EIT countries, such as Ukraine and Russia, the extension of the production capacity often goes hand in hand with the (partial) replacement of wet kilns cement production technology with semi-dry or dry kilns technology. Since such investments lead to a more efficient cement production and therefore to a reduction of GHG emissions, they could qualify as JI or CDM projects. This article explains how for both types of capacity increase JI/CDM project baselines could be determined.

> **Box 1. Baselines for incremental production or capacity**
>
> At its 8th Session, the CDM EB decided on baselines for incremental production or capacity as follows:
>
> *10. If a proposed CDM project activity seeks to retrofit or otherwise modify an existing facility, the baseline may refer to the characteristics (i.e. emissions) of the existing facility only to the extent that the project activity does not increase the output or lifetime of the existing facility. For any increase of output or lifetime of the facility, which is due to the project activity, a different baseline shall apply.* (EB08: Clarification on issues relating to baseline and monitoring technologies)

Basically, when a project replaces existing capacity with more efficient capacity, then the baseline could be derived from the characteristics of the existing facility. However, things are different when a project aims at increasing existing capacity. In that case, the baseline must reflect how the capacity increase would otherwise have taken place. The CDM EB at its 8th meeting has provided guidance on how to deal with capacity increase projects (further referred to as incremental production or capacity, see Box 1). Below, this guidance is further worked out for JI/CDM projects aiming at incremental production/capacity in the cement sector.

Baseline scenario versus baseline emissions

Under JI/CDM any baseline methodology requires that project participants, first, list all investment options available for the service envisaged under the project. From this point on, possible baseline scenarios are identified and, finally, the most credible and/or conservative baseline scenario is selected.

The methodological baseline approach proposed in this article assumes that these three steps are implemented and that the outcome of the baseline scenario is a continuation of the existing situation plus the displacement of other cement facilities for the incremental cement production. This methodology assumes that in absence of the proposed project, the cement would partly be produced by the existing facility and partly by a third-party[1]. A first step in this proposed methodology is to define the existing[2] capacity (either clinker or cement capacity[3]), which requires that the technical lifetime of the existing kilns lasts at least until the end of the crediting period of the project.

The clinker production in the baseline scenario at the existing facility is calculated as follows:

$$CLNK_{exist,y} = CLNK_{actual,y} \text{ with a maximum of } CLNK_{existcap}$$

Where:

- $CLNK_{exist,y}$ - Clinker production in the baseline scenario at the existing kilns in year y [t clinker]
- $CLNK_{actual,y}$ - Clinker production in the project scenario in year y [t clinker]
- $CLNK_{existcap}$ - Clinker production *capacity* of the existing kilns [t clinker]

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1 Note that distinction is made between *production capacity and cement production*. Production capacity is maximum amount of cement (or clinker) that can be technically produced. The production of cement is defined as the actually monitored production of cement in a particular year in the project scenario.

2 If any mothballed and/-or decommissioned kilns exist at the plant, these capacities can only be taken into account if a recommissioning does not require significant investments or face prohibitive barriers.

3 The production capacity of a cement plant is mainly defined by the clinker capacity of the kilns. Therefore, it is recommended to establish the production capacity for clinker.

It is assumed that in the baseline scenario the existing facility would operate at maximum capacity if the actual production in a particular year exceeds the existing capacity. The baseline emissions of the existing capacity are calculated by fixing the specific emissions of the existing kiln using a three-year average prior to project start. Depending on the project boundary, the electricity consumption, calcination, and/or fuel emissions have to be taken into account, this results in the following baseline for incremental cement production:

$CLNK_{incre,y} = CLNK_{actual,y} - CLNK_{existcap}$,

if $CLNK_{actual,y} > CLNK_{existcap}$

Where:

$CLNK_{incre,y}$ -	Incremental clinker production in the baseline scenario in year y [t clinker]
$CLNK_{actual,y}$ -	Clinker production in the project scenario in year y [t clinker]
$CLNK_{existcap}$ -	Clinker production *capacity* of the existing kilns[t clinker]

In order to determine these baseline emissions, it must be identified at which plants the incremental production would have taken place in absence of the JI/CDM cement project. These plants could either be[4]:

1. Another cement plant, which exists in year y and which would produce the incremental amount of cement (Operating Margin or OM); or
2. A new cement plant built before year y (Built Margin or BM).

The cement industry is a transparent market where standardized types of cement products exist. Within a certain region or country, cement can be transported from any producer to any consumer. Consequently, since the incremental cement could, in the absence of the project, have been purchased from any cement producer in the country or region, it is not possible to precisely identify which plant would appear in the 'operating or built margin'.

Emissions of another existing cement plant (OM)

Therefore, instead, the most transparent approach for determining the OM is to calculate the weighted average of specific CO_2 emissions of cement plants in a specific region[5]. This requires that all cement plants in a region[6] are monitored[7] each year. The result will be a factor expressed in tCO_2/tonne cement.

The OM is calculated with the following components: CO_2 emissions due to fuel consumption; emissions due to calcinations, and emissions caused by electricity consumption.

$$OM_y = \frac{EF_{el,y} x EL_y + 0.525 x CLNK_y + \sum_i EF_{fuel,i} x NCV_{fuel,i} x FUEL_{i,y}}{CEM_y}$$

Where:

OM_y	-	OM of cement production in year y [tCO_2/t cement]
$EF_{el,}$	-	Baseline grid factor in year y [tCO_2/MWh]
EL_y	-	Electricity consumption cement sector in year y [MWh]
0.525	-	Calcination emissions [tCO_2/t clinker][8]
$CLNK_y$	-	Total clinker production in region in year y [tonne]
$EF_{fuel,i}$	-	Carbon emission factor of kiln fuel i [tCO_2/GJ]
$NCV_{fuel,i}$	-	Net calorific value of kiln fuel i [GJ/t or 1000 m^3]
$FUEL_{i,y}$	-	Total fuel consumption of kiln fuel i [t or 1000 m^3]

Emissions of a new cement plant (BM)

Alternatively, in the absence of the project, a competitor could decide to build a new cement plant or extend an existing cement plant to meet the market demands. Under the CDM, the methodology ACM0002 has been developed for similar BM circumstances in the power sector: the most recent capacity additions to the electricity grid are to be taken into account comprising 20% of the installed capacity. This approach is very well applicable for regions where cement plants have recently been built. However, it would not work in the cement sector in Ukraine or Russia as hardly any capacities have been added in the past decades, so that cement factories built more than 30 years ago would appear in the built margin.

In such cases, the most *conservative* approach would be to assume that a cement plant would be built taking the Best Available Technology (BAT) in the region. The most important factor is to decide which production technology would be used (wet, semi-dry or dry). The selection of a

4 A similar situation exists in an interconnected electricity grid where electricity can be transported from the producer to the consumer. Giving the similarity, the following approach is based on the underlying principles of ACM0002, which deals with additional power production capacities to be connected to an interconnected electricity grid.

6 All cement plants in this context excludes cement plants hosting registered JI or CDM projects.

6 Region is defined here as all cement plants within a 200 km distance or with at least 10 cement plants.

7 CDM methodologies for the cement sector give certain guidance *as for* how to define a region.

8 The calcination factor taken here is a default factor. If more detailed data exist, the calcination factor should be based on this detailed information.

process depends on the moisture content of the available material in the region. A survey of the moisture content of the available raw material will have to be performed. Based on this survey, a combination of dry and semi-dry processes[9] should be taken. If such a survey is not available, or if the moisture content of all available raw materials is sufficiently low, a dry process has to be selected. The result is a kiln efficiency factor [GJ/t clinker] under the BM.

In order to determine the CO_2 emissions, the following factors will have to be established:

- fuel mix used as kiln fuels;
- the clinker factor;
- the specific electricity consumption.

As an assumption, the fuel mix in the BM will be identical to the fuel mix observed in a certain year in the region. The same applies to the clinker factor if it does not depend on the process type (semi-dry or dry) but, instead, on the observed factor in the region in year y. The specific electricity consumption should be taken as BAT for the selected process type (semi-dry or dry).

The BM factor is then calculated as follows:

$$BM_y = EF_{el,y} x EL_{BM,y} + CLNKFAC_y x 0.525 + EF_{fuelav,y} x KE_{BAT} x CLNKFAC_y$$

where:

BM_y	-	Specific emission of cement production in year y [tCO_2/t cement]
$EF_{el,y}$	-	Baseline grid factor in year y [tCO_2/MWh]
$EL_{BM,y}$	-	BAT specific electricity consumption [MWh/t cement]
CLNKFAC	-	Average clinker factor monitored in region in year y [t clinker/t cement]
0.525	-	Calcination emissions [tCO_2/t clinker]
$EF_{fuelav,y}$	-	Weighted average CO_2 emission factor used in region in year y [tCO_2/GJ]
KE_{BAT}	-	BAT kiln efficiency [GJ/t clinker]

Calculation of OM/BM

The baseline factor is then calculated by weighing the OM and BM factors on a 50-50% basis as is also recommended in ACM0002.

$$BEF_{cemincr,y} = \frac{OM_y + BM_y}{2}$$

Where:

$BEF_{cemincr,y}$	-	Emission factor for incremental cement production (tCO_2/t cement)
OM_y	-	Operating Margin (tCO_2/t cement)
BM_y	-	Built Margin (tCO_2/t cement)

The resulting baseline emission factor is expressed in tonne CO_2 per tonne cement

[9] A wet process can be considered to be an outdated technology.

Local Involvement in CDM Biogas Projects: Argentine experiences

by Alberto Serna Martín & Ton Dietz

Mitigating climate change and contributing to the sustainable development of host countries are the goals of the CDM. In order to achieve these goals, projects follow an implementation chain, which starts with the design and ends with the issuance of Certified Emission Reductions (CERs). During the project design phase, as a means of maximizing the contribution of projects to sustainable development, the input of local stakeholders (Non-Governmental Organisations, Community Based Organisations) is required in a process of public consultation. Drawing on conclusions from a recent study[1] of the multi-stakeholder interaction of two Argentine biogas projects, this article identifies some of the shortcomings of the CDM when it comes to the involvement of local stakeholders in the process of consultation, and highlights how this relates to the sustainable development goal of the CDM.

Biogas projects in Argentina

Biogas projects fall under the scope of waste handling and disposal, which is the second most popular CDM modality currently accounting for almost 21% of CDM projects worldwide.[2] These projects capture CH_4 present in sanitary landfills and convert it into CO_2, which has a 23 times lower global warming potential. The metropolitan area of the city of Buenos Aires, with its 380,000 tonnes of produced solid waste per month turning into a CH_4 generator after disposal, has a high emission reduction potential. Moreover, the absence of a domestic regulatory framework to deal with biogas makes meeting additionality criteria a relatively easy task for project developers. All of this makes the implementation of CDM biogas projects in Buenos Aires an attractive activity for both CEAMSE (*Coordinación Ecológica Metropolitana Sociedad del Estado*; state company that owns the landfills) and project developers. At the moment, all of CEAMSE's landfills (active or inactive) host a CDM project.

The study this article refers to does not evaluate the achievement of the sustainable development and mitigation goals of the projects (it is too early for that), but studies the process by which these goals have been established. It pays attention to the input of all project participants (project developers, DNAs, DOEs, local stakeholders, Annex-I countries, intermediaries, local administrations, the press, *etc.*) during the different stages of the project life cycle. In this article, a summary of some main conclusions is presented.

Local input is only present at the early stages of the project life cycle during the design phase. This is the moment when most of the project participants deliberate about the goals that projects should deliver. The result of this deliberation process is that project developers set the mitigation and sustainable development goals of the projects almost unilaterally. The input of local stakeholders in this process has little or no effect on the decision making around these matters.

If local involvement in the CDM is relevant for sustainable development, why does it have such a limited effect in establishing the sustainable development goals of the projects? The answer to this question lies in aspects inherent to the social context in which the CDM projects are implemented, and in aspects related to the practicalities of the procedures of the CDM.

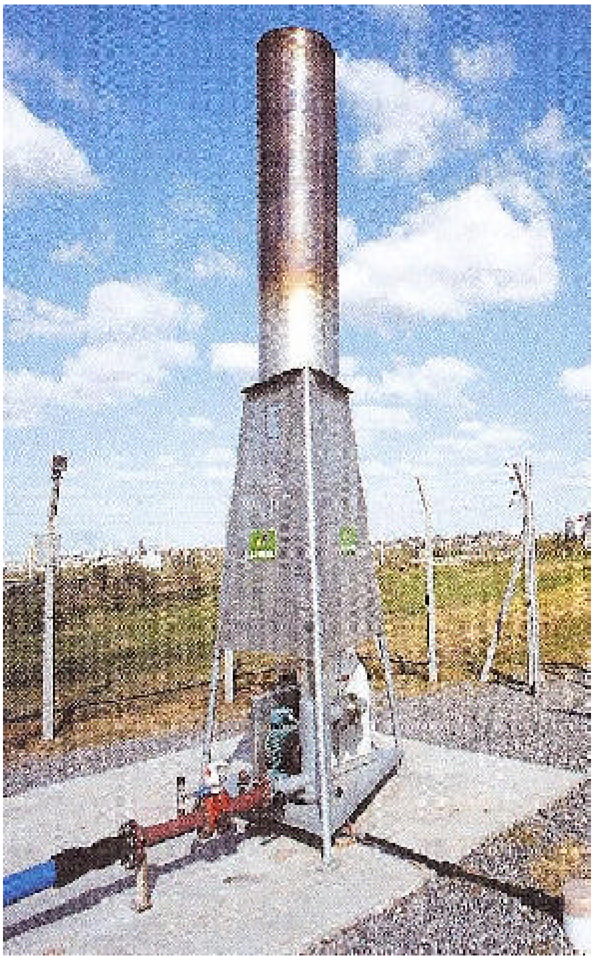
Social context

The following aspects are related to the social context for CDM projects:

- **Structural conflicts between participants:** sanitary landfills in the metropolitan area of Buenos Aires have always been a source of conflict between local communities dwelling in the vicinity of the landfills and CEAMSE. Leachate and landfill gas mismanagement are held responsible for the health problems of the neighbouring communities (skin eruptions, respiratory and digestive problems, and even cancer). As a result, some local stakeholders are structurally against any activity from which CEAMSE might benefit, either economically or technically. Therefore, there has been a lack of trust between these local stakeholders and project developers during the consultation period, which has hindered a transparent dialogue between project participants.

[1] The study is based on the master's thesis of Alberto Serna Martin, for the Research Master's programme in Human Geography, Planning, and International Development Studies at the University of Amsterdam: 'Global Environmental Governance and the CDM as an instrument for tackling Climate Change: a case study of landfill gas recovery projects in the metropolitan area of Buenos Aires' (2008). Mr Ton Dietz was his supervisor. For more information contact authors: alberto.sernamartin@student.uva.nl, or a.j.dietz@uva.nl

[2] http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByScopePieChart.html (24-03-2008).



- **Low educational and economic level of local stakeholders:** the poverty situation of some local stakeholders is so extreme that their livelihoods often depend on the food and the recyclable goods they can find in the landfills. Involvement in the consultation process of a CDM project is not a priority. In the cases that their involvement was requested, availability of communication equipement needed to express comments (computers and internet) was a problem. Furthermore, these stakeholders generally have a limited knowledge of the climate change issue, 'Kyoto' and the CDM.

Procedural issues

The following procedural issues have been identified:

- **Inadequate handling of local stakeholder comments:** in some cases local stakeholders have rejected a project because of its negative impact on the sustainability of the landfill and the surrounding areas, and have requested more information and corrective actions by the project developer. Some local stakeholders used all the formal tools offered by the consultation process (meetings, letters, Internet), but their requests have not been handled. This is possible because no single regulatory entity, such as the CDM Executive Board or the Argentine DNA, has developed a framework for handling the outcomes of the consultation process. This has increased the distrust of local stakeholders towards CEAMSE and the project developers.
- **No contact between DOEs and local stakeholders:** the DOEs in charge of performing the validations have no contact whatsoever with local stakeholders. All the information they use for their assessments comes from project developers who, on some occasions, have ignored the local input. Validation of projects and subsequent submission for registration has occurred with minimised local involvement, and with a lack of consensus on the sustainable development goals.

Local involvement and sustainable development

The social context in which CDM projects are implemented and some procedural issues of the implementation have limited the effective utilisation of local input when establishing the sustainable development goals of CDM biogas projects in the metropolitan area of Buenos Aires. Addressing conflicts between participants prior to the existence of the projects, assessing the capacity of local stakeholders to fully take part in the consultations, constructing a more adequate consultation framework, and ensuring a dialogue between DOEs and local stakeholders are matters that deserve the attention of policy makers, both at the national and the international level. In this way, the process of consultation will become a more useful tool for enhancing the sustainable development goal of the CDM, which, according to the text of the Kyoto Protocol, should have the same status as the GHG mitigation objective of CDM projects.

Does the CDM Foster International Transfer of Climate-Friendly Technologies?

By Antoine Dechezleprêtre, Matthieu Glachant and Yan Ménière*

While its primary goal is to save abatement costs, the CDM is considered by many as a key means to boost technology transfer and diffusion to developing countries. If the technology used in a CDM project is not available in the host country but must be imported, the project leads, *de facto*, to a technology transfer. This technology may consist of 'hardware' elements, such as machinery and equipment involved in the production process, and/or 'software' elements, including knowledge, skills, and know-how.

So far, most climate-friendly technologies have been developed and used in developed countries. Therefore, expecting international technology transfer through CDM projects sounds reasonable. However, whether this is true in practice is an empirical question. In a study financed by the French Environmental Agency (ADEME), we used a dataset describing the 644 CDM projects registered up to 1 May 2007 in order to explore this issue.

Data show that international technology transfers take place in 44% of CDM projects, accounting for 84% of the expected annual CO_2 emissions reductions (towards 2012). Very few projects involve the transfer of equipment alone. Instead, projects often include the transfer of knowledge and operating skills, allowing project implementers to manage the technology.

Current technology transfers under the CDM mainly concern two areas. The first area is end-of-pipe destruction of non-CO_2 GHG with high global warming potentials, such as HFCs, CH_4 and N_2O, which are mainly transfers focused on the chemicals industry, the agricultural sector, and the waste management sector. The second category is wind power, with 60% of projects using equipment from abroad. Biomass-based electricity production projects or energy efficiency measures in the industry sector mainly rely on local technologies.

Our data also show that host countries are very heterogeneous in their propensity to attract technology transfers. For example, 59% of the Chinese projects involve a transfer while the percentage is only 12% in India (see Figure 1).

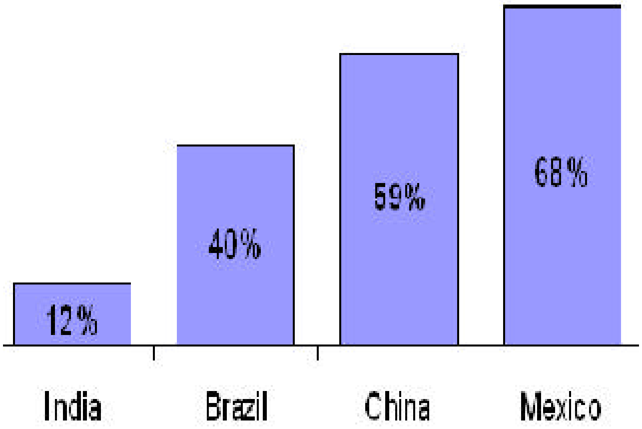


Figure 1. Technology transfer for the main host countries

European countries are by far the largest technology suppliers. In particular, Germany, Spain and Denmark together account for 45% of the exported machinery. This means that the money spent by Annex I countries to finance CDM projects, through the purchase of carbon credits, is only marginally used to buy machinery from countries that have not ratified the Kyoto Protocol. CDM opponents have often claimed that this implies that Annex I countries use the CDM to subsidise their own technologies. A closer look at our data invalidates this assertion: only in 2% of the project cases both the credit buyer and the equipment supplier come from the same Annex I country.

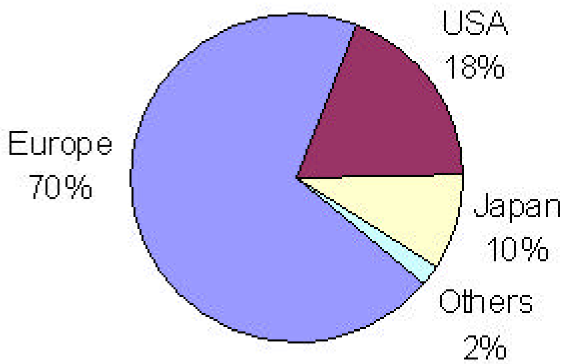


Figure 2. Technology suppliers

As regards the partners involved in CDM projects, only 8% of the projects are implemented in subsidiaries of companies located in Annex I countries. This is much lower than what was expected. By contrast, we frequently observe the involvement of CDM project designers that manage the whole CDM project cycle, from PDD writing to credit sale.

* Reference: Dechezleprêtre, A., Glachant, M., and Ménière, Y., 2007. The North-South Transfer of Climate-Friendly Technologies through the Clean Development Mechanism. CERNA, École des mines de Paris, To download the study: http://www.cerna.ensmp.fr/, Questions or comments should be sent to glachant@ensmp.fr

We have run econometric regressions in order to identify what drives technology transfer. All other things being equal, they show that transfers are more likely in large projects (in terms of emissions reductions). Furthermore, the probability of transfer is 50% higher when the project is developed in a subsidiary of an Annex I-based company. Having an official credit buyer in the project also positively affects transfer likeliness, albeit to a much lesser extent (+16%). The host country's features also matter a lot. Both the openness of the economy and the economic dynamism, as proxied by the recent average annual growth of GDP encourage technology transfer. In particular, one additional percentage point of average GDP growth raises transfer likeliness by 19%.

Do the host country's technological capabilities influence technological transfer? In theory, this factor has ambiguous effects. On the one hand, high capabilities may be necessary to adopt a new technology, but, on the other hand, they also imply that many technologies are already available locally, thereby reducing transfer likeliness. Our estimations show that the first effect strongly dominates in the energy sector and in the chemicals industry, whereas the second effect is stronger for agricultural projects. The interpretation is that technologies transferred in the agricultural sector are not very elaborate, implying that only countries with poor technological skills need to import them, whereas wind turbines and solar panels in the energy sector or abatement devices in the chemicals industry would require technically qualified manpower to be built and operated.

This study suggests several policy lessons for CDM design. Encouraging large projects – or project bundling – allows the exploitation of increasing returns in technology transfer. Promoting projects in subsidiaries of Annex I companies could also be of great use. In practice, one could imagine different ways of providing incentives for companies to do so (*e.g.* additional credits, simplified administrative procedures). To a lesser extent, credit buyers, which are generally not pure financial actors, can also play a positive role. The results also stress the effectiveness of technological capacity building in the energy sector and in the chemicals industry.

Note that these results are valid for countries in which there is a significant number of CDM projects described in the dataset, *i.e.* mainly China, India, Mexico and Brazil. One should not extrapolate these results to host countries with smaller shares in the CDM pipeline, such as in sub-Saharan Africa. Furthermore, it must be recalled that these results only concern inter-country technology transfer and do not describe technology diffusion within host countries.

Voluntary Carbon Market and the CDM: A comparison of impacts in developing countries

By Edgar Cruz, Margaret Skutsch, and Miriam Hinostroza*

Developing countries are accessing both the CDM and the Voluntary Carbon market (VCM) through the implementation of projects that are aimed at achieving real and additional GHG emissions reductions and, at least in theory, at promoting sustainable development.

It is likely that there are significant differences between these two segments of the carbon market, in particular as regards their sustainable development impacts. While CDM is thought to be more rigorous in assuring emissions reductions, because it needs to be officially credited, the VCM presents itself more as socially oriented. This article looks at whether this is the case.

In a survey of 36 CDM projects (out of the 2,391 listed in the August 2007 pipeline) and 19 projects in the voluntary market (out of the 159 we were able to identify), it was first of all clear that VCM projects are on average much smaller than CDM projects; 53% were below 15k CERs per year compared to 18% of the CDM projects. This probably relates to different transaction costs and the related need for economies of scale in CDM projects. There is also a difference in geographical distribution. Of the 154 non-Annex 1 countries that have ratified the Kyoto Protocol, only 64 had CDM projects while 49 had VCM projects by November 2007. There are almost no CDM projects in least developed countries, but VCM projects are present in countries such as Afghanistan and Ethiopia. This is probably because CDM projects get their funding mainly in the host country (68%) through access to syndicate loans (56%), so that only countries with solid financial systems are able to participate. VCM projects rely more on transfers from

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Table 1. Comparison project type CDM and VCM

Item/Market	CDM	VCM (In developing countries)
Most common project type	Renewable energy (60%), CH_4/cement (18%), Energy efficiency (16%)	LULUCF (50%), Renewable (32%), Improved cook stoves (7%)
Location	Asia (72%), Latin America (25%)	Asia (40%), Africa (31%), and Latin America 28%

organizations in developed countries (78%) through donations and emissions trading (around 30% each), and therefore there is no such barrier for LDCs.

The breakdown of project type is also different, with forestry projects making up the majority of the VCM while being almost non-existent in the CDM, as presented in Table 1.

General market characteristics

In a clear contrast between the two markets, most of the VCM projects (58%) receive upfront payments, while this figure is just 15% for CDM projects. The bigger proportion of upfront payments in the VCM probably reflects a different attitude towards uncertainties and more readiness of VCM investors or donors to accept risk.

The contribution to the internal rate of return (IRR) of the emissions trading certificates is bigger in the VCM than in the CDM: in 60% of the VCM projects the IRR contribution is larger than 10%, while this is true for only 19% of the CDM projects. It is clear that carbon finance is a central source of funds for the majority of VCM projects while it functions just as an additional source for most CDM projects.

As regards sustainable development, the perception of the project developers of benefits and impacts is also different between CDM and VCM projects:

- **Environmental impacts:** most of the CDM projects (92%) see reduction in fossil fuel consumption as their main contribution to sustainable development. This type of projects is followed by air pollution reduction (72%) and waste disposal management (39%). In the VCM, the main contribution is linked to biodiversity conservation (63%) followed by air pollution reduction (53%) and water quality improvement (53%). This is of course related to the fact that so many VCM projects concern forestry.
- **Economic impacts:** for CDM these are income generation for company or host organizations (83%), followed by new employment opportunities (78%), technology innovation and research (50%). For the VCM projects, the main attribute is new employment opportunities (74%), followed by productivity increase (47%).
- **Social impacts:** for CDM, income for local communities and poverty alleviation is said to be the main impact (58%) followed by education and training programs (47%) and health problems reduction (36%). In the VCM, the main impact is said to be income for local communities and poverty alleviation (84%), followed by creation of new organizations (53%) and education and training programmes (53%).
- In CDM projects, most of the **technology is imported** from industrialized countries (48%) or is developed locally (48%). In most VCM projects technology is developed locally (50%), only 25% use technology imported from industrialized countries. 17% of VCM projects consider themselves as not "technology heavy", which is again linked to the fact that so many are forestry projects.

Transaction costs, which determine a project size threshold in the CDM market, are higher in the CDM than in the VCM. A low level for pre-implementation costs in the CDM is in the range of USD 20,000 - USD 50,000 and cost of generation emission reductions are typically in the range USD 5,000 - USD 20,000. In the VCM the pre-implementation cost is likely to be less than USD 20,000 and the costs of emission reduction generation are lower than in the CDM. 71% of CDM projects deliver smaller emission reductions than first expected, despite the fact that their PDDs made conservative estimations. It was also found that 55% of the VCM projects are not still measuring emissions reductions.

The two markets interact in a complementary way as around 20% of the projects in the CDM also sell early credits in the VCM, and also several standards in the VCM are based on the CDM criteria. The requirements of the CDM cycle and the access to information on CDM projects contrast with the highly differentiated situation as regards information in the VCM; and although there have been efforts to create VCM standards (by November 2007 there were around 15 sets of standards) it is not clear how strict these are and how strictly they will be applied.

In conclusion, projects developed by the CDM and the VCM in developing countries differ in the way in which they are financed, in their perceived impacts on sustainability, in their transaction costs and in the mechanisms to guarantee environmental integrity. The markets differ greatly regarding geographical distribution, type of technology, and funding access. VCM projects have a broader geographical distribution and are present in LDCs while CDMs are not. They tend to be geared more to poverty alleviation and to broader environmental objectives, but this could be because they are overwhelmingly concerned with forestry projects in rural areas. They have much lower barriers of entry because their starting costs are much lower, and they are much more dependent on upfront payments than CDMs are, however the lack of accountability of some of these credits undermine the potential benefits. On the other hand, if the price of carbon was higher in the compliance market, the transaction costs would not be such a serious barrier for project implementation as they are now.

CDM Technology Focus

ENTTRANS

Compact Fluorescent Lamps

There is a whole range of lamps from ordinary incandescent tungsten filament bulbs to tungsten halogen, halogen infrared reflecting, mercury vapour lamps, compact fluorescent lamps, linear fluorescent, metal halide, compact metal halide, high pressure sodium (high intensity discharge HID lamp) and light emitting diodes. The efficacy of these lamps varies greatly with the least preferred being the ordinary light bulbs and the tungsten halogen lamp and the most preferred fluorescent tubes and compact fluorescent lamps (CFLs).

CFLs have a variety of shapes (see Figure 1) and are now designed to fit almost all light applications and devices but are particularly suitable for lighting. CFLs operate in the same way as a fluorescent strip light. The inside of the bulb is coated with phosphor. Electricity discharging through the bulb excites a small amount of mercury vapour in an inert gas such as argon or neon, which results in UV light emission. This UV light is at the correct energy level to cause the phosphor coating to produce light. There is electronic ballast, which starts the lamp operating. Electronic ballast uses electronic solid-state circuitry to provide the proper starting and operating electrical conditions to power one or more fluorescent lamps. CFLs use less energy than the traditional tungsten filament bulbs. A 20-25-W CFL will give an equivalent lighting service to a 100-W bulb.

There used to be a perception that fluorescent lights use most of their energy in the start-up phase but this is false. All lights should be switched off when not in use. Not only do they use less energy but also they last longer (8,000 hours compared to 500-2,000 hours) so that over their lifetime they pay for themselves (between 500-900 hours depending on the electricity price) and provide substantial cost savings in energy use avoided over its lifetime (about 10-20 times the initial cost over the life of the bulb). For people in developing countries, however, programmes to make CFLs more affordable will be needed in order to overcome the hurdle of relatively high investment costs.

Sustainable development contribution

According to the IEA (2006), lighting ranks among the major end-uses in global power demand. Lighting represents 650 mtoe of primary energy consumption and 2550 TWh of electricity consumption in 2005. This means that grid-based electric lighting is equivalent to 19% of total global electricity production. Lighting requires as much electricity as is produced by all gas-fired generation or 1,265 power plants. Of this amount the major consumption sector is commercial at 43% followed by residential at 31%, industrial (18%), and outdoor stationary sources at 8%.
These statistics refer to on-grid sources. In developing countries, however, off-grid fuel based lighting is the norm, for which, in 2005, 77 billion litres of kerosene and gasoline/diesel were used. The health risks associated with this energy sources are well known and the efficiency is low.

Vehicle lighting also comes under the 'spotlight' and is responsible for the consumption of 55 billion litres of gasoline/diesel in 2005. Solutions are available in the form of *Xenon arc lamps,* which use 20% of the energy for halogen headlamps and coloured LEDs for other applications.

Figure 1.
Energy efficient light bulbs*

IEA, 2006b. *Light's labours lost*, OECD/IEA, Paris, France.
* *Source:* http://www.gseii.org/gseii/islands/st-lucia.html#lighting

The electricity used by lighting is also a major source of CO_2 emissions. IEA (2006) estimate that the emissions of CO_2 from all lighting are 1,889 $MtCO_2$ of which grid-based emissions are estimated at 1,528 $MtCO_2$, fuel-based at 200 $MtCO_2$, and vehicle-based at 161 $MtCO_2$. All these emissions are equivalent to 70% of those from the world's cars.

The biggest consumer is North America followed by Japan/Korea and then Australia/New Zealand before Europe and transitional economies. China and the rest of the world use less than 10% of the light service used in North America (relative to the USA lighting service demand of 1,995 kWh/y, developing countries including China are around 180 kWh/y). Nowadays, many cities in the USA are replacing their incandescent traffic lights with LED arrays because the electricity costs can be reduced by over 80% (see www.eartheasy.com/live_energyeff_lighting.htm).

The IEA (2006) report shows that by installing only efficient lamps, ballasts and controls, global lighting electricity demand would drop substantially and be almost unchanged from 2005 levels by 2030 (75% of the electricity currently used for lighting is reduced). It claims that "Following these measures would save more than 16,000 Mt of CO_2 emissions over the same time frame, equivalent to about 6 years of current global car emissions, and would avoid USD 2,600 billion in total expenditure on lighting through reduced energy and maintenance costs". A single CFL could contribute to CO_2 emission reductions by 0.5 tonnes over the lifetime of the bulb.

Status of the technology

There are more than 30 billion electrical lamps worldwide. The technology is mature though there are other new developments in terms of lamps such as LEDs and HIDs. As there are no international standards, poor quality can be an issue in some areas. The experience from CFL programmes (GEF, 1998) shows that all of these actions are important, but that raising consumer awareness, international harmonisation of standards, quality improvement, effective distribution channels, improving and enforcing bulb quality, and subsidy programmes are most important. China already has a very large manufacturing base for CFLs. Transfer of the technology has therefore already happened in the market and lessons can be learned from these.

Future market potential and developments

The existing market of more than 30 billion bulbs worldwide shows that the market for CFLs is very large. Globally, there were 2,100 CFL manufacturers and 1,200 exporters in 2004. With respect to the future development of CFL in the EU, there is no reason why the CFL penetration should not be on the scale envisaged by the IEA (2006) report if standards can be harmonised and CFLs built into the regulatory framework. In terms of manufacturing worldwide, the EU brands such as Philips or Siemens-Osram have been overtaken by the Chinese manufacturers despite the EU anti-dumping legislation on Chinese bulbs in 2001. Europe has just introduced the WEEE directive, which could make the EU market attractive to China with even higher profit margins possible. In addition, the anti-dumping tariff is due to expire so that the EU may see increased imports from China. Chinese manufacturers are presently operating at 80% of their production capacity.

In developing countries there is a very mixed picture of CFL development and potential. China has been the main producer of CFL bulbs in the world since 1998, with a supply of 1 billion CFLs worldwide in 2004 representing about 75% of the world's total (Global Sources, 2005). The main driver of this success has been the low price of the bulbs. Their main markets are Asia and North and South America who take 70% of the exports from China with 20-30% to Europe. In China energy savings is a national priority and this has been a driver for market penetration of CFL. It is expected that there will be good competition in China with so many good brands available (Worldwatch Institute, 2006). China has adopted an energy savings scheme in their 11th National five-year plan, which is expected to drive up CFL consumption in the next few years. There is also a thriving housing market, which coupled with the development occurring in rural areas is expected to add to the demand in China. In 2005, 50 million CFLs were used in the country.

Finally, the technology requires sophisticated electronic know how and access to supplies of semiconductors and electronic circuitry and Chinese manufacturers have not yet adopted the new technology required. Philips in the Netherlands is hoping to build a CFL assembly factory in South Africa, which could be a model for other areas.

GEF, 1998. Independent Review of Gef and Non-Gef Efficient Lighting Projects, available at: http://www.gefweb.org/wprogram/July98/wp/elifive.doc

Global Sources, 2005. *Light Bulbs and Tubes*, available at: http://secreg.globalsources.com/

Worldwatch Institute, 2006. *Biofuels for transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century*, Extended Summary, Washington: Worldwatch Institute in cooperation with the Agency for Technical Cooperation (GTZ) and the Agency of Renewable Resources (FNR), June. Available at: http://www.worldwatch.org/node/4078

Books, studies and reports

Anger, N. and J. Sathaye, 2008. Reducing Deforestation and Trading Emissions: Economic Implications for the post-Kyoto Carbon Market, ZEW, Discussion paper No. 08-016.

This paper quantitatively assesses the economic implications of crediting carbon abatement from reduced deforestation for the emissions market in 2020. The authors find that integrating avoided deforestation in international emissions trading considerably decreases the costs of post-Kyoto climate policy, even when accounting for conventional abatement options in developing countries. At the same time, tropical rainforest regions receive substantial net revenues from exporting carbon-offset credits to the industrialised world. Moreover, reduced deforestation can increase environmental effectiveness by enabling industrialised countries to tighten their carbon constraints without increasing mitigation costs.

Contact: The paper is available at: ftp://ftp.zew.de/pub/zew-docs/dp/dop08016.pdf.

Carr, C. and F. Rosembuj, 2008. Flexible Mechanisms for Climate Change Compliance: Emission Offset Purchases under the Clean Development Mechanism, *New York University Environmental Law Journal*, Vol. 6, pp. 43-61.

This article focuses on the functioning of the Clean Development Mechanism. The article (i) begins with an overview of the Kyoto “flexible mechanisms” (including the CDM), (ii) explains how CDM offset credits are generated, (iii) examines the growth of the international carbon market, (iv) explores aspects of CDM offset purchase agreements, and (v) summarizes several lessons learned.

Convery, F., D. Ellerman, and C. de Perthuis, 2008. The European Carbon Market in Action: Lessons from the First Trading Period, Interim Report, University College Dublin, Massachusetts Institute of Technology, Université Paris-Dauphine.

This interim report presents the intermediate findings of the research programme “The European Carbon Market in Action: Lessons from the First Trading Period”. The aim of the programme is to analyse the performance of the EU Emissions Trading Scheme and to interpret lessons learned for the benefit of future emissions trading programmes. The programme was launched at the end of 2006 by an international team with involvement of the University College of Dublin, the Massachusetts Institute of Technology, and the Mission Climat of Caisse des Dépôts, Université Paris-Dauphine.

This interim report was prepared after the programme’s second workshop held in Washington, D.C., in January 2008. Two additional workshops will be held in the course of this year: Prague (June 2008) and Paris (September 2008).

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Dechezleprêtre, A., M. Glachant and Y. Ménière, 2007. The North-South Transfer of Climate-Friendly Technologies through the Clean Development Mechanism, CERNA, Paris, France.

This study, financed by the French environmental agency (ADEME), used a dataset describing the 644 CDM projects registered up to 1 May 2007 in order to explore the issue of the extent to which the CDM has resulted in international technology transfer and what these transfers look like in terms of project types and which countries are involved.

Contact: To download the study: www.cerna.ensmp.fr/, please send questions or comments to: glachant@ensmp.fr

Hill, J., Th. Jennings and E. Vanezi, 2008. The Emissions Trading Market: Risks and Challenges, Financial Services Authority, FSA Commodities Group, London, UK.

This paper explains the foundations of the GHG emissions trading market and how the UK Financial Services Authority fits in to the regulation of this market. The research can be considered a continuation of an earlier paper on the “Growth in Commodity Investment: risks and challenges for commodity market participants”. It identifies and discusses the risks related to emissions trading for different market entities.

Contact: Jonathan Hill, Financial Services Authority, London, UK, tel.: +44 20 7066 1000;
Internet: http://www.fsa.gov.uk

The **Joint Implementation Quarterly** is an independent magazine established to exchange the latest information on the Kyoto mechanisms and emissions trading. *JIQ* is of special interest to policy makers, representatives from business, science and NGOs, and staff of international organisations involved in the operationalisation of the Kyoto mechanisms, including emissions trading.

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Abbreviations

AAU	Assigned Amount Unit
AIJ	Activities Implemented Jointly under the pilot phase
Annex A	Kyoto Protocol Annex listing GHGs and sector/source categories
Annex B	Annex to the Kyoto Protocol listing the quantified emission limitation or reduction commitment per Party
Annex I Parties	List of industrialised countries (OECD, Central and Eastern European Countries, listed in Annex I to the UNFCCC)
Annex II Parties	OECD countries (listed in Annex II to the UNFCCC)
non-Annex I Parties	Developing countries
CCS	Carbon Dioxide Capture and Storage
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction (Article 12 Kyoto Protocol)
COP	Conference of the Parties to the UNFCCC
DOE	Designated Operational Entity
DNA	Designated National Authority
ERs	Emission Reductions
ERPA	Emission Reduction Purchase Agreement
ERU	Emission Reduction Unit (Article 6 Kyoto Protocol)
EU ETS	European Union Emissions Trading Scheme
EUA	European Union Allowance (under the EU ETS)
GHG	Greenhouse Gas
IET	International Emissions Trading
ITL	International Transaction Log
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
KP	Kyoto Protocol
LULUCF	Land Use, Land-Use Change and Forestry
MethPanel	Methodology Panel to the CDM Executive Board
MOP	Meeting of the Parties to the Kyoto Protocol
PIN	Project Information Note
PDD	Project Design Document
SBSTA	UNFCCC Subsidiary Body for Scientific and Technological Advice
SBI	UNFCCC Subsidiary Body for Implementation
UNFCCC	UN Framework Convention on Climate Change

JIQ Meeting Planner

29 April - 2 May 2008, Environmental Markets Association's 12th Annual Spring Conference, Miami, Florida, USA.
Organised by Environmental Markets Association.
Contact: www.environmental markets.org

6 May 2008, China - EU CDM Business Conference, Cologne, Germany.
Organised by M&P Group, and the EU-China CDM Facilitation Project.
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2 - 13 June 2008, 28th session of the UNFCC Subsidiary Bodies, Bonn, Germany
Contact: http://unfccc.int/meetings/items/2655.php

26-28 June 2008, Sustainable Innovation as a Tool for Regional Development, Leeuwarden, The Netherlands.
Organised by the Province of Fryslân and the Greening of Industry Network in co-operation with the Cartesius Institute for Sustainable Innovations.
Contact: www.greeningofindustry.org/gin2008.htm; GIN2008@greeningofindustry.org

6-8 August 2008, Energy Security and Climate Change: Issues Strategies and Options, Bangkok, Thailand.
Organised by the Regional Energy Resources Information Center.
Contact: enreric@ait.ac.th

15-17 August 2008, Financing for Climate Change - Challenges and Way Forward, Dhaka, Bangladesh.
Organised by Unnayan Onneshan - Centre for research and action on development
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