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Encouraging CDM energy projects to aid poverty alleviation

Attachment 1

Review of CDM Activities



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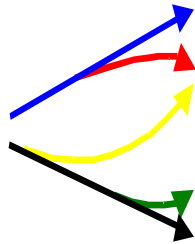
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Acronyms:

AIJ	Activities Implemented Jointly
BAU	Business As Usual
BEA	Bureau of Environmental Analysis
CAN	Community Action Network
CAPA	Clean Development Mechanism for Poverty Alleviation Project
CCPO	Climate Change Projects Office for the UK
CDCF	Community Development Carbon Fund of the World Bank
CF-Assist	Carbon Fund Assist for capacity building for the CDM from the World Bank
CDM	Clean Development Mechanism (defined in Article 12 of the Kyoto Protocol)
CEEST	Centre for Energy Environment, Science and Technology
CER	Certified Emission Reductions (generated from CDM projects)
CO ₂	Carbon dioxide
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC)
COP-MOP	Meeting of Conference of the Parties to the United Nations Framework Convention on Climate Change serving as the Meeting of the Parties to the Kyoto Protocol
CP	Commitment Period
DC	Developing countries
DFID	Department for International Development
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board for the CDM
EF	Emission Factor (kgCO ₂ /kWh)
ER	Emissions reduction
ERU	Emission reductions units
EPA	Environmental Protection Agency
FDI	Foreign Direct Investment
GHG	Greenhouse gas
HH	Household
IB	Intermediate Body
ICS	Improved Cook Stoves
IET	International Emissions Trading
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation (outlined in Article 6 of the Kyoto Protocol)
KITE	Kumasi Institute for Technology and the Environment
KENGEN	Kenya Generation
KP	Kyoto Protocol
LDC	Least developing countries
MCDA	Multi-Criteria Decision Analysis
MEND	Moving towards Emissions Neutral Development
MHP	Micro hydro power plants
MVP	Monitoring and Verification Protocol

M&V	Monitoring And Verification
NBSSI	National Bureau for Small Scale Industries
NGO	Non Governmental Organisation
NEMA	National Environment Management Authority
ODA	Official Development Assistance
PCF	World Bank Prototype Carbon Fund
PDD	Project Design Document
PHP	Pico Hydro power plant
PP	Project participants
SD	Sustainable development
SHS	Solar Home Systems
SSN	South- South- North project
SUSAC	Start-up Clean Development mechanism in ACP countries (Africa, Caribbean and Pacific)
TATEDO	Tanzania Traditional Energy Development Organization
TANESCO	Tanzania Electricity Supply Company
UNFCCC	United Nations' Framework Convention on Climate Change
UNEP	United Nations Environment Programme
VPO	Vice Presidents Office in Tanzania
WBCSD	World Business Council for Sustainable Development

1 Introduction

The work undertaken in this study concerns small-scale energy projects in developing countries. These projects have been investigated as though they were CDM projects. Enabling small-scale projects through minimising transaction costs by using streamlined baselines and procedures is one focus for the study. Another main focus is the assessment of the sustainability benefits from the projects and establishing an approach for that assessment for DC partner country project approval. A third area is the capacity building aspects required to enable these projects to be implemented easily.

This attachment to the final report sets the scene for this project in terms of the international and UK CDM initiatives and in terms of what has been happening in the three host countries (Tanzania, Kenya and Ghana) in this study. We begin in section 2 with the CDM in its UNFCCC context with a specific focus on the CDM process cycle and the methodological issues of CDM project appraisal. Section 3 contains an overview of the type of CDM initiatives which have taken place to date, ranging from capacity building, to methodological studies, to the development and evaluation of projects on the ground. The African context to the CDM is introduced in Section 4 where an outline is given of the common developments and gaps encountered in the three case-study countries of the CAPA project. An overall discussion of the findings is presented in chapter 5.

At the outset of this study there was some concern that so much was happening on the CDM that there was a risk of duplicating other initiatives from different organisations. This is of course always a possibility but it is clear that there is so much to be done in this area if successful projects are to be implemented on any large scale that duplication would even be beneficial if a wider range of stakeholders is reached. The report on the workshops in Attachment 5 illustrates the amount of work and information being requested from developing country hosts. This confirms that the study reported here has not duplicated other work but has expanded and contributed to existing knowledge as well as been of practical benefit to the host countries involved. Indeed the workshop outputs are a powerful argument to DFID to expand this work in the future.

Previous research sponsored by DFID (Begg *et al.*, 2000) showed that small scale energy projects in urban/rural areas can deliver direct sustainability benefits. Under the UNFCCC, the Marrakesh Accords now make specific reference to small scale projects and propose that they should be fast tracked. There is a need for CDM implementation modalities for small scale projects, not only because of the relatively high transaction costs involved, but also to ensure that sustainability benefits are indeed delivered effectively in accordance with local priorities and distributed equitably among all developing countries (DCs). At the moment there is no agreement on how CDM should 'contribute to sustainable development'. This Attachment 1 to the final report aims to:

- Provide an overview of the international mechanisms and the decisions taken at COP-7 with regards to CDM rules and modalities.

- Provide an overview of international and African activities to progress on the CDM, in order to define more closely the niche for the CAPA project in view of ongoing developments.

2 Introduction to the Clean Development Mechanism

Under the Kyoto Protocol, agreed at COP 3 in 1997, three ‘flexible’ mechanisms were agreed. The principle behind these mechanisms was economic efficiency. Reductions could take place where it was cheapest to do so to give countries with targets flexibility in meeting their reduction commitments to minimise overall costs though these mechanisms were to be used in addition to domestic action. The three mechanisms are known as Emissions Trading (ET), Joint Implementation (JI) and the Clean Development Mechanism (CDM).

We are concerned here with one of these mechanisms called the Clean Development Mechanism. The CDM encourages projects in developing countries which (a) reduce greenhouse gas (GHG) emissions and (b) contribute to Sustainable Development (SD) in the host country.

After COP 3 a plan of action was agreed for progressing to meet the targets set and the year 2000 at COP6 was set as the time at which agreements on the methodologies should be finalised. The Kyoto Protocol could then be ratified and come into force and with it the CDM would become operational.

What has happened did not go according to plan due the problems that the US has with reducing their GHG emissions. The sequence of events which followed the failure of the talks in The Hague in 2000 was that there was complete withdrawal of the US from the Protocol despite their ratification of the UN Framework Convention on Climate Change. This put the Protocol into crisis because it cannot come into force unless 55% of countries have ratified and they represent 55% of the emissions.

A continuation meeting was arranged for the summer of 2001 in Bonn, COP6bis. At this meeting many of the issues on methodologies were resolved but at a price. The original target had to be relaxed through the use of Article 3.4 on Additional Activity sinks. This loophole has meant that the overall reductions fell from -5.2% to around 1-2% depending on the assumptions made. Nevertheless all countries rallied round and agreed to go forward despite the US position. This was reinforced at COP 7 at Marrakech where the final agreements were reached on a range of issues. Compliance needs the ratification of the Protocol before final legal changes can be made. Australia in the meantime dropped out of the Protocol to join the US.

The first meeting of the Executive Board for the CDM took place immediately after COP7 and they set up an expert group on the CDM and another on small scale projects. A target for reporting by COP8 was set for small scale project development modalities by COP 8 in India in 2002. At that meeting, a report on streamlined modalities for small-scale CDM projects produced by the small scale Expert Group was approved. This report

included the simplified baseline methodologies and the monitoring requirements for the range of specified project categories for small scale projects.

The categories of project specified are listed in the following Table.

Table 2-1: Project categories for small scale CDM projects

Project type	Project Category
Type (i) Renewable energy projects	A. Electricity generation by User/Household B. Mechanical energy for the User/Enterprise C. Thermal energy for the User D. Electricity generation for a system
Type (ii) Energy efficiency improvement projects	E. E Supply-side energy efficiency improvements- Transmission and distribution F. F Supply side energy efficiency improvement – generation G. Demand side energy efficiency programmes for specific technologies H. Energy efficiency and Fuel Switching measures for industrial activities I. Energy efficiency and Fuel Switching measures for buildings
Type (iii) Other project activities	J. Agriculture K. Switching fossil fuels L. Emission reductions in the transport sector M. Methane recovery
Types(i) to (iii)	N. Other small scale projects (new or revised)

At COP 8 the EB agreed to elaborate on some of the definitions in the text for small scale projects and to draw up an indicative list of energy sources/eligible project activities to explain the terms ‘renewable energy’ and ‘energy efficiency improvement project activities’. Since then at the SBSTA meeting in 2003 the EB announced that six CDM proposals have had their PDD approved subject to some small changes.

The position at the time of writing is that Russia was expected to ratify in May 2003 and this would clear the final hurdle of the 55% emissions rule. However it is now expected to take place at the World Climate Conference at the end of September 2003. Most countries are going forward on the assumption that the Kyoto Protocol will come into force. The UK and Denmark already have an emission trading scheme and the EU is in the process of agreeing a proposed design for an EU wide scheme.

In the following sections we go into more detail on the progress on the CDM but first of all describe the actors in the process and their roles.

2.1 The CDM actors

An overview of the actors in CDM projects is provided below. Their general rights and responsibilities are briefly mentioned while their roles in the project design cycle are discussed in more detail in section 2.2

COP/MOP

The COP/MOP will oversee the rules and procedures of the EB, the accreditation standards for and the designation of operational entities, review of regional/sub-regional distribution of CDM project activities.

Executive Board (EB)

The EB ('Board') is authorised to accredit Designated Operational Entities (DOEs), develop and maintain the CDM registry and approve methodologies for baselines, monitoring plans and project boundaries.

Designated Operational Entity (DOE)

The DOE is a body (e.g. commercial consultants) that has been *accredited* by EB and *designated* by COP/MOP. DOEs are entities who are authorised to validate a project design Document (PDD) and verify and certify emission reductions. It must submit an annual activity report to the EB, are reviewed every 3 years and must accept that spot-checks may be carried out at any time.

Host Party

The host party (i.e. the developing country) in a CDM project must be a party to the Kyoto protocol and designate a national authority for the CDM.

Donor Party

The CDM compliance requirements for the donor country (an 'annex 1 with annex B commitment party') are more elaborate. The donor party must:

1. Be a party to the Kyoto protocol
2. Have targets, calculated as agreed in Article 3 of the Kyoto protocol
3. Have a national system for estimating sources and sinks of GHG, as in Article 5
4. Have a national registry as agreed in Article 7
5. Have submitted the annual inventory (Article 5 & 7) (in the first commitment period, quality assessment only is needed for sources/sector categories from annex A)
6. Have submitted supplementary information on emissions and carbon sinks (Article 3; paragraph 3, 4, 7, 8 and Article 7, paragraph 4)
7. Will be considered to have met the 6 above eligibility requirements unless the enforcement branch of the compliance committee believes that these requirements have not been met (24.CP.7) or, based on reports of the expert review teams (Article 8), decides not to proceed with implementation related to these requirements and transmits this to the secretariat.
8. Will be considered to continue to meet the (first 6) above eligibility requirements until the enforcement branch of the compliance committee decides that the party does

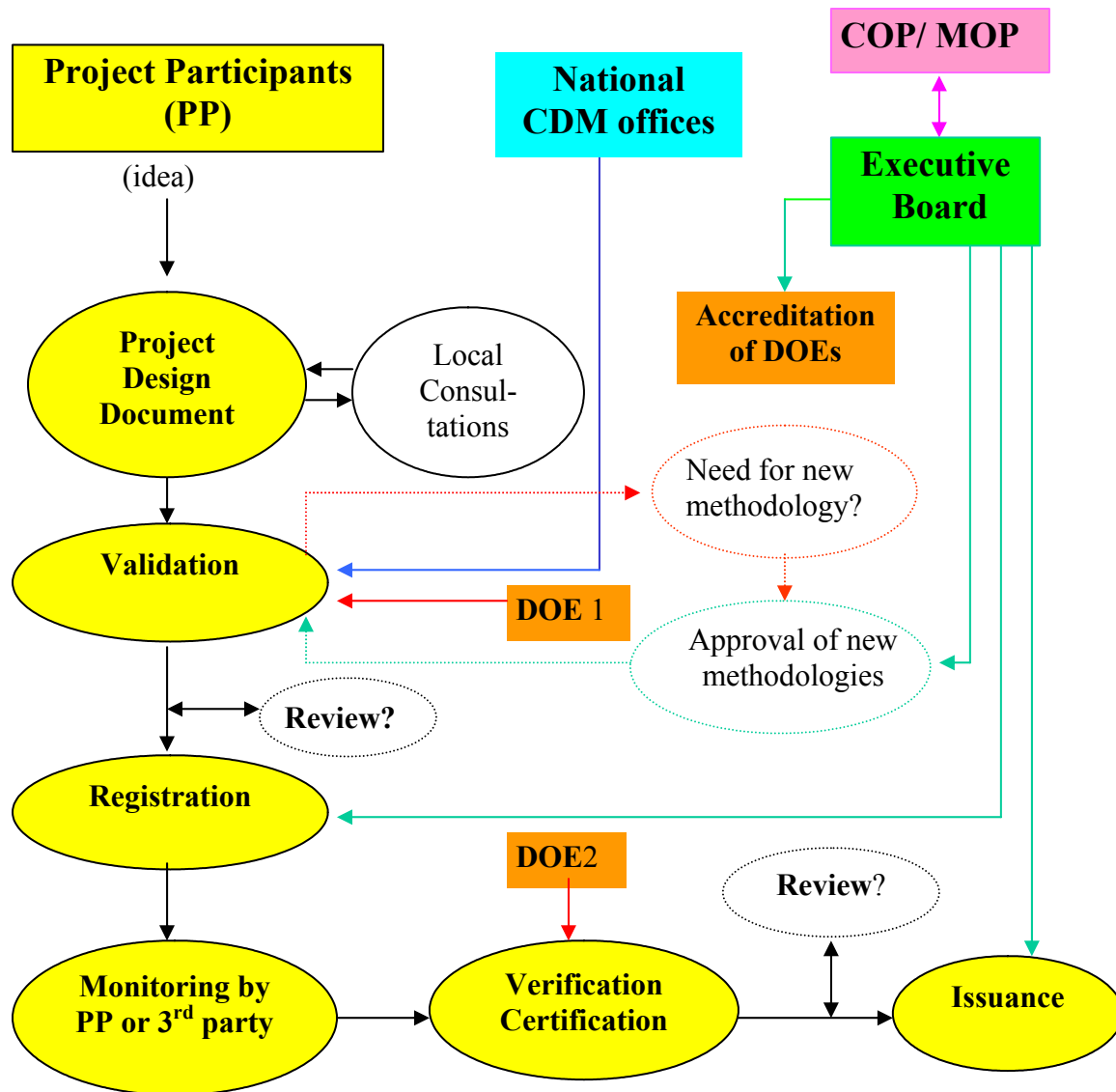
not meet one or more of the eligibility requirements, has suspended the party's eligibility and has transmitted this information to the secretariat.

2.2 CDM Project Cycle

In order to generate the Certified Emission reduction certificates or CERs which can be credited towards a target or sold on the carbon trading markets the project participants must follow a specific set of procedures agreed within the Marrakech Accords. The procedure is known as the project cycle and consists of a number of generic stages. When project developers (Project Participants or PP) decide to pursue a project, they have to produce a *Project Design Document* (PDD). This PDD requires *Validation* by a Designated Operational Entity (DOE) and is then submitted to the Executive Board (EB) of the CDM for *Registration*. Then the project can be initiated by the PP. While the project is running, *monitoring* must take place according to the approved plan. Then a DOE must be hired for the *Verification* of the monitoring process and *Certification* of the amount of emission reductions resulting from the project. Upon certification, *Issuance* by the EB will take place, and the PP will receive the appropriate amount of emission reduction certificates (CERs). The DOE for the validation can be the same as for the verification only for small scale projects.

The requirements and characteristics of the generic stages are discussed in more detail below and illustrated in Figure 2-1.

Figure 2-1 CDM Project Cycle



The main process stages are in yellow. Coloured arrows correspond with the colours of the responsible organisations. Dotted lines indicate additional procedures which may occasionally take place.

2.2.1 Project Design Document (PDD).

The preparation of a good project design document (PDD) is essential if the project is to produce CERs. The details to be included in a PDD have been specified and it ought to include the following:

- Estimation of additionality of the project ie that the reductions produced are additional to any that would have happened in the absence of the project;
- calculations of baselines, the emissions path for what would have been the emissions in the absence of the project ;
- description of boundaries;
- leakage potential in terms of increased emissions elsewhere as a result of the project activities;
- national policy and context of host country;
- crediting period;
- Environmental Impact Assessment (EIA);
- Description of (local) public consultation and resulting adjustments to the plan. *For small-scale projects this public consultation phase is not required.*
- Proposed monitoring methodologies and plan conforming to M&V requirements;
- Project must not divert ODA;
- Technology (transfer) must be sound and safe;
- Written approval must be obtained from donor and host countries, stating their voluntary participation;

2.2.2 Validation by a Designated Operational Entity (DOE)

The project developers contract a Designated Operational Entity (DOE) to review the PDD and ensure that the above validation requirements have been met. When contracted by the PP, the DOE must:

- Comply with laws of host countries when carrying out its functions (validation/registration, or verification/certification);
- Demonstrate that it has no conflict of interest with the participants;
- Only be involved in the validation /registration, or the verification/certification, unless permission is requested and granted by the EB to do both. Maintain a publicly available list of all CDM projects it has worked on;
- Make information obtained from the CDM project participants publicly available, including information about additionality, baseline methodology and EIA;
- Baseline and additionality methodologies in the PDD must be approved by EB. If the project requires the use of new methodologies, then these must be submitted by DOE and approved by EB prior to registration;
- DOE's validation report is made publicly available upon transmission to EB.

2.2.3 Registration by the Executive Board (EB) of the CDM

When the DOE decides validation requirements are met it sends a report to the EB who will register the project. Registration by the EB is automatic 30 days after validation, unless a review is requested by a UNFCCC party, or stakeholder, or approved NGO, or 3 members of the EB.

The request for registration must include written approval of voluntary participation by the national offices of each party involved (DNA).

2.2.4 Monitoring by Project Participants (PP)

When the project is implemented the project participants (or the third party they contracted) must monitor emissions during the project lifetime and report as set out in the PDD. Changes to monitoring methodology must first be approved by DOE. Monitoring of environmental and social impacts is also required for an EIA.

2.2.5 Verification and Certification by DOE

The DOE will verify monitoring data and certify the exact amount of emissions reductions. Verification (ex post determination of emission reductions) by DOE includes site visits, checks of monitoring data and calculation of emission reductions. Certification is written assurance that emissions are reduced by X amount. Monitoring, verification and certification reports are made publicly available. For large-scale projects the DOE at this stage must be a different entity from the one involved at the validation stage.

2.2.6 Issuance by the EB

The EB will issue the Certified Emission Reductions (CERs) 15 days after certification, unless within that period, a review of DOE2 is requested (only if fraud, malfeasance or incompetence of the DOE is suspected).

2.3 Methodological issues in CDM project appraisal

The project design document requires specific inputs that are listed below. These are taken in turn and are discussed in greater detail.

1. Definition of Project Boundaries
2. Assessment of Country Context
3. Assessment of Additionality
4. Definition of Crediting Lifetime
5. Projection of Baseline Scenario
6. Monitoring of Project
7. Calculation of Emissions Reduction
8. Correction for Leakage
9. Uncertainty and the need for conservative estimates

2.3.1 Project boundaries

“The project boundary shall encompass all anthropogenic *emissions* by sources of greenhouse gases under the *control* of the project participants that are *significant* and reasonably *attributable* to the CDM project activity.” (Marrakech Accord, 2001). Project boundaries may vary considerably from one type of project to the next. For example in the case of a off-grid micro-hydro plant, not only the plant itself (zero emissions) is likely to be placed within the boundaries, but also any activities which may be offset by the plant (e.g. kerosene lamps if plant used for lighting). In the case of building insulation improvements, the boundary may include the appropriate fraction of the upstream emissions from (e.g.) coal power plant used to supply electric heating.

2.3.2 Assessment of country context

In order to assess additionality and define the baseline, a country context is needed. Country context would typically include details of current country factors which may affect the project (e.g. fuel/ technology mix in energy sector, environmental regulations, economic/ environmental policies), but also projections of future changes in these country factors.

2.3.3 Additionality

“A CDM project activity is *additional* if anthropogenic *emissions* of greenhouse gases by sources *are reduced below those that would have occurred in the absence of the registered CDM project activity.*” (Marrakech Accord, 2001). This may be interpreted as

environmental additionality (project reduces GHG emissions) or investment additionality. It is not clear that it is sufficient only that the project reduces emissions below a baseline if that would have happened under normal business as usual conditions. The project would then have been in the baseline and would not be additional. However policy makers remain ambiguous about what is meant in practice.

A more comprehensive discussion on additionality is available under Begg et al (2002) Essentially assessment of investment additionality is required to stop free riders. Investment additionality was the original AIJ pilot phase meaning of additionality where projects must not be business as usual. Investment additionality could be demonstrated by evidence of *barriers* to the project's realisation, such as the lack of capital or technical know-how, or by investment criteria such as the Internal Rate of Return. In addition to investment additionality, there is financial additionality; projects must be additional to overseas development aid (ODA).

2.3.4 Crediting lifetime

Crediting Lifetime is the period over which the project can earn credits for emissions reduction. Crediting lifetime can be considered as the period over which the project is also *additional*, i.e. the end of crediting lifetime is the moment when the project would have taken place under normal economic development.

Research by CES on uncertainties in calculation of reductions concluded that opting for a short lifetime is the simplest way of preventing over-estimation of emissions reduction (Jackson *et al.*, 2001). The Marrakech Accord (2001) states that crediting lifetime should be either be a maximum of 10 years; or a maximum of 21 years, revised every 7 years.

2.3.5 Baseline scenarios

“The *baseline* for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that *would occur in the absence of the proposed project activity.*” (Marrakech Accord, 2001). An example of setting a baseline scenario is displayed in Table 2-2.

Table 2-2: Example of setting a baseline scenario: An off-grid micro-hydro plant which supplies electricity to a rural village for lighting and electrical appliances.

- | |
|---|
| <ul style="list-style-type: none"> • Crediting Lifetime:
set at 21y as micro-hydro plant unlikely to be built before then under normal economic development. • Baseline is uncertain so look at a <i>range</i> of alternatives, e.g.:
Baseline 1 (low emissions) offsets lighting provided by kerosene lamps and electricity from car batteries for 21y
Baseline 2 (high emissions) offsets lighting provided by kerosene lamps and electricity from car batteries for first 10y, after which village might have been grid connected, and grid electricity supplied by a combination of coal and natural gas for next 11y |
|---|

2.3.6 Monitoring

The performance of a project must be monitored to estimate emissions of project activity and to calculate emissions of baseline activities. For energy projects, it is common to monitor *energy output/consumption* (rather than direct emissions) as this usually is simpler and still provides good accuracy. Small-scale projects are relatively more difficult and time-consuming to monitor. Take for example a programme to deliver 50,000 improved cookstoves. It is impractical to monitor each stove, so use surveys to estimate the use and therefore total emissions reduction.

Table 2-3 Example of calculating emissions reductions: An off-grid micro-hydro plant which supplies electricity to a village.

- | |
|---|
| <ul style="list-style-type: none"> • Monitor energy output (MWh) of plant • Project emissions <ul style="list-style-type: none"> – zero as no emissions from micro-hydro • Baseline emissions, use between: <ul style="list-style-type: none"> – emission factors of (e.g.) kerosene lamps (tCO₂/lamp); coal power plants (tCO₂/MWh); or – appropriate level of baseline activity, eg number of kerosene lamps, MWh from grid |
|---|

2.3.7 Calculation of Emissions Reductions

Project emissions are based on emission factors (e.g. tCO₂/MWh) or, since emissions can be zero, project activity (e.g. MWh). Baseline emissions are based on emission factors (e.g. tCO₂/MWh) or the level of baseline activity considered ‘appropriate’ (e.g. MWh from plant, number of kerosene lamps). Where possible, equivalence of service should be aimed for, so that projects can be readily compared (Table 2-2).

2.3.8 Leakage

“Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs *outside the project boundary*, and that is measurable and attributable to the CDM project activity.” (Marrakech Accord, 2001). In practice, leakage is very difficult to measure and a simple correction factor may be better (e.g. -10% of emissions reduction). Three different types of leakage pathways can be identified (Table 2-3).

Table 2-3 types of leakage pathways.

Leakage pathway	Nature of leakage	Description
Economic	Negative	The project leads to a reduction in demand for the displaced fuel, leading to a price drop and an increase in sales and consumption elsewhere
Technological	Positive	The project leads to an increase in the use of the project technology elsewhere in the region/ country
Erroneous boundary	Negative	A biomass project assumes that the fuel is from a CO ₂ neutral source, but in fact there is net forest loss

Unfortunately the negotiated text suggests that the baseline leakage should be taken into account when the baseline is counterfactual and this is therefore not possible.

2.3.9 Uncertainty and the need for conservative estimates

Uncertainty in estimating emissions reduction of a CDM project is high, mainly due to *immeasurable baseline*. This can be compounded by difficulties in defining project boundaries, monitoring (esp. small-scale projects) and leakage. Hence, *estimates must be conservative* to prevent compromising the aims of Climate Convention

2.4 Small-scale project modalities

At COP8 new streamlined modalities were adopted for small-scale projects. A new simplified project design document was formulated in conjunction with guidance on simplified baselines, boundaries, monitoring and verification. Though there are some problems with this document which are discussed in Attachment 4, the following gives an indication of the major differences between the standard approach as defined above and the concessions to small-scale projects. We begin with the definitions of small-scale projects.

2.4.1 Definitions

Small scale projects are defined in the following terms.

- Renewable energy projects with maximum output capacity equivalent of up to 15MW
- Energy efficiency improvements which reduce energy consumption on supply or demand side by up to 15GWh/y
- Other project activities that both reduce emissions and directly emit less than 15kt of CO₂e annually

There are problems with these definitions and further explanations are planned.

2.4.2 Key differences compared to standard CDM

In the streamlined modalities the main difference is in the baseline methodologies assigned to the project types which are now prescribed rather than left to the developer. This means that the time spent on baseline formulation is drastically reduced. There are some problems with the current recommendations that are discussed in detail in Attachment 4, but they do streamline the process. Where there is no suitable baseline then a proposed approach can be submitted to the EB for approval and this will then be incorporated in the guidance.

Associated with these baselines are recommended project boundaries and monitoring and verification guidance. One major recommendation in every case is that there should be no correction for leakage. Additionality is specifically addressed as mainly in terms of the barriers faced by the project though financial IRR values can also be used. The calculation of emission reductions is therefore greatly simplified and transaction costs lowered.

There is no requirement for public consultation on the PDD but this has to happen anyway from the inception of the project for these small-scale projects. As mentioned earlier the DOE responsible for the registration can be the same for certification. An EIA is not required and would never be required for these very small-scale projects. However this can leave them vulnerable to abuse of the delivery of sustainability benefits.

This new guidance is being continuously updated and improved.

3 Overview of international CDM initiatives by activity

3.1 Introduction

The number of CDM related research and project activities taking place in the world is rapidly growing. For this reason the initiatives mentioned in this report cannot be considered to be comprehensive. CDM initiatives can cover various themes or types of activities and there are various ways to organise a discussion of these initiatives on a thematic basis. A number of generic activity types are put forward here to provide a pragmatic structure for discussing the various CDM initiatives. These types of activities are very briefly summarised in the following sections.

3.1.1 Capacity Building

Capacity building seems to have been the most common initiative, and is also often named as an important objective in various other initiatives. Capacity building workshops, seminars and projects were also amongst the earliest initiatives, and are still a major objective of most organisations active in CDM. Much of the initial capacity building was (understandably) focussed on the training of national experts, so developing countries could participate more effectively in the COP (for example the African Climate Network, active since 1991). Only more recently capacity building initiatives have also been undertaken outside central government or the larger energy/industry sector. The local business and finance sectors are now often identified as a key target for capacity building, especially if a country is to exploit the possibilities offered by unilateral CDMs. One example of such an initiative is the UNDP/ UNIDO/ UNCTAD sponsored project titled "Engaging the Private Sector in Clean Development Mechanism Project Activities under the UNFCCC/Kyoto Protocol," where UNIDO focuses on the capacity building¹.

It is not clear to what extent the different potential stakeholder groups (in different countries/ regions and sectors) have been able to benefit from the various capacity building efforts. Gaps in capacity building are likely to limit the range of feasible CDM projects in the near future as the lack of capacity will increase transaction costs.

3.1.2 Country studies and emissions inventories

Almost equally common are initiatives to identify and analyse the sources, trends and possible scenarios of emissions for different countries. These initiatives, which typically have a large capacity building component, include the US Country Studies programme and inventory & mitigation studies carried out by a variety of other organisations, such as ECCEE/Risø (e.g. Senegal, Egypt, Botswana), GTZ (Tanzania, Namibia, Zambia),

¹ <http://www.unido.org/asdocs.cfm?did=330967>

Berkeley National Laboratory (Brazil, India) and SEI-Boston (Tunisia, Sudan). Many of these studies were carried out in behalf of the UNDP/GEF.

It seems that in most LDCs, emissions inventories have taken place or are ongoing. To which extent the level of detail in these inventories is sufficient to inform the development of promising CDM projects is not clear at the moment.

3.1.3 Developing methodologies

Many initiatives have focused on the development of methods related to CDM appraisal (see section 2.3), ranging from discussions of specific issues to the development of 'handbooks' for overall assessment. Studies include methods for determining baselines and additionality for (non-small-scale) projects (e.g. Meyers, 1999; Lazarus *et al.*, 1999, 2000; Ellis *et al.*, 2001; Sathaye *et al.*, 2001; Bailey *et al.*, 2001; Jackson *et al.*, 2001) and methods for economic or more integrated assessments (e.g. Lazarus *et al.*, 1994; Sathaye and Meyers, 1994; Christensen *et al.*, 1998; Markandya, 1998). A recent EU study (Probase) on additionality methodologies, baseline methodologies and standardisation of baselines has been completed in early 2003. This should provide more streamlined procedures for large and small projects.

3.1.4 Sectoral studies and market scenarios

Some studies are focused on a specific sector such as agriculture (e.g. Lazarus *et al.*, 1997), carbon sequestration in soils (e.g. Ringius, 1999), transport (e.g. Figueroa, 1999; Halsnaes *et al.*, 2001), the use of wind turbines or PV (Wamukonya, 2001). There has also been a fair amount of research directed at liberalisation and market transformation of the electricity sector (e.g. Turkson, 2000; Christensen *et al.*, 2000) or the market penetration of renewables (Martens *et al.*, 2001). There have also been a number of scenario studies to assess the potential nature and size of the international emissions trading market (see MEND report for an overview). Most of these indicate that Africa will benefit least from the CDM, because of factors such as low growth emissions profiles (fewer opportunities for reductions) and lack of institutional capacity (resulting in higher transaction costs).

3.1.5 Promoting small scale projects

There has been a growing interest in the promotion of small scale projects, especially for regions such as sub-saharan Africa, where the potential for large scale CDM projects is clearly limited.

At an ECN workshop² on CDM SHSs in Washington on September 11 2001, it was noted that the Bonn definition of small scale -smaller than 15MW- was actually still covering quite large projects. It was suggested to introduce a new category, that of micro projects, ranging from 0.1 to 1 MW, which would require extremely simplified procedures. At a second workshop in Amsterdam (26 September 2001), it was concluded that small-scale projects have high developmental priority and streamlined procedures are required to stimulate these projects. These workshops also fed into ‘streamlining procedures for small-scale CDM projects’, a COP 7 side-event organised by the Swiss government which also recommended streamlined procedures and a ‘positive list’ for micro-scale projects. The streamlining of rules and procedures would consist of the following four elements which are expected to reduce transaction costs, the main obstacle for small-scale CDM:

1. allowing for unilateral CDM projects. This will allow small-scale projects to materialise that would never attract international investment.
2. bundling of small-scale projects that are similar so that the international CDM investor only has to deal with the organisation that bundles the projects.
3. Standardisation of baselines so that the costs of baselines development and additionality determination will be reduced.
4. Simplified monitoring and verification procedures (e.g. random controls for project bundles)

Since the attention for small scale CDM projects is fairly recent, it is not surprising to find that studies on simplified modalities for small scale CDM projects are rare. Begg *et al.* (2000) present the results of a broad-based evaluation study of four different small-scale technologies, showing that there is a great deal of potential for positive action using the CDM. They propose a simplified baseline methodology for various small-scale projects which confronts the problem of equivalence of service. To date there has been at least one example of a strictly methodological study that aimed to develop a methodology for streamlining the CDM process for a particular technology. The results of this ECN study (Ybema *et al.* 2000) did not seek to take account of SD benefits (see following section). However the baselines have been incorporated into the current guidance for both SHS and MHP projects.

DFID commissioned work in 2002 to review the current definitions of small-scale projects and evaluate options for simplified modalities. Even with recommended simplifications it was suggested that additional support for these types of projects would be required for transaction costs and performance risk mitigation. It is generally acknowledged that accreditation of in country DOEs will also reduce costs but the requirements for accreditation are onerous and few DC organisations could afford to offset the risk.

Another initiative has been the GHG protocol initiative from the WBCSD. This has been progressing since 2002. Voluntary participation of experts has been encouraged to

² Organised by ECN, IT power and Sunrise technologies.
www.ecn.nl/unit_bs/kyoto/mechanism/cdmshs.html

progress sets of modalities for all aspects of the PDD. Unfortunately though there is a secretariat for this process it is mainly ad hoc in terms of participation so there is a danger of lack of balance in the final outcome.

It is clear that small-scale CDM projects are important for the poorest countries, and therefore required to obtain an equitable geographical spread of CDM projects. But despite the clear recognition of the need for simplified or tailored modalities for small scale and micro-scale projects, more research still has to be carried out. The EB is dealing with new proposals for baseline methodologies using two independent experts to vet the proposals made by consultants. Final decisions are made by the EB.

3.1.6 Seeking sustainable development benefits from CDM projects

The relationship between energy supply and the various aspects of poverty and SD appears to be well researched, for example by the UNDP (e.g. Misana and Karlsson, 2001; Olmos, 2001) but also by DFID (e.g. the Energy for Poverty Reduction (EnPoV) Working Group). However these studies do not provide a direct insight into the methods by which CDM projects should be progressed to provide both GHG emission reductions and SD benefits.

Studies such as Begg *et al.* (2000) have demonstrated that small scale projects in the domestic sector of LDCs can have significant SD benefits, such as freeing up time and energy for other activities (economic, cultural, educational), saving money, and improving living conditions. However, most of the research on the ‘other’ benefits of CDM projects seems to have focused on the environmental impacts of large projects while social impacts, if mentioned, are mostly limited to a handful of issues such as job creation (see for example the publication list of ECCEE/Risø). Illustrative in this respect are the conclusions drawn by Beuermann *et al.* (2000) after an evaluation of a number of AIJ-projects in DCs. They concluded that reporting on sustainability should be tightened and suggested that the project’s environmental impacts other than GHG should be better than those of the reference case (i.e. environmental additionality for non-GHG impacts), and that this same principle should extend to the social and economic impacts. They believe that OECD papers on the use of quantitative indicators and monitoring of participatory approaches would be applicable, while stressing that stakeholder involvement should be designed for the specific project and country circumstances.

Indicators can be used to prioritise projects on the basis SD criteria. In some studies, authors have selected a handful of criteria themselves or elicited these from existing in-country policy documents (WRI, 1999; MEND). In the DFID sponsored MEND project, stakeholders were asked to rank projects according to how these score against the selected SD criteria. Thomas *et al.* (2000; 2001) provide an overview of the various multi-criteria ranking methods available for assisting the decision maker(s).

The main gap in existing initiatives seems to lie in their partial focus (i.e. SD or CDM) rather than an integrated approach. Only an integrated approach can identify potential trade-offs or synergies between poverty alleviation or other SD benefits on one hand and

ER benefits on the other. Another gap lies in the lack of good data underlying many evaluations, for example the MEND project must partially rely on the perceived or hypothetical benefits of projects that have not (yet) been realised. A more detailed examination of the MEND project as well as the S-S-N and SUSAC projects is given in Attachment 3.

3.1.7 Funding of CDM projects for ‘real’ credits

A number of projects have been developed during the AIJ pilot phase which started in 1995 and was further extended at COP7 (see table 4.1). The condition in the pilot phase was that these projects would not automatically earn any credits but could be eligible if they are entered into the normal process. However there are now a number of new initiatives emerging that actually pay for credits. The two main initiatives will be briefly discussed below.

3.1.7.1 The World Bank: Prototype Carbon Fund (PCF), Community development carbon fund, Biocarbon Fund and CF-Assist

The PCF was set up to gain experience in the CDM and contribute to its development. The PCF will contribute about \$ 3.9m to its first African project: The West Nile hydro scheme in Uganda is expected to reduce GHG emissions by about 2 Mt over a period of 21 years. The sustainable development benefits of the project are alluded to, but only in vague terms and seemingly without a ‘real’ assessment (JIQ, 2001):

‘The project has been constructed in the framework of the Ugandan ERT program. The main development target is to provide the municipalities with reliable power. In addition, the project aims to increase the commercial activity in the region. It is expected that this development will lead to better social services’.

The PCF has been criticised for its choice of projects and their additionality has been questioned. Kenya currently has two proposed projects with the PCF.

In response to the need to examine small-scale projects the World Bank set up the Community Development Carbon Fund (CDCF). The purpose is to redress the balance in the flow of funds so that they no longer bypass small countries. They provide access to funds for small projects with high development value by developing a market for ‘development plus carbon’ emission reductions. A Biocarbon fund has also been initiated for sinks projects.

Another initiative which will be useful to all country partners is the CF-Assist programme which aims to strengthen capacity and institutions for JI and the CDM and implement host country carbon market strategies through project and portfolio development and access to the carbon market.

3.1.7.2 The Dutch Carboncredits.nl tender

After an initial round of bidding for JI projects under their 'ERUPT' guidelines in 2000 (which saw 5 projects selected), the Dutch government have had a second JI call closing on the 4th of March 2002 and a first call for CDM bids which closed on the 31st of January 2002. The CDM bids must conform to the Dutch 'CERUPT' guidelines. In addition to taking on board the COP 7 decisions, these guidelines do not seem to elaborate much on SD issues. '*The project proposals will be assessed on the basis of [...] the feasibility and sustainability of the project, and [...] the preferred project technology*'. (JIQ, 2001). These projects are then ranked on price and the cheapest is chosen. Criticisms on the additionality of projects have also been made by NGOs. The problem lies in the low price quoted for the credits which automatically demands large projects which are not necessarily environmentally friendly or additional.

It can therefore be concluded that the credit purchasing CDM initiatives do not attempt to take account of SD benefits explicitly or proactively. This is potentially worrying, since these initiatives may well reflect, or at least influence, the nature of 'real' CDM projects when the Kyoto protocol comes into force.

4 CDM in the African context and the case study countries

4.1 The main sectors for CDM projects in Africa

In the whole of Africa (i.e. including South Africa and North Africa), carbon emissions were 202 M tonnes in 1997 and are projected to be 325mt in 2020. Africa has the lowest fossil fuel consumption of any continent with emissions equivalent to those of Germany or India. In Kenya (annual emissions of 6.8 M tonnes), 67% of the total energy use is consumed in the domestic sector, transport uses 13%, industry uses 12%, agriculture is only 7% and the commercial sector stands at 1%. In Tanzania, woodfuel, charcoal and agricultural residues account for 92% of primary energy use, petroleum accounts for 7.2% while electricity stands at a mere 0.8%. These figures demonstrate the rather limited scope for CDM projects in terms of project type and project size in the LDCs. Significant emissions reductions may well be heavily dependent on the success of micro-scale projects that target the domestic sector, which primarily utilises solid biomass for cooking. The use of biomass also highlights the importance of projects that target the agriculture and forestry sectors. Transport is the biggest sector for fossil fuel use, an expensive and non-indigenous resource in most sub-Saharan African countries.

Under the UNFCCC the current projects in Africa under the AIJ Pilot phase are listed in Table 4-1.

Table 4-1 Overview of planned and ongoing AJI Pilot projects in Africa

Host country	Investing country	type of project
Burkina Faso	Norway	energy efficiency
Djibouti	USA	renewable energy
Equatorial Guinea	USA	fugitive gas capture
Mali	USA	energy efficiency, renewable energy
Mauritania	France	renewable energy
Mauritius	Australia, USA	energy efficiency, renewable energy
Morocco	Italy	energy efficiency
South Africa	Netherlands, USA	energy efficiency
Uganda	Netherlands, USA	energy efficiency, renewable energy, afforestation
Zimbabwe	Canada, France, Germany	renewable energy

Source: JI Quarterly 7(4).

4.2 UK based Activities

The UK has not taken part in the CDM as its priority is to take domestic action first to meet its targets. Nevertheless in view of the development potential of small-scale projects some initiatives could be considered. The Climate Change Projects Office (CCPO) in DEFRA is already a focal point available for companies. If the trend for CDM investment concentrated on Brazil, India and China does continue as predicted, then very few projects could be expected to be implemented in Africa. To redress this situation it is important to facilitate the small-scale projects for implementation in the less developed countries unlikely to be involved in large scale cheap projects under the CDM at present.

A meeting was held at the start of the project with some of the other organisations active in the CDM to find out what was happening with UK actors on the CDM in Africa. Though not intended to be comprehensive, (Ecosecurities were not present the meeting but they are known to be involved in many CDM project proposals), it was clear that there was a lot of activity funded through a variety of sources (Table 4-2). It points to an active contribution from the UK.

Table 4-2 Some of the CDM activities undertaken by UK organisations in Africa.

Organisation/Sponsor	Activity	Country
ESD/FCO	Capacity building, project Identification	Kenya
ESD/EU/DFID SUSAC	Start-up CDM	Zambia, Uganda , Nepal
ESD/KITE/IT Power / FCO MEND	Enabling small scale CDM in LDCs	Columbia, Bangladesh, Ghana,
ESD/PCF	West Nile Hydropower baseline and MVP development: mini grid, old diesel plant substituted	Egypt
ESD	Follow up projects in agro processing ie biomass	Kenya
ESD/PCF	Cogeneration sugar cane bagasse	Kenya
ESD	Tea sector woody biomass	
ESD	Coffee husks	Uganda
ESD	Sugar cane bagasse	Zambia
IT Power	Bagasse	Uganda
IT Power	MHP sites	Ghana
IT Power	MHP sites	Kenya
IT power/ECN/ sunrise technologies/NOVEM/Shell	SHS systems Baselines, streamlined CDM procedures, M&V, Transaction costs, stakeholders, guidelines	8 countries
IT Power/UN Foundation	Capacity Building	China
CES/ITC/KITE/CEEST/ITDGEA/DFID	Encouraging CDM for poverty alleviation (CAPA)	Tanzania, Kenya, Ghana

4.3 Activities in the Case study countries

In each of the case study countries a range of organisations have been active in promoting and capacity building on the CDM.

In Table 4-3, the activities reported by the country partners are listed showing the organisations which have been sponsoring the initiatives. The World Bank in particular has recently become very active in facilitating the CDM.

Table 4-3: Sponsored CDM activities in partner countries

Country	Activity	Organisations
Tanzania	Project for assessment of the barriers for CDM project in industries, institutional, capacity building, addressing barriers and linking to Regional African Programme	UNIDO/ Ministry of Energy
	A solar project in Mwanza Region for an assessment of technical and market barriers.	UNDP/GEF/Ministry for Energy
	A national workshop on national communication to the UNFCCC plus the CDM issues has been conducted on 31 April 2001 with specific areas for action identified as awareness raising, stakeholder involvement, capacity building. Information networks, sectoral policies and the need for projects in line with national priorities and host sovereignty.	Division of Environment
	Regional workshop on CDM projects and related issues	Division of Environment
	Support for climate change institutions There is also the Kilombero forest project, which has generated 15752 pre 2000 GHG credits with a 99yr lease of 13121 ha of which 1700 have been planted.	GTZ, UNEP, UNIDO
	Awareness raising workshop on CDM for Tanzania, Uganda, Kenya and Rwanda and Burundi. CEEST in collaboration with PETRAD the Norwegian International Program for petroleum Management organised a workshop August 1999 for East African delegates on awareness raising for the CDM. Objectives included strategies for East Africa to	Norwegian international programme for Petroleum management (PETRAD)

	participate in the CDM, awareness raising, specific needs, the roles of government, private sector, NGOs etc, and integration and cooperation on CDM processing mechanisms.	
	First workshop on CAPA 2002	DFID
	Final workshop on CAPA	DFID
Ghana	Climate change capacity building project and contribute to African regional approach	UNDP/GEF
	Assistance Program on Vulnerability and Adaptation Studies on water resources	GOG/Netherlands government
	CDM Project (Ghana, Uganda and Zimbabwe). Awareness and use of CDM for sustainable development	GOG/UNEP CCEE/RISØ
	Hosting of African Regional Workshop on CDM	GOG/UCCEE
	Africa CDM Projects Initiative (YA/RAF /98/415	UNIDO
	Build national capacity for development of CDM projects, Develop an enabling environment in Africa to take advantage of CDM for sustainable development	
	Prepare CDM projects to attract inflow of FDI	
	First workshop on CAPA 2002	DFID
	Final workshop on CAPA 2003	DFID
Kenya	a project with CES/ITC in 1998-2000 on evaluating CDM-type projects	DFID
	a project by ESD/EAA in 2000	DFID
	a CDM project	Climate Network Africa.
	Formation of the clean energy technology centre at KIRDI 2001 project	UNEP/UNDP and GOK
	CC activities	Meteorological department
	Capacity building project on climate change 1999 to 2000	University of Nairobi and the Environment Secretariat

	an energy efficiency and auditing project for industry improved cook stoves	the UNDP and the Kenya Government GTZ and USAID have been involved. Other organisations involved in testing, designing, training, dissemination and production activities are Kenyatta University Appropriate Technology Centre (KU-ATC), Kenya Energy and Environment Organisation (KENGO), ITDG, Belleive Foundation, Private Clay Liner Manufacturers and UNICEF.
	Workshop on Enhancing CDM operations in Africa	Canadian JI/CDM office and UNDP
	First workshop on CAPA	DFID
	Partnership building for the CDM	Bureau of environmental analysis (BEA- an NGO), UNDP, GoK
	Workshop on technical design of baseline for CDM projects and technical information exchange (2002)	Bureau of environmental analysis (BEA- an NGO) and the Development Bank of South Africa
	Final workshop on CAPA	DFID
	Workshop on Capacity development for the CDM	World Bank PCF, Ministry of environment and National environment management authority

There are overlaps between these workshops and activities but for each the emphasis has been different so that though there is some repetition there is also new additional information which moves the CDM further forward.

In addition for all countries there is a new initiative from the Earth Council Online Learning Center for Sustainable Development (LearnSD) and the UNCTAD/Earth Council's Carbon Market Programme. They have an online course "The Clean Development Mechanism (CDM) Project Development." This course provides an in-depth study of the rules governing the CDM under the Kyoto Protocol, the CDM project cycle and the requirements and criteria for CDM projects.

5 Discussion and Conclusions

The list of initiatives with regards to CDM is growing rapidly. However there is a lot to be achieved to ensure that CDM projects will become widely developed and will contribute to sustainable development. The increased emphasis on small scale projects can be explained from a number of perspectives. It is clear that small scale projects are needed to obtain the 'equitable geographical spread' of CDM activities in the world, since the poorest countries with small populations (i.e. especially sub-Saharan Africa) offer only very limited scope for large projects. These projects have also been shown capable of delivering direct SD benefits, including poverty alleviation.

Focusing support for CDM projects that provide both GHG emissions reductions and SD benefits can be useful for a number of reasons. First of all these diverse benefits will influence the motivation and commitment of individuals and local organisations that help support a project during its lifetime (e.g. Vine and Sathaye, 1999). SD benefits are likely to provide a lasting positive impact on behaviour and consumption patterns, thus providing a positive leakage/spill-over which will increase the emissions reductions in the future (since the consumers benefit). Also, the group of stakeholders in a project is likely to be diverse, representing different concerns about different impacts. The more impacts/stakeholders are taken into consideration in the project design and implementation, the less likely the project will fail because of unforeseen opposition or lack of support. In fact, for some governmental and non-governmental organisations, involvement in the CDM is more likely to result from their interest in certain SD benefits, rather than from urgent concerns about the impacts of climate change (e.g. Goldemberg and Reid, 1999, although the authors studied large DCs who may have stronger institutions and policies). Finally it should be noted that some CDM projects can offset some of the impacts of climate change on vulnerable groups in DCs. It has been pointed out that most efforts to address climate change to date have focused on mitigation or preventive action to limit GHG emissions, rather than adaptation (Kates, 2000 in Olmos, 2001). However it is possible to identify CDM type projects which can achieve all these simultaneously. For example an ICS project can reduce of need of firewood in an area which is increasingly exposed to droughts. Such a project is likely to save the local community time and money, reduce the pressure on the remaining forests and thus mitigate the impacts of climate change and simultaneously reduce emissions. Such projects should be especially encouraged as they provide more benefits related to climate change, but are also more likely to be urgent from the socio-economic perspectives of the poorest. Such projects would benefit from a more integrated approaches which include the domestic, agricultural and forestry sectors.

It is clear that there is still much work to be done on the development of small scale CDM modalities, broad-based or bottom-up decision processes on SD priorities and capacity building in the case study countries and other LDCs.

In this study we have tried to address the facilitation of small scale projects through the development of a Sustainability Assessment Model (Attachment 3), through the

streamlining of the modalities for a range of small scale projects (Attachment 4), and the exploration of the capacity building and institutional needs of implementing small-scale projects (Attachment 5).

It can be concluded that despite the range of activities already undertaken and documented here, that there is still a need for further work and for capacity building for various stakeholder groups in all countries or regions. The necessary focus on small and micro-scale projects in sub-saharan Africa, only underlines the importance of stakeholder involvement since many of these projects will be community based. The further development of simplified modalities for the different micro-scale projects with associated technologies is a prerequisite to the successful implementation of such CDM projects. The involvement of country partner stakeholders and experts in the development and testing of these modalities has not only been highly desirable to secure valuable data on various real projects in the partner countries, but has also provided a hands-on and interactive format for capacity building with the stakeholders.

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