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Bali: Hope Beyond Relief?

Since the completion of the Climate negotiations of Bali in December 2007, many reports, opinions, and policy statements have been published. These reactions have made clear that many had been nervously waiting for the outcomes of Bali. Failure at Bali would have been a serious setback in the process of shaping an international climate policy regime along the lines recommended by the IPCC and increasingly hoped for by the general public.

Thanks to the *Earth Negotiations Bulletin* and other media sources, the whole world could be kept informed about the final hours of the Bali negotiations. Many news bulletins showed the dramatic pictures of the refusal of the US delegation to adopt a text on a Bali Roadmap, which were followed by shots of a nicely formulated, but slightly non-diplomatic one-liner by the representative of Papua New Guinea, after which US delegate leader Paula Dobrianski 'gave in' and agreed to the text. This was a beautiful TV-coverage, but the report by Benito Müller ("Bali 2007: On the Road Again") has made clear that reality was much less spectacular, since the drama that unfolded during the night of 13th to 14th of December was largely caused by the formulation of actually one sentence in the draft decision text.

As Müller clearly explains in his report, the crucial paragraph during the final hours of the negotiations was paragraph 1.b.ii of the Draft decision text, which dealt with mitigation actions by developing countries. In the draft text, two formulations for this paragraph were included ('bracketed'). According to one formulation, developing countries would undertake nationally appropriate mitigation actions in a measurable, reportable and verifiable manner, thereby supported by developed countries by financing, technology and capacity building. The second formulation was slightly different and seemed to imply that the financing, technology and capacity building support by developed countries would have to be measurable, reportable and verifiable. A slight difference in wording could thus have strong implications.

There was a problem when the COP President presented a final draft text in which the first formulation (measurable, reportable and verifiable mitigation actions for developing countries) was included and not the second. India protested and after hectic deliberations and postponed and interrupted plenary sessions, the second formulation was suggested by the G-77&China instead of the first one. This was unacceptable for the US delegation because they feared that, with a view to the future negotiations under a Bali Roadmap, the second formulation was too flexible for developing countries in terms of their future mitigation actions. Eventually, the delegation of South Africa explained that the text was a reflection of the willingness expressed by developing countries during the Bali meeting to voluntarily commit themselves to measurable, reportable and verifiable mitigation actions. According to several reports, this explanation eventually made the US delegation adopt the Decision by COP-13 on the Bali Action Plan:

"… to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, …, by addressing inter alia: …
(b) Enhanced national/international action on mitigation of climate change, including, inter alia, consideration of: …
(ii) Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner."

Perhaps equally important in this COP decision was paragraph 1.b.1, which stated that all developed countries will consider "measurable, reportable and

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verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, …, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances." This paragraph also covers the involvement of developed countries that are presently not part of the Kyoto Protocol, such as the USA and Turkey, in a future climate policy regime.

The paragraph text contains two striking aspects. First, it refers to both commitments and actions as possible ways to formulate a developed country's involvement instead of commitments as in the Kyoto Protocol. Second, it refers to developed countries instead of Annex I Parties (similar to the reference to developing countries in the other paragraphs mentioned above instead of non-Annex I Parties).

According to *Earth Negotiations Bulletin* (see their summary of COP-13 and COP-MOP-3, vol.12, No. 354, p.19; http://www.iisd.ca/climate/cop13), this could be considered both a breakthrough and a risk. On the one hand, it creates "a prospect of moving beyond the constraints of working within only Annex I and non-Annex I countries when defining future contributions to a future agreement". On the other hand, however, some developing countries expressed concern that this new distinction might lead to a situation in which some present Annex I Parties "would seize on this development to 'jump ship' and attempt to adopt more relaxed commitments than those under the Kyoto Protocol." One consequence of the new distinction between developed and developing countries might be that some present *non-Annex I Parties* may in a future climate regime be considered *developed countries*.

The negotiations launched by the COP Decision on the Bali Action Plan will be conducted by a new UNFCCC subsidiary body called the *Ad-Hoc Working Group on Long-Term Cooperative Action*. The negotiations are scheduled to be completed in 2009 at COP-15 (to be held at Copenhagen, Denmark). During 2008, four negotiation sessions will be held.

In addition to the developments at COP-13, also negotiations took place in the context of the third meeting of the Kyoto Protocol Parties. The so-called *Ad-hoc Working Group on Further Commitments for Annex I Parties under the Protocol* (AWG) determined a work programme for 2008 and 2009, which should result (after six meetings) in a set of recommendations in 2009 on future emission reduction commitments for industrialised countries under the Kyoto Protocol. This implies that during 2008-2009 two negotiation tracks will remain operational. One track is the above-mentioned Ad-hoc Working Group on Long-Term Cooperative Action under the UNFCCC (to be completed at COP-15) and the other one will be the already existing AWG managed under the Kyoto Protocol (to be completed by COP-MOP-5).

Consequences for JI and the CDM

It was decided by COP-MOP-3 to undertake a formal review of the Kyoto mechanisms. The focus will, among others, be on the increasing complexity of the CDM, the system of reviewing project design documents, and opportunities for simplification of the CDM procedures. In order to support the implementation of CDM projects in least developed countries, it was decided that the administration fee for these projects would be waived.

The COP-MOP-3 discussed two cases of CDM project eligibility: the further acceptance of HFC-23 emission reduction projects and the possibility of carbon capture and storage (CCS) projects under the CDM. With respect to first type of projects the issue discussed was whether HFC-23 destruction projects could become eligible under the CDM if the HFC-23 emissions were produced in a new HCFC-22 plant.

Photo courtesy of IISD, Canada, Earth Negotiations Bulletin.

Since HFC-23 is a by-product of HCFC-22 (a cooling substance) production, there might be an incentive to built new HCFC-22 facilities in order to generate more CERs. The political reality is that the Montreal Protocol has recently agreed on an accelerated phase-out of HCFC-22 (which is an ozone-depleting gas) production. Also, it was agreed at Bali that the CDM should not be used to promote the increase of HCFC-22 gases. Nonetheless, Bali did not reach a consensus on this issue, mainly because of the opposition of, among other countries, China, which presently hosts a number of HFC-23 destruction CDM projects.

Also on the inclusion of CCS no consensus could be reached. The basic idea is that CERs can be generated by capturing CO_2 before or after combustion of a fossil fuel and subsequently store the CO_2 under ground, *e.g.*, in an empty natural gas or oil field. It could also be stored in operational gas and oil fields with the objective to enhance the pressure in the field and thus increase gas or oil production from the field. The CCS option is generally considered a promising but relatively expensive option (depending on whether it is applied in combination with oil or gas production enhancement) and there are concerns about the risk of leakage of CO_2 from the fields and the relatively small contribution to sustainable development. The EU, Canada, China, Japan and the OPEC countries were in favour of including CCS under the CDM, but other countries, including India (despite its considerable CCS potential), were against this.

Will the roadmap become successful?

Relief. That may have been the best term to summarise the mood of people working on climate change issues. The momentum created by Al Gore's 'Inconvenient Truth' and the IPCC reports was continued and the Bali outcome has led to a general feeling of optimism about a future climate policy regime.

The process that has been started at Bali – the Roadmap – and which needs to result in a new climate policy regime in 2009, resembles the process that was started in 1995 at COP-1 with the 'Berlin Mandate' and which led to the Kyoto Protocol. Then, negotiations took place within the called the *Ad-Hoc Group on the Berlin Mandate* (AGBM).

When comparing both processes, it is difficult to say whether the present Ad-Hoc Working Group tasks are more or less difficult than the tasks of the AGBM. In 1995, there was no real architecture for a climate policy regime; only the UNFCCC established three years before offered general guidance. Now, there is an operational climate protocol from which specific lessons can be learned. In 1995, one of the key issues was whether industrialised countries should be given the opportunity to use emissions trading through projects ('joint implementation' or JI) for complying with their emission reduction commitments or objectives. At COP-1, JI could only be kept afloat through the adoption of a pilot phase. Now, project-based emissions trading (mainly through the CDM) has become a very successful and inevitable mechanism of international climate policy co-operation.

In 1995, the scientific evidence on the impact of human action on the global climate was not yet as convincing as nowadays and the awareness of the risks of a changing climate through anthropogenic activities was much smaller than nowadays.

During the 1995-1997 process, the AGBM process focussed a lot on the shape of industrialised countries' mitigation actions (quantified objectives or commitments; QELRCs or QELROs) and the role of developing countries in a protocol.

From the two-year discussions in the AGBM-framework it can be learned that a slow progress at the consecutive sessions is no reason to panic and worry about the final outcome of the negotiations. During the AGBM process several nice ideas were tabled, which varied from measurable and verifiable policies and measures proposed by the EU, to smart formula's for calculating Annex I Parties' individual and differentiated emission reduction commitments. In the end, however, at Kyoto, everything turned out to be different with commitments for Annex I Parties concluded by 'percentage negotiations' and a global scope for emissions trading (instead of only JI among Annex I Parties, as initially expected by negotiators). Despite the hard work at the AGBM sessions, the

Box 1. Other key decisions at 'Bali'

- Measures and incentives will be developed to reduce GHG emissions due to deforestation.
- Agreement has been reached on the establishment of a Fund for Adaptation
- A set of actions was adopted to enhance international technology transfer and co-operation. COP-13 decided to extend the work of the Expert Group on Technology Transfer by five more years (see also..pp in this issue).
- A second review of the Kyoto Protocol (pursuant to its Article 9) will be completed at COP-MOP-4 (December 2008). Parties have been invited to express their views on a number of issues, including the scope, effectiveness and functioning of the flexibility mechanisms.

See also http://unfccc.int

success at Kyoto was largely due to the address by US Vice-President Al Gore, the momentum of 'boiling' negotiations at COP-3 during the final hours of the meeting, and the leadership of key negotiators such as AGBM Chairman Raul Estrada (Argentina).

The upcoming negotiations show several similarities with the AGBM process in the sense that the division of tasks between developed and developing countries is again high on the agenda and the eventual character of the actions will again be a topic of intense discussion. As said above, the present process can built on much more expertise and the experience with the Kyoto Protocol, as well as a much stronger 'climate urgency' momentum, but the key message from AGBM may be that care must be taken of the likelihood of ratification of the agreed policy regime after 'Copenhagen'. The discussions at Bali have made perfectly clear that an 8-year ratification period (as was eventually the case with the Kyoto Protocol) will be too long to enable a smooth continuation of a global climate policy after the end of the Kyoto Protocol commitment period.

Market Expectations at the Start of EU ETS Phase II

By Sam Fankhauser and Friedel Sehlleier, IDEAcarbon

Carbon trading entered a new phase. The Kyoto compliance period finally started while the EU ETS entered into a new and much tighter phase in January 2008. The pilot stage is over.

The 2,082 $MtCO_2$ emissions cap set by the European Commission should deliver credible emission reductions. Based on recent economic growth forecasts and average forward fuel prices, the cap will create an annual shortfall of 206 $MtCO_2$, according to simulations conducted by IDEAcarbon and ECON in the December update of the Global Carbon Report.

Based on today's market information, the costs of making up for this shortfall domestically (the marginal abatement costs) are around €26 per tCO_2.

Without the availability of credit imports this would be the average price of CO_2 in the EU ETS over the next five years. However, because the import limit for Kyoto credits is relatively generous, at 278 million tCO_2 per year, the EU market will likely settle at a much lower price. As long as the price for Kyoto credits does not rise above domestic abatement costs (€26), CER imports will effectively put a cap on the EUA price.

We do not expect the Kyoto price to rise above €26. One might wonder whether CDM delivery problems, as experienced last year by companies such as Ecosecurities and AgCcert, give reason for a more cautious view about credit availability, which would push up prices. Delivery risks are real, and we have long argued that the market overestimates the issuance of carbon from the CDM pipeline. These are complex projects carried out in difficult business environments and an untested regulatory framework. A certain failure rate had to be expected. However, even if delivery predictions have been downgraded, we did so by 10% to 1.85 billion CERs up to 2012, both public and private demand can be met comfortably. The market for issued (*i.e.* risk free) Kyoto credits should clear at an average price of €22 (18 – 26) per tCO_2 over 2008 – 2012.

Overall and despite share price volatility, the phase II market appears quite robust. The extensive simulations we undertook for the December Update of the *Global Carbon Report* show that it would take a rather unlikely combination of gas prices, coal prices, economic growth and perhaps freak weather to trigger a substantial rise or fall in the EUA price. The main remaining risk to the phase II price, both upside and downside, is uncertainty about climate policy and carbon prices post-2012.

While Bali may have brightened prospects for a post-2012 regime, its yet-to-be-defined substance matters to the market and allows for sophisticated guesses of post-2012 market scenarios. Similarly, the post-2012 EU ETS framework matters to the phase II market. If the European Commission is willing to send a strong and unambiguous signal about phase III allocations, prices may rise above the €26 mark, but we do not expect this to happen until the final years of phase II trading.

For more information about the Global Carbon Report visit www.ideacarbon.com.

Contribution of AIJ Projects to Sustainable Development: A Dutch case study

By Pieter van Beukering, Harro van Asselt and Joyeeta Gupta

In 2006, the Policy and Operations Evaluation Department (IOB) of the Netherlands Ministry of Foreign Affairs launched a study to evaluate the contribution of AIJ and CDM projects in the portfolio of the Netherlands Government to sustainable development in the host countries. The starting point for the study was that sustainable development is a country-context specific concept, which has been underscored for the CDM by the Marrakech Accords.*

The study has been carried out by the Institute for Environmental Studies, Vrije Universiteit Amsterdam, and the Foundation Joint Implementation Network, both in the Netherlands. Its aim was to explore how GHG emission reduction projects with Dutch investment involvement and Government approval have thus far contributed to sustainable development in the host countries, and to examine the expected contributions from these projects in the future. For the second part of this objective, 44 CDM projects have been studied on how these are expected to contribute to sustainable development in the host countries (see also *JIQ*, October 2007, pp.1-2). The first part concerns an evaluation of five Activities Implemented Jointly (AIJ) projects implemented under the Netherlands' pilot project programme, which ran between 1994-2000, on the basis of project documents (plans and realised outcomes) and field trips (including interviews with stakeholders).

These five AIJ projects were part of a pilot programme; their dual aim was simultaneously to contribute to sustainable development and to reduce GHG emissions. The evaluation sought to improve the understanding of what may be expected from such projects and to elucidate the relation between expectations and actual outcomes. The AIJ projects evaluated were implemented in Costa Rica (wind power), Vietnam (biogas), South Africa (mini-hydro plant), China (sunny greenhouses) and India (biomass gasification).

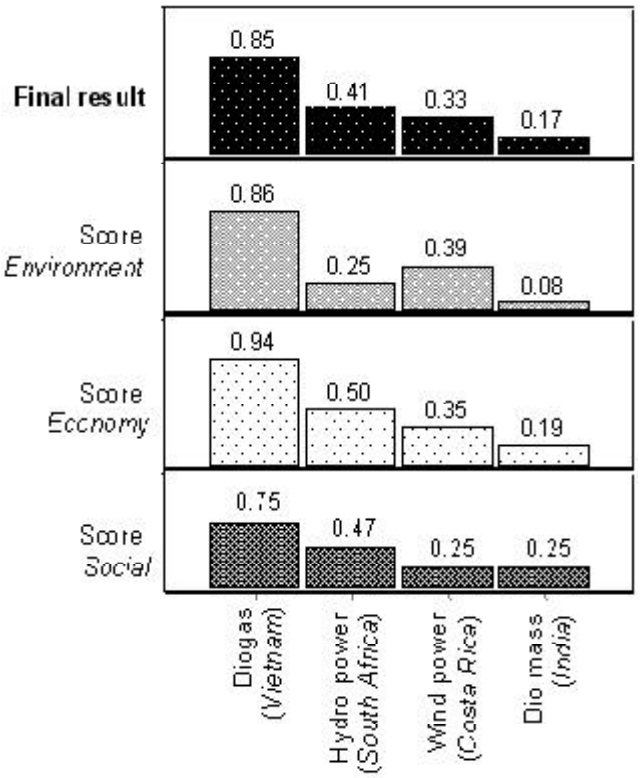

Figure 1. Scoring and ranking of four case studies on the basis of equal weights for environmental, economic and social impacts.

Results

The results of the AIJ projects in terms of their contribution to sustainable development are mixed (see Figure 1). While one project was successful in reducing GHG emissions and in contributing to various aspects of sustainable development, another project performed well on sustainable development criteria although its GHG emission reductions were modest.

On the basis of the assessment, several general conclusions can be drawn with regard to whether the projects meet the various criteria of sustainable development. The key common elements between the projects are as follows:

* The full report will be released by the Netherlands Ministry of Foreign Affairs in 2008. Detailed case studies of the AIJ projects can be found in Gupta, J., van Asselt, H. and van Beukering, P. (eds.), 2007, *Pilot Projects in the Climate Change Regime and Sustainable Development*. IVM Report S-06/35, Vrije Universiteit Amsterdam. This article has been written by the researchers and does not necessarily reflect the views of IOB or the Netherlands' Ministry of Foreign Affairs."

1. Four of the five projects contributed to *reducing GHG emissions*. Only for the Chinese project, reductions were not measured partly due to malfunctioning, as well as the absence of a proper baseline.
2. All the projects had *low local pollution impacts*, except for the South African case study, where the loss of one wetland was replaced with the rehabilitation of another wetland.
3. Four of the five projects could have benefited from greater involvement from the local partners in order to determine *local benefits* that could have made the projects more socially acceptable and viable. Only the Vietnamese project had considerable local participation in the projects.
4. None of the five projects generated substantial *local employment*, as this is possibly inherent in the nature of such small-scale projects. Only in the construction phase of some of the projects, a large number of local workers were employed.
5. The projects do not necessarily reveal that women's interests were compromised; yet *gender aspects* were rarely explicitly taken into account. Where the interests of women have been taken into account, this has been done because of national legal requirements (the shareholders group in South Africa) or in a way relatively unrelated to the project (women empowerment in India).

Lessons learned

The pioneering projects faced different types of initial hurdles. Some projects took a long time to develop (*e.g.* Costa Rica) or to secure national permits (South Africa). Other projects (*e.g.* China) started without a properly developed baseline. The more successful projects succeeded largely because the partners were proactive in ensuring that the project was well developed, managed and executed. More specifically, several success factors have been identified:

- *Demand-driven*: The more successful projects are those for which the choice of the technology was based on an assessment of local sustainable development needs.
- *Design*: Good project design is a critical factor to deliver a significant contribution to sustainable development, but also to enhance a project's cost-effectiveness.
- *Documentation*: Also essential is the maintenance of high-quality project documentation, since this enables local managers to be aware of the effectiveness of their operations, and to intervene if necessary.
- *Long-term planning*: It should be recognised that projects to promote innovative ideas with demonstrative effect in developing countries inevitably take longer to develop.

For the studied AIJ projects, the objective of supporting sustainable development in the host countries (see above) was not systematically enforced. Therefore, only one of the five projects (Vietnam) explicitly took sustainable development into account. Hence, this project scores very well in terms of meeting sustainable development criteria and with respect to GHG emission reductions per EURO spent. This project was also the most cost-effective of the five – indicating that a well-designed project can simultaneously be cost-effective and meet criteria of sustainable development.

A Post-2012 Perspective for Joint Implementation

*By Lennard de Klerk**

It is proposed that the European Union allows post-2012 emission reductions from JI projects to be used for compliance purposes in the third phase of EU ETS from 2013 to 2020. This will substantially boost investor confidence in emission reduction projects in Central and Eastern Europe, supporting the reduction of several 100 million tonnes of GHGs[1].

Background

Joint Implementation (JI) projects are project activities in Annex-I countries having a quantitative target under Annex B of the Kyoto Protocol. The mechanism is particularly valuable for the countries of Central and Eastern Europe – whose industrialised economies were highly inefficient in energy use, and which still have massive investment requirements to modernise their industry. In that respect JI projects are more focussed on renovating the existing industrial complex.

Compared to the CDM, few JI projects have reached the carbon market so far. In the early days of JI the start of the crediting period of 1 January 2008 looked far away, no international guidelines for JI projects existed and JI approval procedures were absent. In 2006 and 2007 the situation of JI changed significantly as the JI Supervisory Committee established rules and most Host Countries have their approval procedures in place. As we saw in the CDM, it takes a while before a market has gained sufficient momentum and confidence from investors to take off.

The problem

Just as the momentum for JI is now building up with daily JI PDDs being published, projects are bumping into a brick wall: the crediting period for JI expires on 31 December 2012 – in only five years time. This is in contrast to CDM projects where the crediting period is from the start of the project for ten years or three periods of seven years. A long-term perspective is necessary for Kyoto flexible mechanisms to be valuable for large investment projects in the energy, steel, mining and cement sector which have lead times of several years and long-term paybacks. When only three to four crediting years remain, the credits provide insufficient incentive for the investment. The Bali agreement aims at a new post-2012 agreement by the end of 2009, but project developers cannot wait another two years. Investors in JI need a perspective *today*.

The solution

A post-2012 perspective for JI can easily be created by the European Commission. While designing the third phase of the EU ETS (2013 – 2020), the Commission should acknowledge the importance of JI as a compliance tool, and a way of improving the fuel efficiency of its neighbouring countries Ukraine and Russia. The latter is of strategic importance for Europe's security of supply.

The commission should allow ERUs[2], generated post-2012, to be used for compliance purposes in the third phase of the ETS. To give clarity to the crediting period of a JI project, the period should be set by the Commission similar those of CDM projects, i.e. 10 years. The latter will also facilitate non-Annex I countries that want to become Annex I countries (and convert from a CDM to a JI country), but would like to have a similar crediting period for their existing and emission reduction projects.

One argument against a firm stance on JI (and CDM) projects is that the JI/CDM mechanism can be a useful negotiation tool with Russia and non-Annex I countries. However, by allowing only ERUs and CERs from *new* projects (started post-2012) in Host Countries that have joined a new international agreement, the incentive is kept as the JI/CDM project stream will dry-up in those Host Countries not joining the new international agreement. But predictability and certainty is provided to investors if *existing* projects (started pre-2013), will be recognised in all cases.

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1 Estimation of already developed JI PDDs vary between 205 PDDs with 215 million tCO_2 (UNEP Risoe center, December 2007, www.cdmpipeline.org/ji-projects.htm) and 295 JI PDDs with 270 million tCO_2 volume (Point Carbon, September 2007, ji.unfccc.int/Workshop/15_October_2007.html). It is estimated that about the same amount of projects is currently under development.

2 In a JI project ERUs are converted from AAUs in the Host Country registry. In absence of a new international agreement, no AAUs can be converted into ERUs. In that case ERUs should be created similar to CERs. Should a new international agreement be reach, keeping JI as a mechanism, the new rules can be used to create ERUs.

ENTTRANS

Sustainable Cooking Technologies

As part of the EU-funded research activity ENTTRANS, an overview is given of the status of a number of low-carbon sustainable energy technologies in different categories: cooking, heating and cooling, electricity production, energy efficiency, lighting, and carbon capture and storage. For each of these technologies the main characteristics and functions are explored, as well as their availability in different parts of the world, their implementation chain characteristics, and how the CDM could enhance their implementation. JIQ briefly describes these technologies in a series of articles. This issue will focus on cooking technologies. The background technology descriptions for this article have been Prepared by Dr. Katherine Begg (University of Edinburgh, UK) and Ms Sarina Adhikari (Asian Institute of Technology, Thailand), who are both partners in ENTTRANS.

Improved technologies for cooking address one of the most important issues for poor people in developing countries. According to Practical Action (2007; http://practicalaction.org/?id=energy), 2.4 billion people in the world use biomass for cooking, which could be wood, crop residues, charcoal, or animal waste. IEA (2006; World Energy Outlook 2006) states that by the year 2030 another 200 million people extra worldwide will rely on biomass for their cooking and heating needs. Switching to cleaner fuels and having access to those fuels is one strategy for dealing with the problems of the health effects caused by the smoke and other pollutants released in enclosed cooking areas.

The following cooking technologies have been identified under ENTTRANS:

- **Improved cook stoves**: Through efficiency improvements of widely used wood stoves for cooking purposes in developing countries, the amount of toxic smoke can be reduced. In its simplest form, improved stoves rely on the provision of an enclosure for the fire to reduce the loss of radiant heat and protect it against wind. In addition, by controlling the upward flow of the combustion gases, the transfer of heat to the cooking pot can be strenghtened.
- **Ethanol and methonal cook stoves**: Stoves based on ethanol/methanol can be used for cooking, water heating and heating of buildings. Ethanol is produced from sugar plants or other sources of biomass and can thus be considered a carbon-neutral energy source. Methanol is derived from natural gas and therefore still results in emissions of CO_2
- **Biomass gasification stoves**: This technology converts biomass into a mixture of nitrogen, carbon monoxide, hydrogen, and methane, which can be burnt for cooking.
- **Cook stoves based on liquefied petroleum gas and liquefied natural gas**: For heating and cooking the technology using these fuels is very similar to existing gas stoves and is commercially available in almost all countries. The main condition for these technologies is a good supply chain for both LNG and LPG. Existing gas stove burners can be easily adapted to burn LNG and LPG, which are both widely available and have, among other applications, been used extensively for heating and cooking, both in the EU and in developing countries.
- **Solar cookers:** People have been using solar cookers or ovens for centuries. Solar cookers may be used to cook food and to heat the drinking water. The cooker concentrates and bends solar radiation with the help of a reflecting surface on the back, top, and bottom sides of a pot. Handling it is easy, but the solar cooker does need its space: the larger the reflector surface, the stronger its power to heat.
- **Charcoal**: Charcoal is used as a domestic fuel for cooking and heating in many developing countries. It is the most popular barbecue fuel throughout the world. Its advantages when used as a domestic fuel are that it: produces less smoke while burning, requires little or no preparation before actual use, has a higher energy content per unit mass, can be easily transported and stored, and reused when left over after cooking.
- **Biogas**: Biogas is a gaseous mixture generated during anearobic digestion processes using waste water, solid waste (*e.g.* at landfills), organic waste, and other sources of biomass. Biogas generally has a methane component of 50 to 60% and can be used for several purposes among which cooking, (on-site) power production and heating.

Sustainable development

All these technologies have in common that they contribute to modernising the cooking procedures, in particular in developing countries. In particular, they contribute to improving the health conditions in

houses. For instance, Warwick and Doig (2004, Smoke: the Killer in the Kitchen, Indoor Air Pollution in Developing Countries, ITDG Publishing, London) estimate that each year 1.6 million women and children die because of smoke-related complaints, mainly due to cooking on traditional biomass in houses. In addition, since these technologies require no or much less biomass, the drudgery for women in children in developing countries, who, under business-as-usual circumstances, generally collect the wood for the traditional biomass stoves, is strongly reduced. This provides scope for alternative activities for women (other work) and children (school).

In terms of environmental benefits, there is some controversy about the GHG emission reduction potential of improving cooking technologies in developing countries, as it is important to consider the full life cycle of the fuel and the materials used in the technology and the products of incomplete combustion. For most biomass technologies (and many other technologies) this data is not available. However, there is some work comparing wood burning stoves with LPG and kerosene stoves which indicates that the results depend on whether GHGs other than methane and CO_2 are included in the analysis.

For example, when considering CO_2 and methane only, renewably harvested biomass emits less GHG than kerosene, LPG, and natural gas or coal gas. If a more comprehensive list of emissions associated with incomplete combustion of biomass is used, then the picture changes. The better quality fuels, which are more fully combusted and have less products of incomplete combustion, have less contribution to global warming than wheat, maize or wood fuel. At best, 100% renewably harvested wood has a similar contribution to the better quality fuels.

Gasified biomass in combination with renewable harvesting methods can achieve low GHG emissions. The emissions from conversion of biomass to ethanol would therefore have to be taken into account before a proper comparison can be made of the effect of these different stoves on GHG levels.

Ethanol is usually derived as a by-product of sugar production, biomass distillation or from sorghum or jatrophia and should therefore be carbon neutral. This means that there should be a significant reduction in CO_2 emissions compared to an unsustainably harvested wood stove or fossil fuelled kerosene stove. The displacement of wood fuel means that unsustainable harvesting of wood is halted and tree cover has a chance to regenerate. This conserves biological diversity as well as increasing sinks for GHGs.

Biogasification stoves are efficient, boiling 25 litres water for 1 kg wood chips with no pollutant emissions. These stoves use waste agricultural products so that they are normally carbon neutral and also reduce deforestation rates.

In China, Grimm *et al.* (2002, Fostering EU-China cooperation in the development of the biomass fuelled heating and cooking stove market in China, 12th European Conference on Biomass Energy, Industry and Climate Protection, 17-21 June 2002) estimate that 130 kg/capita/year of coal are used for heating and cooking. The potential for emission reductions in GHG and air pollutants from coal is very high. Not only does the coal result in SO_2, NOx, total suspended particulates, and CO_2 emissions, but also has arsenic, lead, mercury and fluorine, as well as other poisonous pollutants. The problems of air pollution from coal burning in Beijing are well known and similar problems exist throughout China. Therefore, large benefits can be gained from reducing the use of coal in inefficient stoves as the acid rain problem in Europe in the 1970s and 1980s demonstrated with the death of forests and reductions in crops, as well as health effects caused by the air pollution from coal-fired power stations and local small inefficient stoves.

Market penetration

The commercial availability of modern cook stoves in developing countries depends on the country circumstances, such as resources to pay and the fuel supply chain. In some cases the technology has been transferred to developing countries, whereas in other cases the technology has been developed and manufactured in a developing country itself. Examples of the latter are the 'Superblu' ethanol stove in Malawi, the 'Cooksafe' ethanol stove from South Africa and the NARI ethanol stove in India (see Figure 1 on p.10). For ethanol and methanol stoves, an important aspect of the applicability is that they must be coupled to the supply chain for the fuel.

Improved cookstoves are very cheap but do not last as long as the ethanol stoves. In Kenya, for instance, ethanol stoves have not been widely used. Instead the *Upesi improved cook stove* is popular and interventions include hoods and windows in the kitchen. Grimm *et al.* (2002) describe an EU-China joint venture on the development of a biomass heating and cooking stove project under the EU-China Local Authority linking programme. The existing stoves have a low efficiency (15-25%) and produce air pollution

which is now recognised as a serious problem in Beijing and solutions being sought under this project were biomass oriented. Grimm *et al.* (2002) quote the annual market capacity in Beijing for stoves at 10 million according to statistics from the Ministry of Agriculture. In 2002 only 3 million units were being produced commercially so that a large market for efficient low emission stoves in China remains to be explored.

Barriers and drivers for establishing markets are similar to other technologies with quality control service back up, spare parts and maintenance being important for establishing a customer base. In India, Rajvanshi (2004, Development of stove running on low ethanol concentration, Nimbkar Agricultural Research Institute (NARI), India, November 2004) points out that the Indian Government has to change regulations to allow low grade ethanol to be available as a cooking and lighting fuel for household purposes. There are obvious social problems in making alcohol available in this way which would have to be addressed. The ethanol supply would have to be treated to ensure that supplies were not misused given that ethanol is used for drinking. For instance, ethanol gel could be a solution for that problem.

Also cultural aspects play a role in the success of technology transfer. Solar cookers are an example of this. 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.

CDM perspective

Improving cooking technologies in developing countries would have many benefits, as has been described above. It would reduce the need for traditional biomass in cooking which would reduce the pressure on forests from where the firewood is taken. It would create opportunities for women and children in poor regions since they do not have to spend time anymore (or at least much less time) on firewood collection. Introduction of sustainable cooking technologies would also lead to GHG emission reduction as they lead to reduction in the use of firewood from unsustainably harvested wood and in several cases also of kerosene. Finally, and perhaps the most important contribution of improved cooking technologies would be to reduce the health impacts of cooking on traditional biomass or kerosene as the problems of in-house smoke can be greatly relieved.

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However, the technologies require a clear analysis of the implementation chain as it some cases the stoves can be produced in the countries whereas in other countries they must be imported. There are also supply chain issues, *e.g.*, for ethanol and methanol, and care needs to be taken of cultural aspects in the countries.

Since both a sustainable development contribution and CO_2 emission reduction can be achieved from introduction modern cooking technologies in developing countries, such activities would, in principle, fit well under the CDM. Given their size and characteristics, transfer of modern cook stoves to developing countries through the CDM would require a programmatic approach. CDM programmes of cooking technology transfer activities do not need to be developed entirely from scratch since there have been several programmes already to introduce the technologies. For example, in almost all countries in Asia improved cook stove programmes have been initiated, with over 189 million improved cook stoves disseminated thus far and 35 million stoves installed in India (Bhattacharya and Salam, 2006, A Review of Selected Biomass Energy Technologies: Gasification, Combustion, Carbonization and Densification, A publication of Asian Regional Research Programme in Energy, Environment and Climate, April 2006).

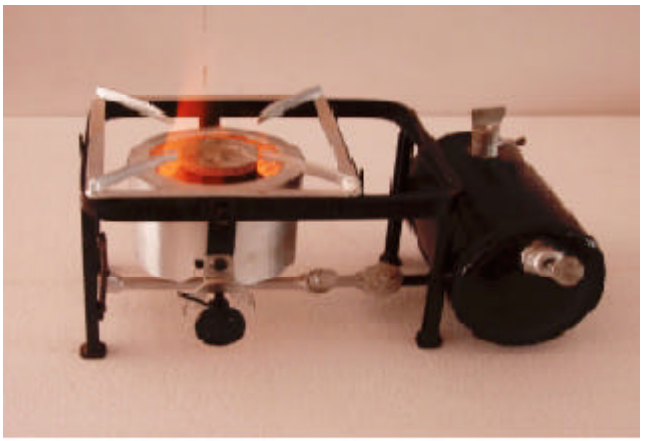

Figure 1. The NARI cookstove developed by the Nimbkar Agricultural Research Institute (Rajvanshi *et al.*, 2004). It is based on a modification of an existing pressurised kerosene stove which uses either a standard or a dilute ethanol mixture derived from sugarcane or sweet sorghum.

Air Quality Benefits of CDM Projects can be Significant

*By Stefan Bakker**

The CDM can be an attractive instrument for local policymakers to improve air quality. Industry and transport sector projects may have high ancillary benefits in term of air pollutant emissions and associated damage reductions. However, a sharp increase in transport sector CDM projects is needed to achieve a significant impact.

This is concluded in the research and capacity building project CURB-AIR, which addresses the question 'how can the CDM contribute to better air quality in Asian cities?' This project entails a research collaboration agreement between the Energy research Centre of the Netherlands, Stockholm Environmental Institute (UK), Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas (Spain), Centre for Energy and Environmental Resource Development (Thailand), Yayasan Pelangi (Indonesia), Winrock International (India), and Energy Research Institute of the Shandong Academy of Sciences (China), and is co-funded by the European Commission.

In the past two years, we have carried out research on air quality and CDM. The Asian project partners have been working with local policymakers in four cities: Jakarta, Bangkok, Bangalore and Jinan. Each of these cities suffers from severe health impacts due to urban air pollution. Policies to improve air quality are being developed, however implementation of the measures appears difficult and slow in practice. This is particularly true for the transport sector, which is in many cases the key sector to address in these densely urbanised areas.

Therefore, in interaction with stakeholders in four Asian cities, four case studies that represent promising measures to improve air quality and are potential CDM projects, were identified:

- Bus rapid transit (BRT) systems (Jakarta and Bangkok),
- Ethanol/diesel blend in bus fleet (Bangalore), and
- Biomass gasification (Jinan).

In Jakarta 7 corridors of BRT are in operation while 3 others are under construction. An expansion to 15 lines was planned until the year 2010. However, due to financial constraints and decreasing of political and public support, this expansion is currently under debate. It is, however, unlikely that corridor 8-10 can be applied as CDM due to the possibility of operation to start in mid 2008. However, corridor 11-13 and corridor 14-15 are likely to be developed as CDM projects. The approved methodology AM0031 for BRT can be used, as the Jakarta case is very similar to the Transmilénio project in Bogotá (Colombia) which was approved earlier by the CDM EB. To apply this methodology, an extensive set of data is needed to establish the baseline, and should be monitored accordingly when the project is implemented.

However, based on a rough calculation of the potential emission reduction in corridor 11-13, there is an option to develop and apply a simplified small-scale baseline methodology. Another possibility is to combine corridor 11-13 and corridor 14-15 to be implemented as programmatic CDM. All those options are currently being assessed and further detailed feasibility study is needed to gather all data required for the baseline and monitoring methodologies.

Bangkok is currently constructing its first BRT lines, and six more lines are being planned in the next three years. The local government has shown great interest in CDM. However, AM0031 cannot be used, as this BRT is intended to complement the existing public transport system rather than replace it. The recently rejected methodology NM229 (Insurgentes in Mexico City) appears to be suitable, though. We therefore hope this methodology will be resubmitted and approved in the not-too-distant future, as the three BRT lines that are under consideration are likely to stand a good chance to generate CERs.

Blending of diesel with ethanol is a new technology that has been demonstrated to be successful in buses in the South-Indian state of Karnataka in recent months. An additive is required to make the two substances mix properly. In addition to climate benefits, the blend also results in significant reduction of air pollutant emissions (*i.e.* more than just the blending percentage)

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in Bangalore. It is a very promising technology with a large potential for replication. With regard to CDM, the development of a new methodology for the blend is being worked on.

In Jinan (Shandong province, China) a significant part of the dust pollution affecting the city originates from open air burning of agricultural residues in nearby villages. Therefore, if the biomass would be collected and used for electricity production, this would both reduce GHG-, as well as air pollutant emissions. A 2-MW biomass gasification demonstration plant is currently being constructed. If running successfully, this technology has a great potential for replication. This could be done under the CDM, making use of ACM0006 or AMS I-D.

We have explored environmental impacts based on the case that the 2-MW biomass gasification plant (BGPG) would be replicated five times in villages close to Jinan. Annual emission reduction would amount to approximately 63,000 tCO_2-eq. In addition, emissions of particulate matter (PM10), SO_2, CO, VOC, and to some extent NO_x, are reduced significantly, making the health benefits associated with this technology large.

Economic valuation of impacts on human health of air pollution has been studied using the *ExternE damage costs* methodology. By applying this methodology, we estimate the health cost of the open air burning of biomass residues for a single site (i.e. the baseline scenario) to be approximately RMB* 40 million (€ 4 million) annually. Using this biomass in the gasification plant will reduce this impact greatly, with almost 90% as shown in the graph below. We note that the calculations are based on a European methodology and the figure should not be interpreted as a comprehensive assessment. Therefore, the cost valuation in the graph is presented in relative terms.

For the other transport case studies, due to the complexity associated to the mobile nature of the sources, as well as extensive data requirements, the reduction in air pollutants have not yet been quantified accurately. However, these transport cases will also result in urban air quality improvements. The example of Jinan shows that the air quality benefits of projects that could qualify under the CDM can be substantial, and perhaps can outweigh the climate benefits. However, in the international context, only the GHG reductions can generate additional revenues for project developers. Therefore, the CDM could be seen by local policymakers as a window of opportunity to finance projects that improve the local environment. With more transport sector projects and baseline methodologies currently under development, there could be future for the air quality – CDM concept.

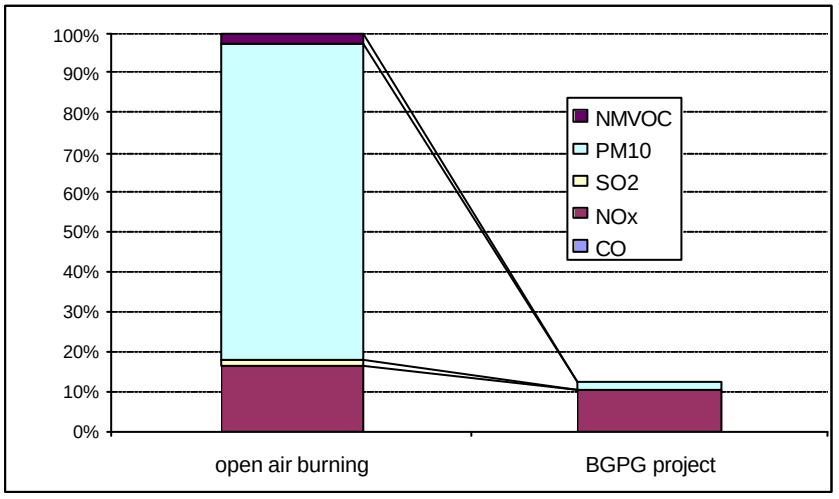

Figure 1. Reduction of air pollution health cost for the Jinan biomass case

* Renmimbi (literarly people's currency), the official currency for the People's Republic of China

The European Energy and Climate Policy Plan

On 23 January 2008, the European Commission presented a plan of reforms in the EU energy policy. The document must still be approved by the European Parliament and the EU member states. According to the draft, the GHG emission reduction is supposed to reach 20% below 1990 levels in 2020 and 30% in case of a follow-up to the Kyoto Protocol. Apart from that, 20% of energy production will originate from renewable sources, as opposed to 8.5% at the moment. Moreover, 10% of the fuel demand of the transport sector will be covered by biofuels, which: do not originate from countries with high biodiversity carbon stocks, use best agricultural practices for its production and account for carbon emissions at least 35% lower than those resulting from oil.

The cost of the reforms is estimated at €60 billion per year. Due to the increasing use of renewable energy sources, the prices of electricity are supposed to rise with 10-15% by 2020. On the other hand, such a solution for fulfilling of energy demand will result in reduced costs of energy import accounting for €50 billion per year. Another source of savings resulting from the proposed draft is the less strict air pollution control, which comes round to additional €11 billion per year until 2020.

The draft also concentrates on emissions trading in the period between 2013 and 2020. As for ETS, it is proposed to extend its scope with chemical and aluminum industries and to include other GHGs besides CO_2. At the same time, the quota of emission permits will be reduced by 21% as compared to 2005 levels.

Moreover, the power sector will be entitled to full auctioning of the emission permits and it is suggested that the energy-intensive industries will have been given free energy permits by 2010. The proposed draft foresees stepping away from national allocation plans for CO_2 emissions and replacing those by a cap per sector applying to EU as a whole with separate auctioning rights for each of the member states. The profits from auctioning, which will amount to ca. €50 billion per year, will be awarded to the member states provided that 20% of the revenues will be used for investments aiming at battling the climate change.

Emissions from sectors beyond the scope of ETS (*e.g.* transport, building, services and agriculture) will on average be reduced with 10% by 2020 as compared to the 2005 levels. The national emission reduction targets will be calculated on the basis of GDP per capita (ranging from –20% to +20% of 2005 levels).

The presented plan also sets rules for carbon capture and storage and for state aid in creating environmentally friendly power generation schemes. The government funding may be used to cover the difference between production costs and market prices.

CDM Methodologies approved by the CDM EB

(updated 5 February 2008)

- Registered CDM project activities (918)
- Approved large-scale project methodologies (48); 49 in October 2007
- Approved Consolidated Methodologies (12); 12 in October 2007
- Approved Afforestation and Reforestation Methodologies (10); 8 in October 2007
- Approved Small-scale afforestation and Reforestatio Methodologies (3); 8 in October 2007

For most up to date information regarding approved and consolidated methodologies, see: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

JI project status

(updated 5 February 2008)

- Registered JI project activities (1)
- JI project activities at determination (110)

Books, studies and reports

A. Evans and D. Steven, "Climate Change: the State of the Debate", New York University's Center on International Cooperation.

The report is a part of the London Accord launched on December 19, 2007. Evans and Steven discuss what the reasons behind the increasing interest of politics in climate change issue are and whether that interest will last. The authors also concentrate on the ways of raising awareness of climate change among various social groups and explore the future perceptions of the issue.

For further information, please contact:
Alex Evans, alex.evans@nyu.edu
David Steven, david@riverpath.com

V. Oikonomou and W. van der Gaast, "Linking Policy Instruments for the Post 2012 Era: Joint Implementation and White Certificates as a Hybrid Scheme", International Association for Energy Economics, Fourth Quartet 2007.

Nowadays, there is a debate on the issue of market mechanisms under the Kyoto Protocol. With a view to the post-Kyoto era also other policy options are explored which contain different market-based instruments. An example of such a policy option is the concept of White Certificates, which aims to improve energy efficiency. Compared to the Kyoto mechanisms (*i.e.* International Emissions Trading, Joint Implementation, and the Clean Development Mechanism), which have been broadly discussed in the literature, the topic White Certificates is quite new, and only a few literature sources address it

The authors state that JI gains potential in combination with other policy mechanisms. The JI – White Certificates combination derives from the same policy targets in case of both instruments. Oikonomou and van der Gaast discuss the possibilities of merging White Certificates and JI and thus create a new climate policy mechanism.

For further information, please contact:
Vlasis Oikonomou,
Copernicus Research Institute for Sustainable Development and Innovation, Utrecht University, the Netherlands; University of Groningen, the Netherlands, e-mail address: v.oikonomou@rug.nl; or
Wytze van der Gaast, Foundation Joint Implementation Network, The Netherlands, e-mail: jin@jiqweb.org

Ott, H., 2007. Climate Policy Post-2012 - A Roadmap: the Global Governance of Climate Change, Wuppertal Institute for Climate, Environment and Energy, Discussion paper for the 2007 Tällberg Forum.

This paper gives an overview of the scientific findings behind climate change policy presented by the Intergovernmental Panel on Climate Change, as well as the analysis done by Sir Nicholas Stern. Furthermore, it documents the diplomatic efforts to tackle climate change in the context of the UNFCCC and other arenas.
For further information, please contact:
Wuppertal Institut für Klima, Umwelt, Energie GmbH Döppersberg 19, D - 42 103 Wuppertal, Tel: (0202) 2492 246 /- 129 (Sekr.), Fax: (0202) 2492 250, e-mail:hermann.ott@wupperinst.org

Creyts, J., A. Derkach, S. Nyquist, K. Ostrowski, J. Stephenson, 2007. "Reducing U.S. Greenhouse Gas Emissions: How much at what cost?", McKinsey and Co, U.S. Greenhouse Gas Abatement Mapping Initiative, Executive Report, December 2007.

This report was prepared by McKinsey and Company, in cooperation with business leaders, industry experts, academics and environmental NGOs. The goal of the research was to determine the costs and possible solutions for reducing and preventing GHG emissions is the U.S. in coming 25 years.

This report can be downloaded from:
http://www.mckinsey.com/clientservice/ccsi/pdf/US_ghg_final_report.pdf

IDEAcarbon/ECON, "Global Carbon Report, December 2007 Update".

The December 2007 update to the Global Carbon Report is an annex to the main report published in September 2007. There are additional two updates to follow in March and June 2008. The December issue provides a detailed analysis of price sensitivity in EU ETS and also concentrates on other recent developments in the carbon markets taking place after the publication of the main report.

For more information about the Global Carbon Report visit www.ideacarbon.com.

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

7-8 February 2008, Climate Change Diplomacy, Malta.
Organised by Diplo and Ministry of Foreign Affairs in Malta.
Contact: conference@diplomacy.edu

27 February 2008, Getting Our Message Straight on Climate Change, Brussels, Belgium.
Organised by the Regional Environmental Center for Central and Eastern Europe and the European Economic and Social Committee.
Contact: cc@rec.org

11-13 March 2008, Carbon Market Insights 2008.
Organised by Point Carbon
Contact: conference@pointcarbon.com

31 March - 4 April 2008, First session of Ad hoc Working Group on Long-term Cooperative Action under the Convention and the first part of fifth session of Ad hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
Contact: http://unfccc.int/meetings/items/2654.php

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