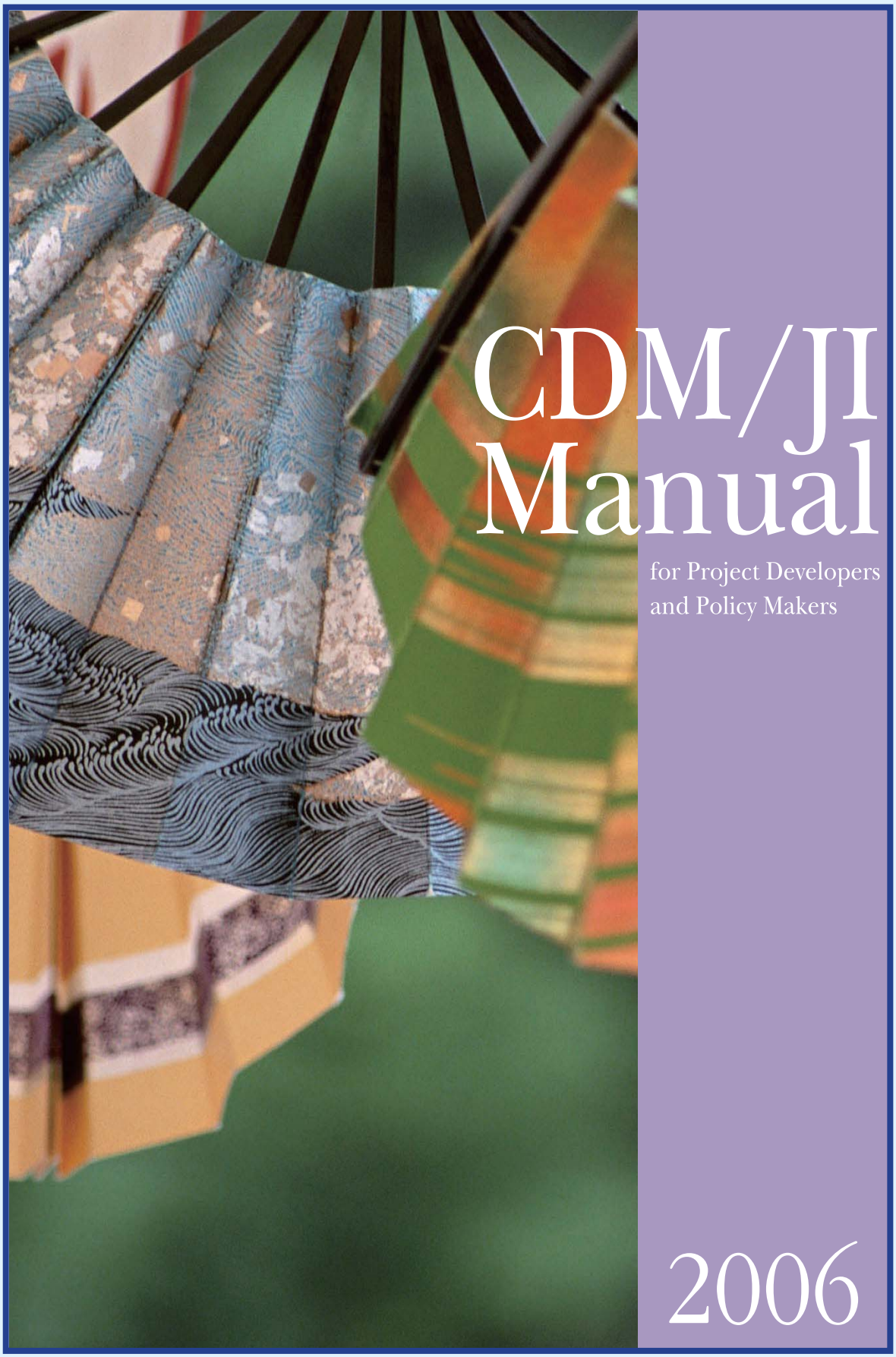

CDM/JI Manual

for Project Developers and Policy Makers

2006

Ministry of the Environment, Japan

Global Environment Centre Foundation

Preface

This manual was originally made for Japanese entities conducting CDM (Clean Development Mechanism) and JI (Joint Implementation) projects, supported by the Ministry of the Environment, Japan (MOE). As the CDM-related rules and procedures are rapidly evolving and have become more complex, there has been growing demand for a comprehensive guide for the CDM, both in Annex I countries and non-Annex I countries.

Eyeing the entry into force of the Kyoto Protocol in February 2005, the MOE and Global Environment Centre Foundation (GEC) responded to this demand by releasing the first version of the CDM Manual in December 2004 that aimed at being a comprehensive guide for a wide range of stakeholders to further promote CDM projects. The COP/MOP 1 officially adopted the Marrakech Accords, including the CDM Modalities and Procedures and the JI Guidelines, as well as recognised the endeavours that the CDM Executive Board (EB) had undertaken. Moreover, the JI Supervisory Committee was officially established, and started to work at its 1st meeting in February 2006. JI-related rules are also rapidly being formulated referencing the EB efforts and CDM-related rules, where appropriate. Under these circumstances, we are pleased to release the latest version of the CDM/JI Manual, updated with the technical assistance of Pacific Consultants Co., Ltd.

We hope this manual will be of help to many people, especially CDM/JI project developers and policy makers. We are pleased if it would contribute to implementation of high-quality CDM projects worldwide.

Ministry of the Environment, Japan (MOE)
Global Environment Centre Foundation (GEC)

Background

The Kyoto Protocol, which was adopted at the third Conference of the Parties (COP3) to the United Nations Framework Convention on Climate Change (UNFCCC) held in December 1997, came into force in February 2005. In order to assist the Parties to achieve their GHG emission reduction targets, the Protocol defines three innovative “flexibility mechanisms” to lower the overall costs to meet the targets. These mechanisms are comprised of the CDM, JI and Emissions Trading. Japan, taking into consideration the use of those mechanisms, plans to advance its emissions reduction.

Since 1999, the Ministry of the Environment, Japan (MOE) has been supporting feasibility studies on CDM and JI projects carried out by Japanese private companies and NGOs. Those studies are to accumulate know-how and experience on project findings and related rules international and domestic, in the aim of finding promising projects.

Global Environment Centre Foundation (GEC) has been managing the CDM/JI Feasibility Study Programme as the secretariat.

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List of Abbreviations

AAU	assigned amount unit
A/R	afforestation or reforestation
AR WG	afforestation and reforestation working group
ACM	approved consolidated methodology
AIE	accredited independent entity
AE	applicant entity
AM	approved methodology
CDM	Clean Development Mechanism
CDM-AP	CDM Accreditation Panel
CDM A/R M&P	CDM A/R modalities and procedures (Decision 19/CP.9, contained in the document FCCC/CP/2003/6/Add.2)
CDM-AT	CDM assessment team
CDM M&P	CDM modalities and procedures (Decision 17/CP.7, contained in the document FCCC/CP/2001/13/Add.2)
CER	certified emission reduction
COP	Conference of the Parties to the UNFCCC
COP/MOP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
DNA	designated national authority
DOE	designated operational entity
EB	CDM Executive Board
ERU	emission reduction unit
GHG	greenhouse gas
IRR	internal rate of return
JI	joint implementation
JI-AP	JI Accreditation Panel
JI-RT	JISC review team
JISC	JI Supervisory Committee
lCER	long-term CER
LULUCF	land use, land-use change and forestry
Meth Panel	Methodologies Panel
NGO	nongovernmental organization
NM	new methodology
NPV	net present value
OE	operational entity
PDD	project design document
RIT	CDM registration and issuance team
RMU	removal unit
SSC	small-scale CDM
SSC WG	small scale working group
tCER	temporary CER
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction to the CDM

1.1 What is CDM?

1.1.1 Clean Development Mechanism (CDM)

The Clean Development Mechanism (CDM) is a mechanism based on the provision of Article 12 of the Kyoto Protocol. It is a scheme for greenhouse gas (GHG) reduction through cooperation between developed countries (Annex I Parties to the United Nations Framework Convention on Climate Change (UNFCCC)), which are committed to certain GHG emission reduction targets in the Kyoto Protocol, and developing countries (non-Annex I Parties), which do not have any commitments to reduce GHG emissions. The purpose of the CDM is to assist to accomplish the GHG reduction targets of developed countries under the Kyoto Protocol, as well as to contribute to sustainable development of host countries. Under the CDM, Annex I Parties implement projects（e.g. projects of landfill gas (methane) recovery with power generation） resulting in reduction of greenhouse gas emissions within the territories of non-Annex I Parties. Annex I Parties are able to acquire all or parts of the credits (certified emission reductions: CERs) which result from the projects (see Figure 1-1).

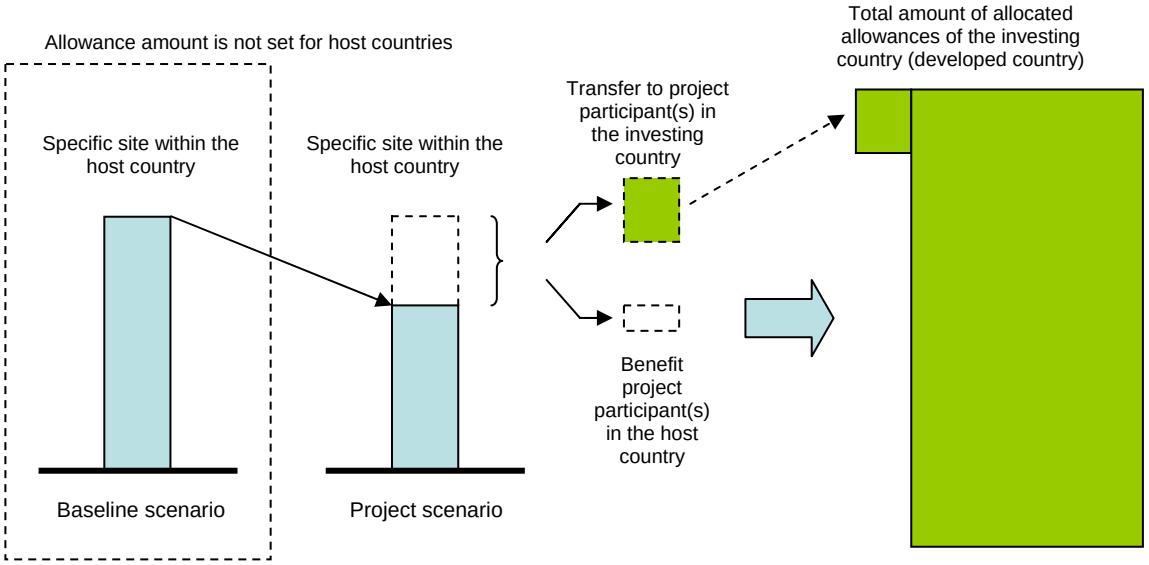


Figure 1-1 Outline of the CDM

Under the CDM, since credits are generated in developing countries that do not have AAUs (Assigned Amount Units[1]), the total amount of permitted emissions in the Annex I Parties increases. The total GHG emissions around the world would increase if CERs would be issued more than actual reductions. Therefore, the CDM requires the projects to follow strict procedures set out by the Executive Board (EB) in order to ensure that the amount of CERs is not overestimated. The procedures include a third-party assessment of emission reductions by Designated Operational Entities (DOEs) through processes called validation and verification, and a final approval of project registration and issuance of CERs by the EB. The Kyoto Protocol requires that the DOE shall certify emission reductions on the basis of:

(a) Voluntary participation approved by each Party involved;

(b) Real, measurable, and long-term benefits related to the mitigation of climate change; and

[1] Credits equivalent to the initial Assigned Amounts of Annex I Parties calculated in a way prescribed in the Kyoto Protocol. AAUs are issued within the national registry of each Annex I Party prior to the First Commitment Period.

(c) Reductions in emissions that are additional to any that would occur in the absence of the certified project activity.

[Kyoto Protocol, Article 12. 5]

The CDM is the only Kyoto mechanism under which credits can be generated starting from year 2000, prior to the Kyoto Protocol First Commitment Period (2008-2012). This is often referred to as "retroactive crediting" (Refer Box 4-2 for details).

1.1.2 Key Concepts of CDM Project

(1) Baseline

Baseline is defined as "the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity" [CDM Modalities and Procedures (CDM M&P)[2], para. 44].

(2) Additionality

The concept of "additionality" is closely related to that of "baseline", and has to be paid particular attention to when setting up a baseline scenario and developing a methodology. It is defined in the CDM M&P that "[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" [CDM M&P, para. 43].

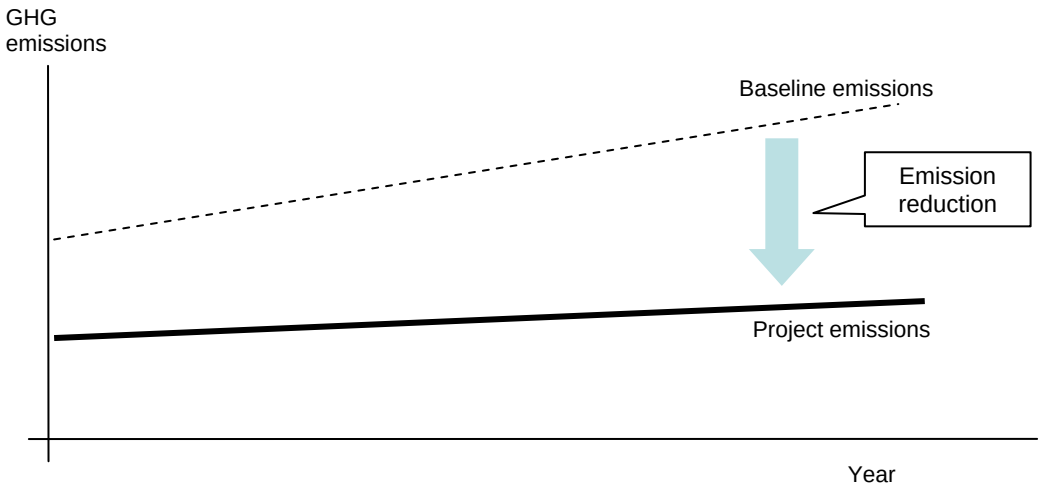


Figure 1-2 Concept of "additionality"

The EB at its 10th meeting provided four options as examples of tools that may be used to demonstrate that a project is additional and therefore not the baseline scenario including, among others:

(a) A flow-chart or series of questions that lead to a narrowing of potential baseline options; and/or

(b) A qualitative or quantitative assessment of different potential options and an indication of why the non-project option is more likely; and/or

(c) A qualitative or quantitative assessment of one or more barriers facing the proposed project activity (such as those laid out for Small-Scale CDM projects); and/or

(d) An indication that the project type is not common practice (e.g. occurs in less than [<x%] of similar cases) in the proposed area of implementation, and not required by a Party's legislation/regulations.

[EB10, Annex 1]

[2] CDM M&P refers to Decision 3/CMP.1: Modalities and procedures for a clean development mechanism as defined in Article 12 of the Kyoto Protocol, contained in the document FCCC/KP/CMP/2005/8/Add.1, pp.6-29.

In addition to this guidance, the EB at its 16th meeting approved the "Tool for the demonstration and assessment of additionality" (hereinafter additionality tool). The most recent version as of October 2006 is version 02 [EB22, Annex 8]. The additionality tool provides a general framework to demonstrate additionality of projects, and is widely applicable to various types of projects although some modification/arrangement is necessary to some project types. Project participants wishing to submit proposed new baseline methodologies may use the additionality tool, but the use of the additionality tool is not mandatory for preparing methodologies [EB18, para. 20].

The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) at its first session confirmed that the use of the additionality tool is not mandatory for project participants, and that in all cases the project participants may propose alternative methods to demonstrate additionality for consideration by the EB, including those cases where the additionality tool is attached to an approved methodologies [Decision 7/CMP.1[3], para. 28].

In spite of that, the additionality tool is still one option usable for the demonstration of additionality of a project. Detailed descriptions of the additionality tool are found in the Section 4.2.4 below.

1.2 CDM institutions

The institutions for the CDM are depicted in Figure 1-3.

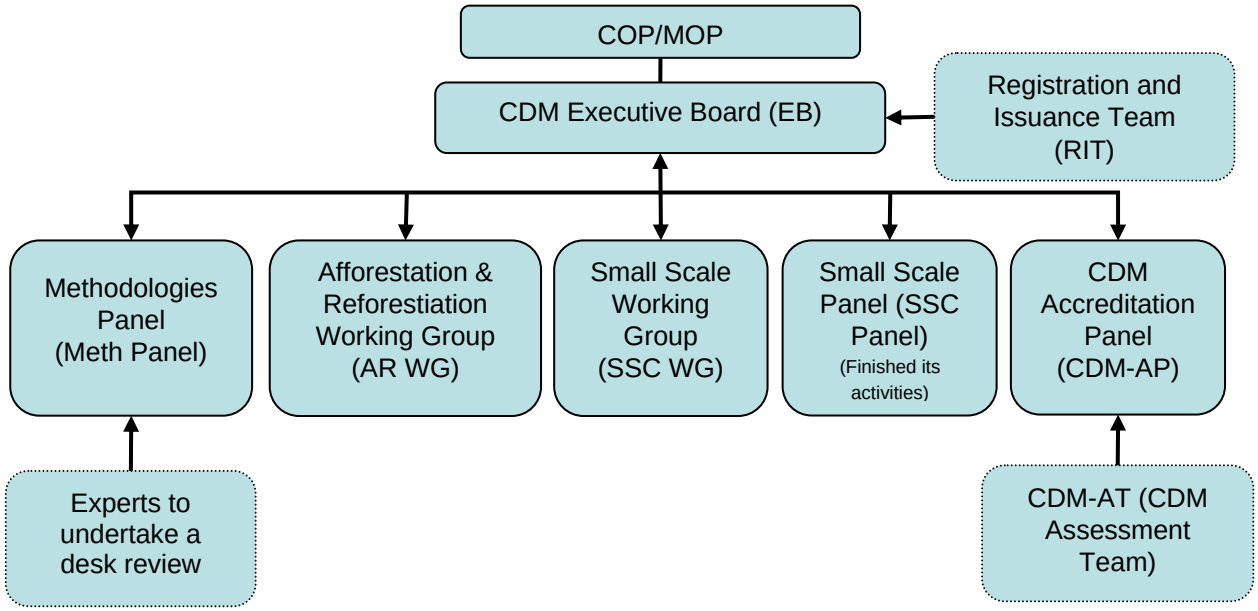


Figure 1-3 CDM institutions

1.2.1 COP/MOP

As the CDM is a mechanism under the Kyoto Protocol, the COP/MOP shall have authority over and provide guidance to the CDM [CDM M&P, para. 2].

1.2.2 Executive Board (EB)

For the actual operation of the CDM, the EB is the body that supervises the CDM, under the authority and guidance of the COP/MOP [CDM M&P, para. 5].
The responsibilities of the EB include:

[3] Decision 7/CMP.1, "Further guidance relating to a clean development mechanism", contained in the document FCCC/KP/CMP/2005/8/Add.1, pp.93-99.

- To approve new methodologies related to, inter alia, baselines, monitoring plans and project boundaries;
- To review provisions with regard to simplified modalities, procedures and the definitions of Small-Scale project activities and make recommendations to the COP/MOP; and
- To be responsible for the accreditation of operational entities, in accordance with accreditation standards, and make recommendations to the COP/MOP for the designation of operational entities. This responsibility includes:
  (i) Decisions on re-accreditation, suspension and withdrawal of accreditation; and
  (ii) Operationalization of accreditation procedures and standards.

The EB is also responsible for, among others, making recommendations to the COP/MOP on further modalities and procedures for the CDM; reviewing the accreditation standards; reporting to the COP/MOP on the regional and subregional distribution of CDM project activities; and developing and maintaining the CDM registry.

The EB comprises of ten members from Parties to the Kyoto Protocol as follows:

Five United Nations regional groups (one from each)	5
Annex I Parties	2
Non-Annex I Parties	2
Small island developing States	1
Total	10

Since the EB held its first meeting in November 2001, it has been holding a meeting every two to three months. Meeting reports, agenda and relevant documents, including webcast of the meetings are available on the CDM website [http://cdm.unfccc.int/EB].

The EB has thus far established the following panels and working groups to assist it in the performance of its functions.

(1) Methodologies Panel (Meth Panel)

The Methodologies Panel (Meth Panel) was established to develop recommendations to the EB on guidelines for methodologies for baselines and monitoring plans.

Specifically, the Meth Panel:

- Prepares recommendations on submitted proposals for new baseline and monitoring methodologies;
- Prepares draft reformatted versions of proposed new baseline and monitoring methodologies approved by the EB;
- Prepares recommendations on options for expanding the applicability of methodologies and provides tools for project participants to choose among approved methodologies of a similar nature; and
- Maintains a roster of experts and selects experts who are to undertake desk reviews to appraise the validity of the proposed new methodologies.

Furthermore, the Meth Panel elaborates recommendations to the EB on:

- Revisions to the project design document, in particular on sections relevant to baseline and monitoring;
- Draft “decision trees, and other methodological tools, where appropriate, to guide choices in order to ensure that the most appropriate methodologies are selected, taking into account relevant circumstances”;
- Guidance on identified modalities and procedures contained in the annex to decision 17/CP.7 with a view to facilitating the development of project-based methodologies by project participants. Such modalities and procedures shall be identified by the panel and addressed in accordance with guidance provided by the EB;
- Further work on items identified in “Terms of references for establishing guidelines on baselines and monitoring

methodologies" [Appendix C of the CDM M&P] as appropriate; and

- Amendments on the annex on indicative simplified methodologies for Small-Scale CDM project activities.

Since the Meth Panel held its first meeting in June 2002, it has been holding meetings every two to three months. Meeting reports, agenda and relevant documents are available on the CDM website [http://cdm.unfccc.int/Panels/meth].

When a new methodology is submitted to the Meth Panel, the Meth Panel selects experts from a roster of experts, to obtain an appraisal of the validity of the proposed new methodology by undertaking a desk review. A proposed new methodology shall be available to the Meth Panel at least ten weeks prior to its next meeting. In case more than ten proposed new methodologies are submitted by the deadline, the Chair of the Meth Panel can decide to postpone the analysis of some submissions to the subsequent meeting. Submissions received and confirmed to be completed by the secretariat shall be treated on a "first come first served" basis. [Procedures for the submission and consideration of a proposed new methodology (version 11), para. 10 & 11]

(2) Small Scale Panel (SSC Panel)

The Small Scale Panel (SSC Panel) was operational from April 2002 to August 2002 and recommended draft simplified modalities and procedures for Small-Scale CDM project activities to the EB. The SSC Panel met three times and finished its work with the result of a final recommendation on simplified modalities and procedures for Small-Scale CDM project activities to the EB on its fifth meeting.

(3) Accreditation Panel (CDM-AP)

The CDM Accreditation Panel (CDM-AP) prepares the decision making of the EB in accordance with the procedure for accrediting operational entities. The CDM-AP chooses an ad hoc Assessment Team (CDM-AT). The CDM-AT shall undertake an assessment of the applicant and/or designated operational entities and prepare an assessment report for the CDM-AP. A team shall be composed of a team leader and at least two team members chosen to serve in a team for an assessment at a time [EB09, Annex 1].

(4) Afforestation and Reforestation Working Group (AR WG)

The working group on afforestation and reforestation for CDM project activities (AR WG) was established to prepare recommendations on submitted proposals for new baseline and monitoring methodologies for A/R CDM project activities. Since its first meeting in July 2004, the AR WG has been working in cooperation with the Meth Panel to evaluate proposed new baseline and monitoring methodologies. The AR WG makes recommendations on the new AR methodologies to the EB on the basis of its evaluations, and four methodologies have been approved by the EB (as of October 2006). The approved AR methodologies are listed in section 3.3.5 below. In addition, the AR WG worked on the simplified methodologies for SSC-A/R CDM project activities (AR-AMS0001), approved by the COP/MOP at its first session, which was revised at EB26 [EB26, Annex 17]. The AR WG also worked on the tool for the demonstration and assessment of additionality in A/R CDM project activities agreed by the EB at its 21st session [EB21, Annex 21], and the procedures to define the eligibility of lands for afforestation and reforestation project activities agreed at EB22 [EB22, Annex 16]. The procedures to define the eligibility of lands for afforestation and reforestation project activities was revised and its title was changed at EB26. The new title is the procedures to demonstrate the eligibility of lands for afforestation and reforestation project activities (version 02) [EB26, Annex 18] (Refer to section 3.3.3 (4) below for details).

(5) Small Scale Working Group (SSC WG)

The Small Scale Working Group (SSC WG) was established to prepare recommendations on submitted proposals for new baseline and monitoring methodologies for Small-Scale CDM project activities. Since The SSC WG, whose first meeting was held in January 2005, has the following functions:

- To prepare precise and workable recommendations for consideration and adoption by the EB on submitted proposals for new Small-Scale project activity categories and new simplified baseline and monitoring plans;
- To prepare, as appropriate, draft revisions for the consideration of the EB of the indicative list of simplified

baseline and monitoring methodologies contained in the appendix B of the simplified modalities and procedures for Small-Scale CDM project activities.

(6) Registration and Issuance Team (RIT)

The Registration and Issuance Team (RIT) was established to assist EB members in their task to consider requests for registration of project activities and requests for issuance of CERs submitted to the EB by designated operational entities (DOEs). The RIT is composed of 10 members and a Chair. EB members, including alternate members, assume the role of the Chair on a rotating basis after every ten cases.

The RIT serves the following purposes:

- To prepare appraisals of requests for registration submitted by DOEs assessing whether the validation requirements are met and/or appropriately dealt with by DOEs;
- To prepare appraisals of requests for issuance of CERs submitted by DOEs assessing whether the verification and certification requirements are met and/or appropriately dealt with by DOEs;
- To identify general issues related to registration and issuance for consideration by the EB.

1.2.3 Designated Operational Entity (DOE)

A designated operational entity (DOE) is either a domestic legal entity or an international organization accredited and designated on a provisional basis by the EB until confirmed by the COP/MOP.

A DOE has the following two key functions in the CDM project cycle.

1) Validation: It validates a proposed CDM project activity, and subsequently requests registration of the proposed CDM project activity.
2) Verification and Certification: It verifies emission reduction of a registered CDM project activity, certifies as appropriate, and requests the EB to issue Certified Emission Reductions (CERs) accordingly.

A DOE can perform either validation or verification and certification on the same CDM project activity. However, upon request, the EB may allow a single DOE to perform all these functions within a single CDM project activity. For Small-Scale CDM project activities, the same DOE may undertake validation, and verification and certification.

A list of sectoral scopes, shown in Table 1-1 below, has been prepared based on the list of sectors and sources contained in Annex A of the Kyoto Protocol. Sectoral scope(s) of accreditation sets the limits for work which a DOE may perform under the CDM with regard to validation as well as verification and certification related to identified sector(s), and determines the requirements a DOE shall meet in addition to those determined in Appendix A to the CDM M&P. This list may be further modified in accordance with the procedural guidelines. [http://cdm.unfccc.int/DOE/scopes.html]

Table 1-1 List of Sectoral Scopes

Scope Number	Sectoral Scope
1	Energy industries (renewable/non-renewable sources)
2	Energy distribution
3	Energy demand
4	Manufacturing industries
5	Chemical industries
6	Construction
7	Transport

8	Mining/mineral production
9	Metal production
10	Fugitive emissions from fuels (solid, oil and gas)
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
12	Solvent use
13	Waste handling and disposal
14	Afforestation and reforestation
15	Agriculture

Source: http://cdm.unfccc.int/DOE/scopes.html

As mentioned above, DOEs are designated on a provisional basis by the EB, until the COP/MOP confirms the designation. Table 1-2 shows the 16 DOEs that have been confirmed their designations by the COP/MOP and have been accredited and provisionally designated by the EB before COP/MOP confirmation.

Table 1-2 List of DOEs (as of October 2006)

Ref. Number	Entity Name (short name)	Sectoral scopes for validation	Sectoral scopes for verification and certification
E-0001	Japan Quality Assurance Organization (JQA)	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13	
E-0002	JACO CDM.,LTD (JACO)	1, 2, 3	
E-0003	Det Norske Veritas Certification Ltd. (DNVcert)	1, 2, 3, 4, 5, 6, 7,8,9, 10, 11, 12, 13, 15	1, 2, 3, 4, 5, 6, 7,8,9,10, 11, 12, 13, 15
E-0005	TÜV Industrie Service GmbH TÜV SUD GRUPPE (TÜV Industrie Service GmbH TÜV)	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14,15	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 15
E-0006	Tohmatsu Evaluation and Certification Organization Co., Ltd. (TECO)	1, 2, 3	
E-0007	Japan Consulting Institute (JCI)	1, 2, 13	
E-0009	Bureau Veritas Quality International Holding S.A. (BVQI Holding S.A.)	1, 2, 3	1, 2, 3
E-0010	SGS United Kingdom Ltd. (SGS)	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 15	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 15
E-0011	The Korea Energy Management Corporation (KEMCO)	1	
E-0013	TÜV Industrie Service GmbH TÜV Rheinland Group (TÜV Rheinland)	1, 2, 3, 13	
E-0014	KPMG Sustainability B.V. (KPMG)	1, 2, 3	
E-0018	British Standards Institution (BSI)	1, 2, 3	
E-0021	Spanish Association for Standardisation and Certification (AENOR)	1, 2, 3	1, 2, 3
E-0022	TÜV NORD CERT GmbH (RWTUV)	1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13	1,2,3
E-0025	Korean Foundation for Quality (KFQ)	1, 2, 3	
E-0029	PricewaterhouseCoopers - South Africa (PwC)	1, 2, 3	

Source: http://cdm.unfccc.int/DOE/list

An applicant entity (AE) is an entity which has applied for accreditation by the EB, but has not yet been accredited and designated as a DOE. An AE, in order to be accredited, has to carry out activities witnessed by the CDM-AT related to validation and/or verification and certification. Validation and/or verification and certification activities, witnessed during the accreditation procedure, are considered valid if the AE is successfully accredited by the EB. An AE, for which a CDM-AT has been assigned, may submit proposed new methodologies. An AE must also maintain documentary evidence (e.g. a procedural report) for each new methodology submitted to the EB. The AE once accredited is authorized to function as DOE in the sectoral scope(s) for which the EB agreed to designate.

Table 1-3 shows the AEs that have been issued with the indicative letter, excluding the operational entities that have already been confirmed their designations by the COP/MOP and provisionally designated as DOE by the EB, shown in Table 1-2.

Table 1-3 List of AEs issued with the Indicative Letter (as of October 2006)

Ref. No.	Entity Name (short name)
CDM-E-0004	Misuzu Sustainability Certification Co. Ltd (formerly ChuoAoyama Sustainability Certification Co. Ltd)
CDM-E-0008	AZSA Sustainability Co., Ltd. (Former ASAHI & Co.)
CDM-E-0020	Conestoga Rovers & Associates Limited.(CRA)
CDM-E-0023	Lloyd's Register Quality Assurance Ltd (LRQA)
CDM-E-0024	Colombian Institute for Technical Standards and Certification-ICONTEC
CDM-E-0028	Shin Nihon Environmental and Quality Management Research Institute Co., Ltd (Shin Nihon)
CDM-E-0030	Nippon Kaiji Kentei Quality Assurance Limited (NKKKQA)
CDM-E-0031	Perry Johnson Registrars Clean Development Mechanism, Inc.(PJR CDM)

Source: http://cdm.unfccc.int/DOE/AEnewMeth

2. CDM Procedures

2.1 CDM project cycle

The project cycle is common to all CDM project types, such as large scale[4], Small-Scale and A/R CDM activities.

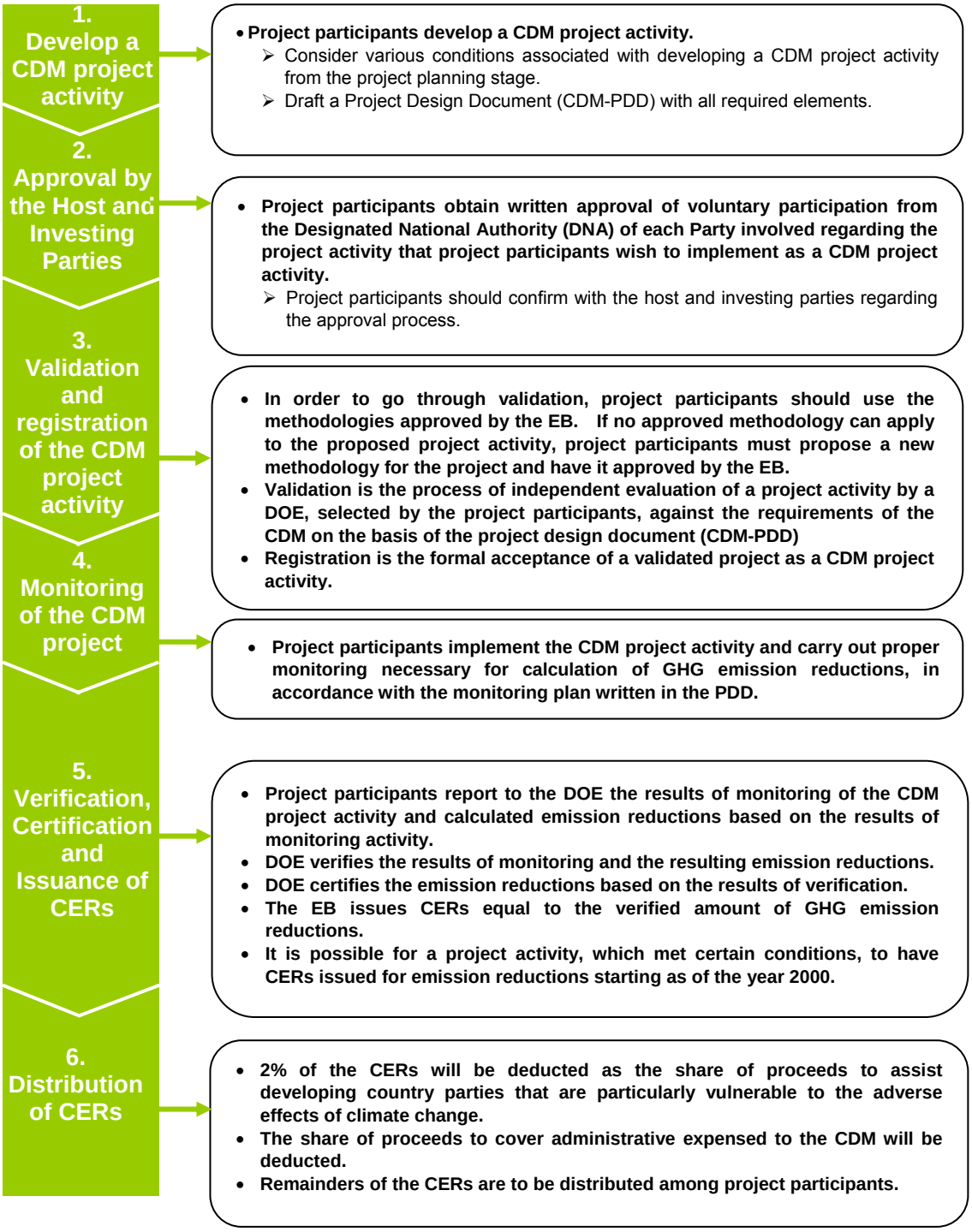


Figure 2-1 CDM project cycle

[4] The term “large scale” refers to all non-A/R project activities that do not fall within the definition of Small-Scale CDM project activities.

CDM project activities can be divided into the different types (shown in Table 3-1) depending on the size and types of activity undertaken. Project participants who wish to develop a CDM project activity should first determine in which of the following categories the project activity would fit, as different modalities and procedures and formats apply to each project type.

Figure 2-2 describes the approval process of an emission reduction project activity and methodologies up to the registration of the project activity as a CDM project activity.

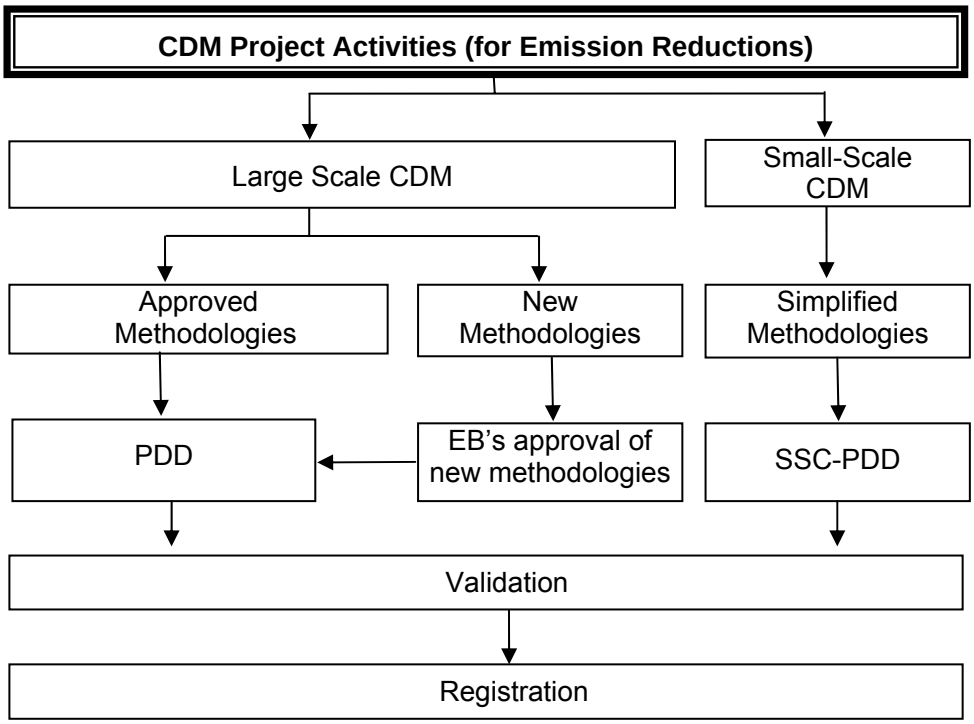


Figure 2-2 Approval process of CDM project activities and methodologies

2.2 CDM project development

2.2.1 Approved Methodologies (AM)

Once a proposed new methodology is approved by the EB, it is reformatted and given a number as an approved methodology (e.g. AM0001).

Table 2-1 is the list of approved methodologies. The list of approved methodologies is regularly updated on the CDM website [http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html].

Table 2-1 List of Approved Methodologies (as of October 2006)

Number	Approval History (Composing NMs and AMs)	Methodology Title (including baseline and monitoring methodologies)
AM0001 (ver.4)	NM0007-rev	Incineration of HFC 23 Waste Streams
AM0002 (ver.2)	NM0004-rev	Greenhouse gas emission reductions through landfill gas capture and flaring where the baseline is established by a public concession contract
AM0003 (ver.3)	NM0005-rev	Simplified financial analysis for landfill gas capture projects
AM0007	NM0028	Analysis of the least-cost fuel option for seasonally-operating biomass cogeneration plants

AM0009 (ver.2)	NM0026	Recovery and utilization of gas from oil wells that would otherwise be flared
AM0010	NM0010-rev	Landfill gas capture and electricity generation projects where landfill gas capture is not mandated by law
AM0011 (ver.2)	NM0021	Landfill gas recovery with electricity generation and no capture or destruction of methane in the baseline scenario
AM0013 (ver.3)	NM0038-rev, NM0039, NM0085	Avoided methane emissions from organic waste-water treatment
AM0014 (ver.2)	NM0018-rev	Natural gas-based package cogeneration
AM0017 (ver.2)	NM0017-rev	Steam system efficiency improvements by replacing steam traps and returning condensate
AM0018	NM0037-rev	Steam optimization systems
AM0019 (ver.2)	NM0053	Renewable energy project activities replacing part of the electricity production of one single fossil-fuel-fired power plant that stands alone or supplies electricity to a grid, excluding biomass projects
AM0020	NM0042-rev	Baseline methodology for water pumping efficiency improvements
AM0021	NM0061	Baseline Methodology for decomposition of N_2O from existing adipic acid production plants
AM0022 (ver.3)	NM0041-rev2	Avoided Wastewater and On-site Energy Use Emissions in the Industrial Sector
AM0023	NM0091	Leak reduction from natural gas pipeline compressor or gate stations
AM0024	NM0079-rev	Baseline methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants
AM0025 (ver.4)	NM0090 NM0127 Replaces AM0012*	Avoided emissions from organic waste through alternative waste treatment processes
AM0026 (ver.2)	NM0076-rev	Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid
AM0027 (ver.2)	NM0115	Substitution of CO_2 from fossil or mineral origin by CO_2 from renewable sources in the production of inorganic compounds
AM0028 (ver.2)	NM0111	Catalytic N_2O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants
AM0029	NM0080-rev NM0153	Methodology for Grid Connected Electricity Generation Plants using Natural Gas
AM0030	NM0124-rev	PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities
AM0031	NM0105-rev	Methodology for Bus Rapid Transit Projects
AM0032	NM0107-rev	Methodology for waste gas or waste heat based cogeneration system
AM0033	NM0123-rev	Use of non-carbonated calcium sources in the raw mix for cement processing
AM0034	NM0143 NM0164	Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants
AM0035	NM0135	SF_6 Emission Reductions in Electrical Grids
AM0036	NM0140-rev	Fuel switch from fossil fuels to biomass residues in boilers for heat generation
AM0037	NM0145	Flare reduction and gas utilization at oil and gas processing facilities
AM0038	NM0146	Methodology for improved electrical energy efficiency of an existing submerged electric arc furnace used for the production of SiMn
AM0039	NM0147	Methane emissions reduction from organic waste water and bioorganic solid waste using composting
AM0040	NM0163	Baseline and monitoring methodology for project activities using alternative raw materials that contain carbonates in clinker manufacturing in cement kilns

Note: AM0004, AM0005, AM0006, AM0008, AM0015 and AM0016 have been withdrawn, as they were included into consolidated methodologies.

* AM0012 is replaced by AM0025 by refining the applicability of AM0012, since both AM0012 and AM0025 are applicable to projects related to the avoidance of emissions by organic waste treatment, including composting..

2.2.2 Approved Consolidated Methodologies (ACM)

Upon request by the EB, the Meth Panel drafts consolidated methodologies based on proposed new methodologies and approved methodologies with similar applicability. The approved consolidated methodologies are shown in Table 2-2 below.

An approved methodology, which is covered by a consolidated methodology, continues to remain valid in its own right

[EB15, para. 8 (a)]. However, the EB decided to withdraw the following approved methodologies:

- AM0004 and AM0015 (replaced with ACM0006),
- AM0005 (replaced with ACM0002),
- AM0006 and AM0016 (replaced with ACM0010),
- AM0008 (replaced with ACM0009), and
- AM0012 (replaced with AM0025, whose applicability was refined to be applicable to projects previously covered by AM0012).

Although Approved Consolidated Methodologies had to be used in conjunction with the "tool for the demonstration and assessment of additionality (additionality tool)", the COP/MOP1 confirmed that the use of the additionality tool is not mandatory for project participants, and that in all cases the project participants may propose alternative methods to demonstrate additionality for consideration by the EB, including those cases where the additionality tool is attached to an approved methodology.

However, the additionality tool is still useful to demonstrate additionality of a proposed project. Therefore, section 4.2.4 explains the additionality tool in detail.

Table 2-2 List of Approved Consolidated Methodologies (as of October 2006)

Meth. Number	Methodology Title (including baseline and monitoring methodologies)
ACM0001 (ver.4)	Consolidated methodology for landfill gas project activities
ACM0002 (ver.6)	Consolidated methodology for grid-connected electricity generation from renewable sources
ACM0003 (ver.4)	Emissions reduction through partial substitution of fossil fuels with alternative fuels in cement manufacture
ACM0004 (ver.2)	Consolidated methodology for waste gas and/or heat for power generation
ACM0005 (ver.3)	Consolidated Methodology for Increasing the Blend in Cement Production
ACM0006 (ver.3)	Consolidated methodology for grid-connected electricity generation from biomass residues
ACM0007	Consolidated methodology for conversion from single cycle to combined cycle power generation
ACM0008 (ver.2)	Consolidated methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring
ACM0009 (ver.3)	Consolidated methodology for industrial fuel switching from coal or petroleum fuels to natural gas
ACM0010	Consolidated baseline methodology for GHG emission reductions from manure management systems

DOEs have to confirm, in the process of validation, that the baseline and monitoring methodologies used in proposed PDDs comply with requirements pertaining to methodologies approved by the EB.

2.2.3 Applicability of approved methodologies

There are 40 AMs and 10 ACMs approved by the EB as of October 2006, as shown in Table 2-1 and Table 2-2. Project participants who wish to apply an approved methodology to their project activity must check the applicability of AMs and ACMs, which is shown in the Appendix 1 of this manual. In the Appendix 1, AMs and ACMs are categorized according to project types, i.e.:

(i) Projects involving methane capture and/or avoidance;
(ii) Projects involving utilization of renewable energy or low-emission fuels;
(iii) Projects involving energy efficiency improvement or fuel/material switch;
(iv) Projects involving other GHGs (HFC, N_2O or PFC); and
(v) Projects involving transportation.

Project participants should be aware that the DOE will check the applicability of the selected approved methodology to

the proposed project activity in the process of validation.

2.2.4 Proposal of a new baseline and monitoring methodology

Figure 2-3 shows the procedures for proposing a new baseline and monitoring methodology. If project participants intend to propose a new baseline and monitoring methodology for consideration and approval by the EB, they should prepare the methodologies forms for baseline and monitoring methodologies (CDM-NM) along with a draft project design document (CDM-PDD) and as minimum, complete sections A to C, including relevant annexes.

Project participants should select and contract a DOE/AE for submission of a new methodology. In case of a DOE, project participants should ensure that the DOE is accredited to perform validation of the sectoral scope of the proposed project activity (refer to Table 1-1 and Table 1-2).

Once project participants submit necessary documentations (CDM-NM and draft CDM-PDD) to the EB through the DOE/AE, a member of the Meth Panel would conduct a pre-assessment of the quality of the submission. Alternatively, the DOE/AE may voluntarily undertake a pre-assessment of a newly proposed methodology before submitting it. In such case, no pre-assessment by the Meth Panel is needed.

If the result of the pre-assessment is satisfactory (grade 1), the proposed new methodology is made publicly available on the CDM website to invite public inputs for a period of 15 working days. Comments shall be forwarded to the Meth Panel at the moment of receipt and made available to the public at the end of the 15 working days. If the result is unsatisfactory (grade 2), the documentation is sent back to the project participants.

For submissions rated grade 1, after being made publicly available for public inputs, two members of the Meth Panel would prepare a draft recommendation, based on recommendations by desk reviewers selected from a roster of experts. During that process, the Meth Panel may request additional technical information from the project participants.

A fee of USD 1,000 shall be charged to project participants when submitting a proposed new methodology for regular project activities (not applicable to methodologies for Small-Scale and afforestation and reforestation project activities). If the proposed methodology is approved and the project activity for which it was developed is registered, the registration fee shall be lowered by that amount [EB22, para. 14 (c)].

The Meth Panel would prepare a preliminary recommendation regarding the approval of the proposed new methodology and forward it to project participants. At this stage, project participants may submit clarifications to the Meth Panel within 4 weeks on technical issues concerning the proposed new methodology raised in the preliminary recommendation by the Meth Panel.

If the preliminary recommendation is in favor of approving or not approving the proposed new methodology, or the project participants do not provide any clarifications, the preliminary recommendation is to be considered as a final recommendation. If project participants provide clarifications, the Meth Panel shall consider them at its next meeting and prepare its final recommendation to the EB. The Meth Panel, in its recommendation to the EB, rates the proposed new methodology as follows:

(a) To approve the proposed methodology with minor changes (“A” case);
(b) To reconsider the proposed methodology, subject to required changes (“B” case);
(c) Not to approve the proposed methodology (“C” case).

The final recommendation is forwarded to the EB and is made publicly available. The EB would consider the proposed new methodology at the next meeting following the receipt of the final recommendation by the Meth Panel.

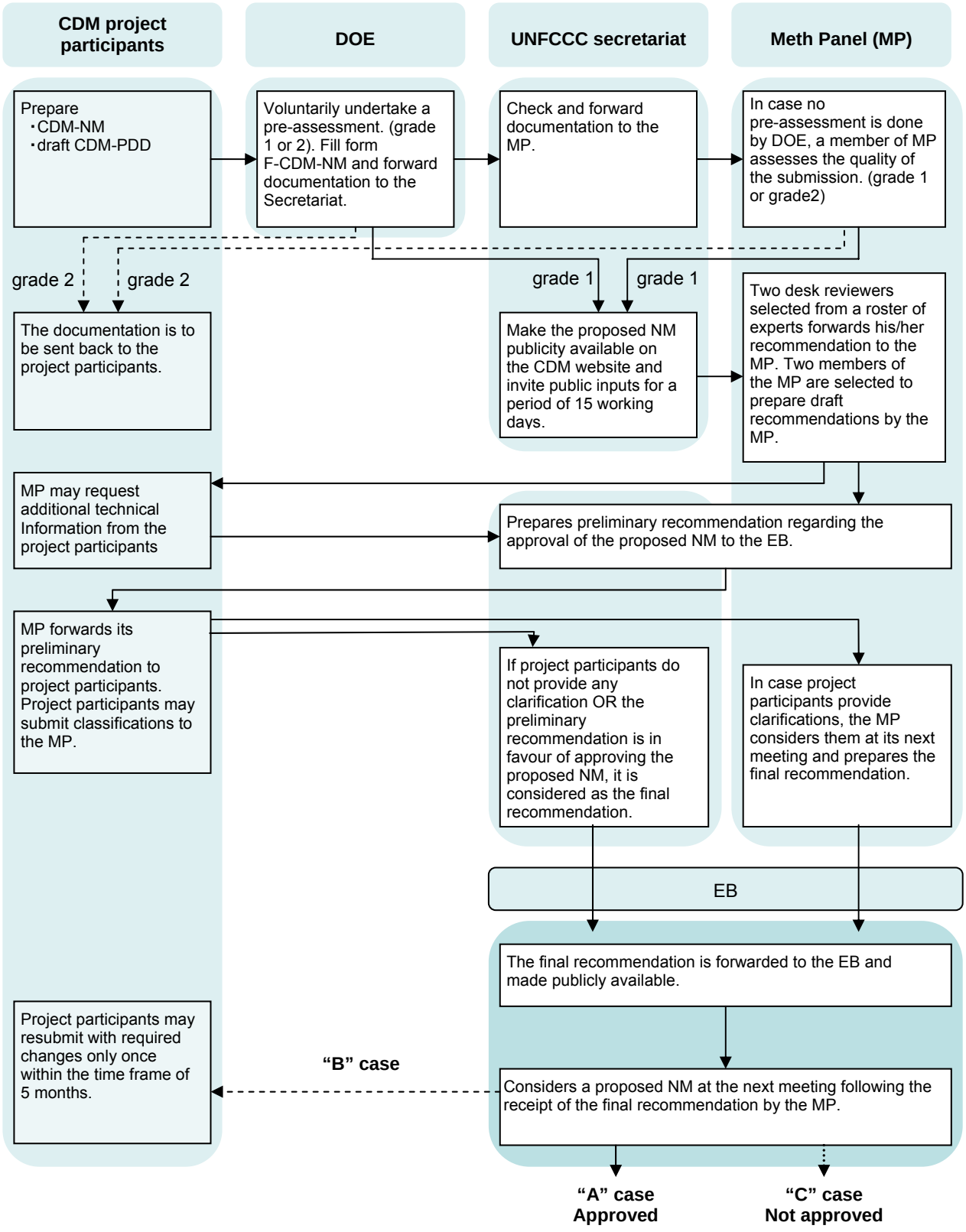


Figure 2-3 Procedures for new methodology submission

If the EB considers the case to be re-submitted (so called "B" case), project participants have the opportunity to re-submit the proposal taking into consideration:

- Required changes being made by the project participants, taking into account issues raised by the EB, recommendations made by the Meth Panel, and re-submission of a duly revised proposal. The secretariat shall make the revised proposal publicly available upon receipt;

- Reconsideration of the revised proposal directly by the Meth Panel, without further review by desk reviewers; and
- A recommendation by the Meth Panel being made to the EB.

In the "B" case, a proposed methodology may be resubmitted to the EB with required changes only once. If it is not resubmitted within the timeframe of five months, it will be considered as withdrawn [EB21, Annex 2].

The EB shall expeditiously, if possible at its next meeting but not later than four months after the date of receipt of the proposed new methodology, review the proposed new methodology in accordance with the CDM modalities and procedures.

For further details of the submission and approval process, refer "Procedures for the submission and consideration of a proposed new methodology (Version11)" available on the website [http://cdm.unfccc.int/Reference/Procedures/Pnm_proced_ver11.pdf].

2.2.5 Draft a Project Design Document (CDM-PDD)

Project participants need to draft a project design document (CDM-PDD), which describes the project activity as well as the application of the baseline and monitoring methodology to the project activity. Project participants should check with the CDM website for the most current version of the CDM-PDD. As of October 2006, CDM-PDD Version 03 is the most recent version. Chapter 4 below explains in detail how to fill out the PDD.

2.3 Approval by the Parties involved

The project activities for emission reduction or removal enhancement are required to obtain approvals of the Parties involved before they can be officially registered as CDM project activities. The Parties involved are normally both the host Party and the investing Party(ies), and the CDM project activities need to receive the approval from all Parties involved.

The Party's approval shall be the written approval of voluntary participation which was issued from the designated national authorities (DNAs), including confirmation by the host Party that the project activity assists it in achieving sustainable development [CDM M&P, para. 40 (a)].

The national procedures and process for the Party's approval for CDM projects are decided by each Party. Those procedures could contain the criteria of sustainable development for the Party.

While project participants have to receive written approval by the Parties involved, the timing to receive the approval can be quite flexible: project participants can attach the approval to their PDD on the occasion of the stage of project development, PDD development, or validation. However, the approval shall be attached before the request of the registration of the project activities as CDM. Since some Parties require validation before requesting for approval, project participants should closely check the approval procedures of the Parties involved.

It is possible to register a CDM project activity in which there is no Annex I Party involved. Such project activities are called "unilateral CDM", which means that approval by Annex I Party would not be necessary to register a CDM project activity. Annex I Parties can acquire CERs from a unilateral project activity after submitting a letter of approval regarding the project activity to the EB [EB18, para. 57]. Representatives of holding accounts of entities authorized by non-Annex I Parties to participate in the project activity shall make a request to forward CERs to accounts in national registries in order for an Annex I Party to acquire CERs [EB20, para. 71].

2.4 Validation and Registration

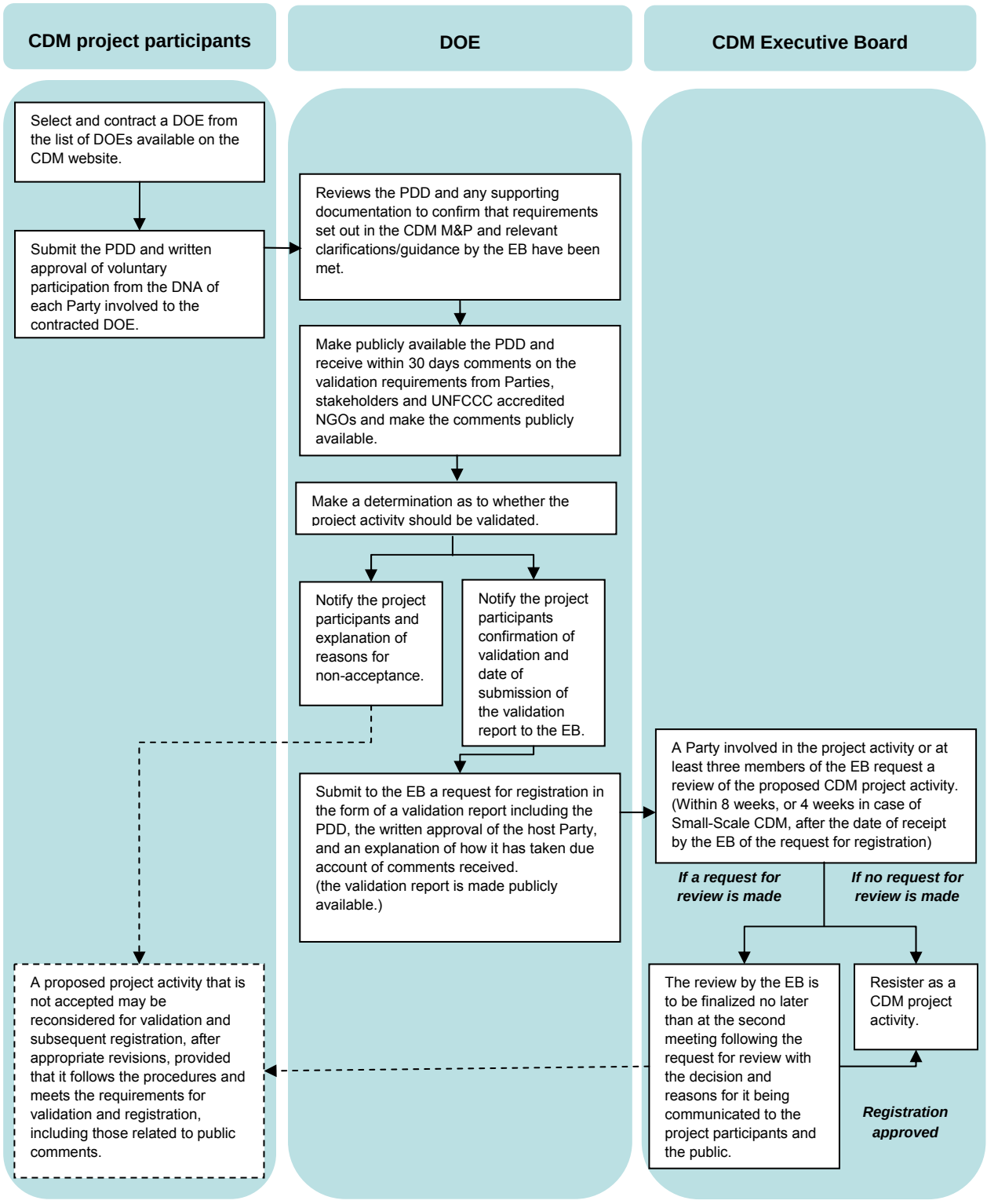


Figure 2-4 Validation and registration procedures

2.4.1 Validation

Validation is the process of independent evaluation of a project activity by a DOE against the requirements of the CDM on the basis of the CDM-PDD. Project participants should select and contract a DOE to undertake validation.

The validation and registration process is shown in Figure 2-4.

First, project participants submit a CDM-PDD to a DOE, who reviews the CDM-PDD and opens it for public inputs. For the purpose of the local stakeholder review, project participants are requested to describe a project activity in a manner that allows the local stakeholders to understand the project activity. During this review process, DOEs usually draw attention of the project participants to the points in the PDD that need to be clarified and/or improved through Corrective Action Requests (CARs). In this way, project participants are given the opportunity to improve the CDM-PDD. After the deadline for receipt of public inputs, the DOE determines whether the proposed project activity should be validated. Once the decision is made, the DOE informs project participants its determination on the validation of the project activity.

The DOE reviews the CDM-PDD and any supporting documentation to confirm that the following validation requirements, as set out in paragraph 37 of the CDM M&P, are met.

(a) The following participation requirements are satisfied;
- Participation in a CDM project activity is voluntary.
- Parties participating in the CDM shall designate a national authority for the CDM.
- A Party not included in Annex I may participate in a CDM project activity if it is a Party to the Kyoto Protocol.

(b) Comments by local stakeholders have been invited, a summary of the comments received has been provided, and a report to the DOE on how due account was taken of any comments has been received;

(c) Project participants have submitted to the DOE documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts and, if those impacts are considered significant by the project participants or the host Party, have undertaken an environmental impact assessment in accordance with procedures as required by the host Party;

(d) The project activity is expected to result in a reduction in anthropogenic emissions by sources of greenhouse gases (GHGs) that are additional to any that would occur in the absence of the proposed project activity;

(e) The baseline and monitoring methodologies comply with requirements pertaining to:
(i) Methodologies previously approved by the EB; or
(ii) Modalities and procedures for establishing a new methodology;

(f) Provisions for monitoring, verification and reporting are in accordance with decision 17/CP.7, the CDM M&P and relevant decisions of the COP/MOP; and

(g) The project activity conforms to all other requirements for CDM project activities in decision 17/CP.7, the CDM M&P and relevant decisions by the COP/MOP and the EB.

2.4.2 Registration

Registration is the formal acceptance by the EB of a validated project as a CDM project activity. Registration is the prerequisite for the verification, certification and issuance of CERs related to that project activity.

As shown in Figure 2-4, the registration by the EB shall be deemed final eight weeks, or four weeks in case of Small-Scale CDM project activities, after the date of receipt by the EB of the request for registration, unless a Party involved in the project activity or at least three members of the EB request a review of the proposed CDM project activity.

The review by the EB shall be made in accordance with the following provisions:

(a) It shall be related to issues associated with the validation requirements;

(b) It shall be finalized no later than at the second meeting following the request for review, with the decision and the reasons for it being communicated to the project participants and the public.

The Registration and Issuance Team (RIT) assists the EB's appraisal process of the project activities requested for registrations. The EB members refer to the RIT's appraisals and made decisions for necessity of reviews.

For detailed procedural instructions for the registration and review of a proposed CDM project activity, refer to the following documents on the "Procedures" page of the CDM website [http://cdm.unfccc.int/Reference/Procedures].

Procedures for registration of a proposed CDM project activity (Version 02)
[http://cdm.unfccc.int/Reference/Procedures/proced_registration_ver02.pdf]
Procedures for review as referred to in paragraph 41 of the CDM modalities and procedures
[http://cdm.unfccc.int/Reference/Procedures/review_proced.pdf]

2.5 Monitoring, verification and certification through issuance of CERs

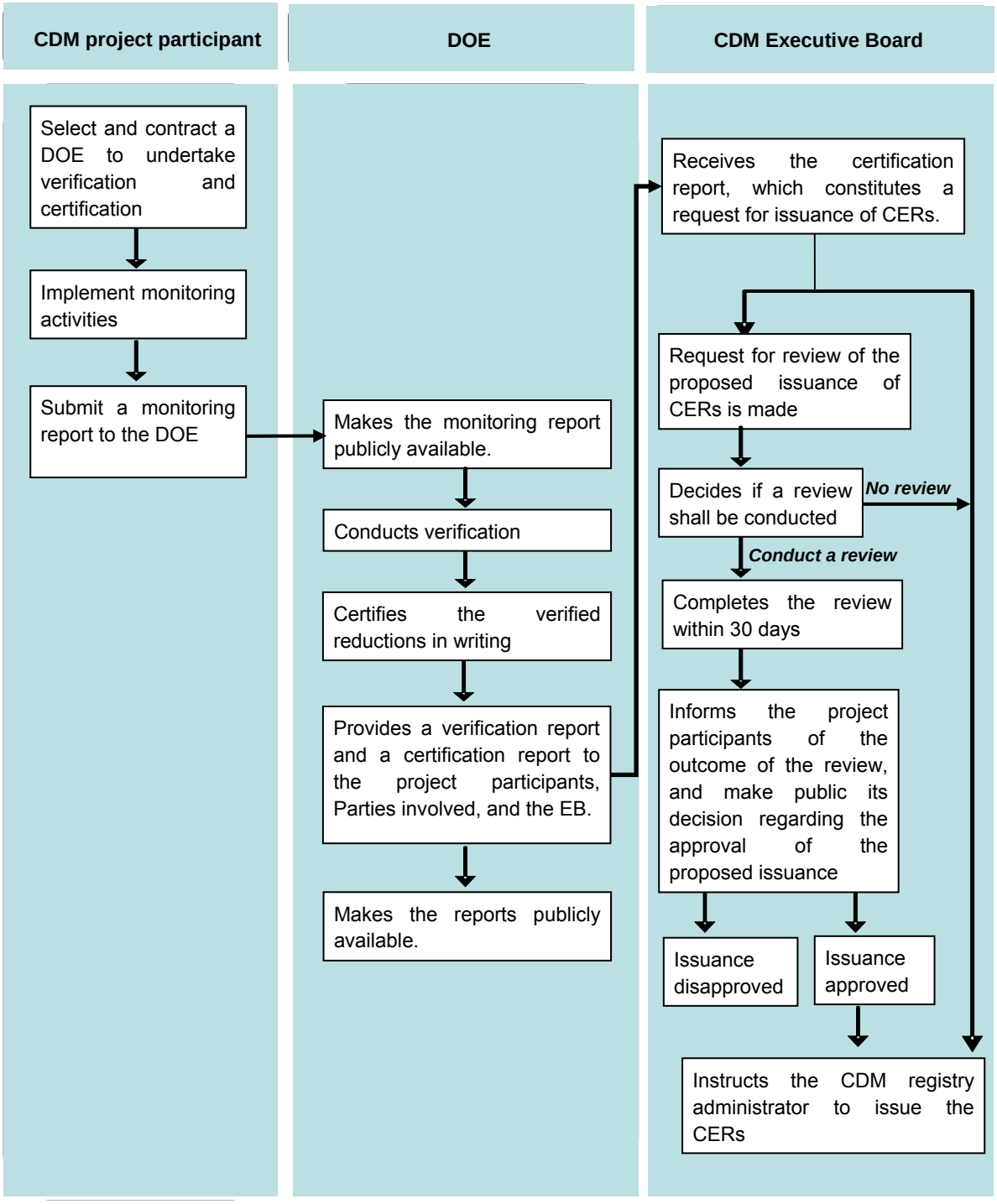


Figure 2-5 Procedures from monitoring through issuance

2.5.1 Implement monitoring activities

As shown in Figure 2-5, the first step that project participants must take to ensure issuance of CERs as planned is to properly implement the monitoring activities according to the monitoring plan stated in the registered PDD, since it is a condition for verification, certification and the issuance of CERs [CDM M&P, para. 57-58].

Project participants then prepare a monitoring report for the period they would like to have verified and CERs issued. The length of such period can vary according to the interests of project participants. For example, the lengths of verified periods of CERs that have already been issues range from two months to four years. A monitoring report covers all the items contained in the monitoring plan, as shown below:

- The collection and archiving of all relevant data necessary for estimating or measuring anthropogenic emissions by sources of greenhouse gases occurring within the project boundary during the crediting period;
- The collection and archiving of all relevant data necessary for determining the baseline of anthropogenic emissions by sources of greenhouse gases within the project boundary during the crediting period;
- The identification of all potential sources of, and the collection and archiving of data on, increased anthropogenic emissions by sources of greenhouse gases outside the project boundary that are significant and reasonably attributable to the project activity during the crediting period;
- The collection and archiving of information relevant to the provisions in paragraph 37 (c) (of the CDM M&P, regarding the analysis of the environmental impacts of the project activity);
- Quality assurance and control procedures for the monitoring process;
- Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources by the proposed CDM project activity, and for leakage effects; and
- Documentation of all steps involved in the calculations of emission reductions and leakage.

[CDM M&P, para. 53].

2.5.2 Provide monitoring report to DOE for verification and certification

A DOE verifies and certifies the emission reductions achieved during the period covered by the monitoring plan. Project participants must select and contract a DOE different from the one that undertook validation of the corresponding project[5]. In case of small-scale CDM project activities, the same DOE may undertake validation, and verification and certification.

2.5.3 Verification

The DOE, upon receipt of a monitoring report by the project participants, shall review and determine the monitored reductions in anthropogenic emissions by sources of greenhouse gases that have occurred as a result of a registered CDM project activity during the period covered by the monitoring report. During this process of verification, the DOE shall:

- Determine whether the project documentation provided is in accordance with the requirements of the registered project design document and relevant provisions;
- Conduct on-site inspections, as appropriate;
- Use additional data from other sources, if appropriate;
- Review monitoring results and verify that the monitoring methodologies for the estimation of reductions in anthropogenic emissions by sources have been applied correctly and their documentation is complete and transparent;
- Recommend to the project participants appropriate changes to the monitoring methodology for any future crediting period, if necessary;
- Determine the reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the CDM project activity using calculation procedures consistent with those contained in

[5] If project participants request the EB, a single DOE may be allowed to perform validation, verification and certification within a single CDM project activity even in the case of normal scale project activities.

the registered project design document and in the monitoring plan;

- Identify and inform the project participants of any concerns relating to the conformity of the actual project activity and its operation with the registered project design document. Project participants shall address the concerns and supply relevant additional information; and
- Provide a verification report to the project participants, the Parties involved and the Executive Board. The report shall be made publicly available.

[CDM M&P, para. 62]

Project participants would need to provide clarifications and additional information as requested by the DOE during the verification process. In particular, project participants should be ready to answer questions by the DOE during on-site inspections, which may comprise a review of performance records, interviews with project participants and local stakeholders, collection of measurements, observation of established practices and testing of the accuracy of monitoring equipment.

2.5.4 Certification

Following verification, the DOE will certify in writing that the project activity achieved the reductions in anthropogenic emissions by sources of greenhouse gases as verified. It shall inform the project participants, Parties involved and the EB of its certification decision in writing immediately upon completion of the certification process and make the certification report publicly available [CDM M&P, para. 63].

2.5.5 Issuance of CERs

The certification report submitted to the EB by the DOE constitutes a request for issuance of CERs equal to the verified amount of GHG emissions reductions [CDM M&P, para. 64]. The issuance shall be considered final 15 days after the date of receipt of the request for issuance, unless a Party involved in the project activity or at least three members of the EB request a review (see Box 2-1) of the proposed issuance of CERs [CDM M&P, para. 65]. When the request for issuance becomes final or the EB decides to approve the issuance as the result of a review, the EB instructs the CDM registry administrator to issue the specified quantity of CERs into the pending account of the Executive Board in the CDM registry [CDM M&P, para. 66].

From the pending account, the issued CERs are promptly forwarded to the following accounts within the CDM registry. Figure 2-6 shows how CERs are issued and distributed among different accounts within the CDM registry.

Accounts	Amount of CERs to be forwarded
Accounts for the management of the share of proceeds	The share of proceeds to assist in meeting costs of adaptation (SOP-Adaptation): 2 % of issued CERs
Accounts of Parties and project participants involved	In accordance with the request by project participants

However, the CERs are issued only when the share of proceeds to cover administrative expenses (SOP-Admin) has been received [Decision 7/CMP.1[6], para. 37]. Therefore, project participants must pay the SOP-Admin prior to the issuance of CERs. Moreover, they need to communicate with the EB about their request regarding the distribution of CERs.

The holdings, transfers and acquisitions of Kyoto units[7] will be tracked and recorded through a computerized system of registries that consist of the following:

- A national registry is to be established and maintained by each Annex I Party. This will contain accounts for the

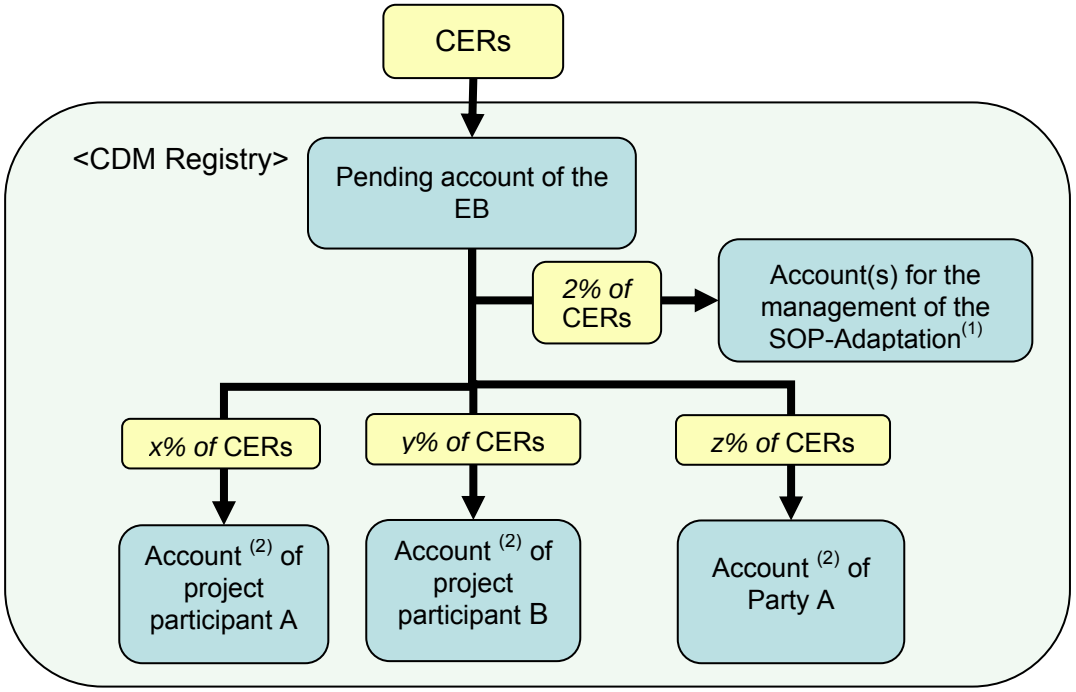
[6] FCCC/KP/CMP/2005/8/Add.1, pp.93–99.

[7] "Kyoto units" is defined here to include AAUs, RMUs, ERUs, CERs, tCERs and lCERs. Note that it is not a formal UNFCCC term and used here for the purpose of convenience.

holdings of Kyoto units by the Party, as well as by any entities authorized by the Party to hold them. It will also contain accounts for setting units aside for compliance purposes (retirement) and removing units from the system (cancellation). Transfers and acquisitions between account holders or between Parties will take place through these national registries.

- A CDM registry is established and maintained by the secretariat under the authority of the CDM EB. This CDM registry is to conduct the issuance and distribution of CDM credits, upon instruction by the EB, and is to contain accounts for project participants.
- An international transaction log (ITL) will be established and maintained by the secretariat. This will verify transactions of Kyoto units as they are proposed, including their issuance, transfer and acquisition between registries, cancellation, retirement and carry-over to any subsequent commitment period. If such verification finds any proposed transaction to not to be in order, the registry is required to stop the transaction.

["Registry systems under the Kyoto Protocol" (http://unfccc.int/kyoto_mechanisms/items/1673.php)]



(1) SOP-Adaptation means the share of proceeds to assist in meeting costs of adaptation
(2) It may be a permanent holding account or temporary holding account. Temporary accounts for Annex I Parties and project participants from such Parties are created for the purposes of receiving CERs forwarded to them from the pending account and for transferring such CERs to accounts in national registries, until national registries for such Parties and entities would be operational. [EB 12 report, para. 35 (b)]

Figure 2-6 Issuance of CERs into the CDM registry

The CDM registry has been set up and the issuance of CERs has been taking place. However, the ITL is still under development. The COP/MOP requested the secretariat to implement the ITL in 2006, with a view to allowing registry systems to successfully connect to the ITL by April 2007. It is planned that the CDM registry will be the first registry to be initialized with the ITL. Thereafter, the initialization process is likely to prioritize those registry systems for which domestic or regional trading arrangements require an early acquisition of certified emission reductions which have been issued on the basis of CDM project activities [FCCC/SBI/2006/INF.3].

Within the CDM registry, temporary accounts for Annex I Parties and project participants from such Parties are created for the purposes of receiving CERs forwarded to them from the pending account. Once national registries for such Parties and entities, as well as the ITL, become operational, transfer of such CERs from the temporary accounts in the CDM registry to accounts in national registries can take place.

Box 2-1: Review of the issuance of CERs [CDM M&P, para. 65]

A review of the issuance of CERs can be conducted when a request for review is made by a Party involved in the project activity, or at least three members of the EB. A request for review is to be made within 15 days after the request for issuance of CERs has been received. The reason for a review shall be limited to issues of fraud, malfeasance or incompetence of the DOEs. The EB, at the next meeting after the receipt of a request for review, decides if it shall perform a review. The EB should complete the review within 30 days following the decision to perform the review, and inform the project participants of the outcome of the review, as well as make public its decision regarding the approval of the proposed issuance of CERs and the reasons for it.

Reasons for requesting a review

- The DOE accepted the request for certification although it had been aware of a shortcoming that a procedure prescribed in the approved methodology was not implemented by the project participant.
- The DOE noted the malfunctioning of the methane measurement instrument. A discount factor should possibly have been applied for the period for which data are missing.
- The monitoring procedure that estimates the biomass consumption based on the efficiency instead of measuring the biomass consumption should not be accepted.
- There are no monitoring results for some items mentioned in the monitoring report.
- It is not clear how fossil fuel consumption can be cross-verified. Conversion of steam generated to fossil fuel consumption may require use of boiler efficiency and this is not specified.
- It seems the PDD was not revised as stated in the verification report to include the two additional mechanisms for cross-verification of the fossil fuel consumption as it claimed it would.
- The procedure for measuring flare efficiency prescribed in the methodology is not followed without proper submission and acceptance of deviation by the EB.
- The emissions reductions achieved in the project seem to be overestimated.
- The amount of verified CERs is larger than the validated CERs stated in the PDD when treating retroactive data and CERs.

Actions taken by the EB

- At EB23, it was decided a review would not be undertaken for one project activity. Instead, the EB requested the DOE to conduct a verification of the revised monitoring report and submit a new request for issuance. [EB23 report, para. 93]
- At EB 24, it was decided that a review would not be undertaken. The EB noted the additional clarifications provided by the DOE were satisfactory. [EB24 report, para. 82 & 83]
- At EB 25, it was decided that a review would not be undertaken and CERs have been issued as requested for one project activity. For three project activities, it was decided that a review would be undertaken and a review team consisting of three EB members has been formed.

Source:

EB reports and requests for review for the following projects:

- 0108 “Granja Becker GHG Mitigation Project”
- 0115 “GHG emission reduction by thermal oxidation of HFC 23 at refrigerant (HCFC-22) manufacturing facility of SRF Ltd”
- 0341 “6.5 MW biomass based (rice husk) power generation by M/s Indian Acrylics Ltd. and replacement of electrical power being imported from state electricity grid/ surplus power supply to grid”
- 0080 “SRS Bagasse Cogeneration Project”
- 0164 “Bandeirantes Landfill Gas to Energy Project (BLFGE)”
- 0183 “’Optimal Utilization of Clinker’ project at Shree Cement Limited (SCL), Beawar, Rajasthan”

2.6 Costs related to CDM project cycle

There are two types of costs associated with preparing and implementing a CDM project activity. The first type is the costs for developing the project activity that are common to any commercial project development, e.g. feasibility assessment, initial costs for construction and equipments, operation and maintenance costs, cost of capital, etc. Since these costs are not particular to CDM project activities, this manual does not discuss them in detail.

The second type of costs is the ones due to specific requirements of the CDM scheme, which is sometimes referred to as "transaction costs", which are incurred at different stages of CDM project cycle.

The following fees are to be paid to the UNFCCC secretariat, which have been determined by the UNFCCC process, i.e. COP, COP/MOP or the EB. Therefore, they can be clearly calculated according to the UNFCCC prescriptions:

- New methodology submission (USD 1,000. Only applicable if project participants submit a new baseline and monitoring methodology.)
- Registration fee
- Share of Proceeds to cover to cover administrative expenses (SOP-Admin)
- Share of proceeds to assist with the costs of adaptation (SOP-Adaptation)

Box 2-2: Share of Proceeds to cover administrative expenses and Registration fee

The Kyoto Protocol states that the COP/MOP shall ensure that a share of the proceeds from CDM project activities is used to cover administrative expenses as well as to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation [Art.12.8]. Concerning the provision, COP/MOP at its first session decided that the share of proceeds to cover administrative expenses (SOP-Admin) shall be:

(a) USD 0.10 per certified emission reduction issued for the first 15,000 tonnes of CO_2 equivalent for which issuance is requested in a given calendar year;

(b) USD 0.20 per certified emission reduction issued for any amount in excess of 15,000 tonnes of CO_2 equivalent for which issuance is requested in a given calendar year.

[Further guidance relating to the clean development mechanism (Decision 7/CMP.1)]

The EB at its 23rd meeting clarified the following, regarding the registration fee [EB23, Annex 35]:

- ❖ The registration fee shall be the share of proceeds applied to the expected average annual emission reduction for the project activity over its crediting period.
- ❖ The maximum registration fee payable based on this calculation shall be USD 350,000.
- ❖ No registration fee has to be paid for CDM project activities with expected average annual emission reduction over the crediting period below 15,000 t-CO_2 equivalent.
- ❖ The registration fee shall be deducted from the share of proceeds for administrative expenses. In effect, the registration fee is an advance payment of the SOP-Admin for the emission reductions achieved during the first year. If an activity is not registered, any registration fee above USD 30,000 shall be reimbursed.

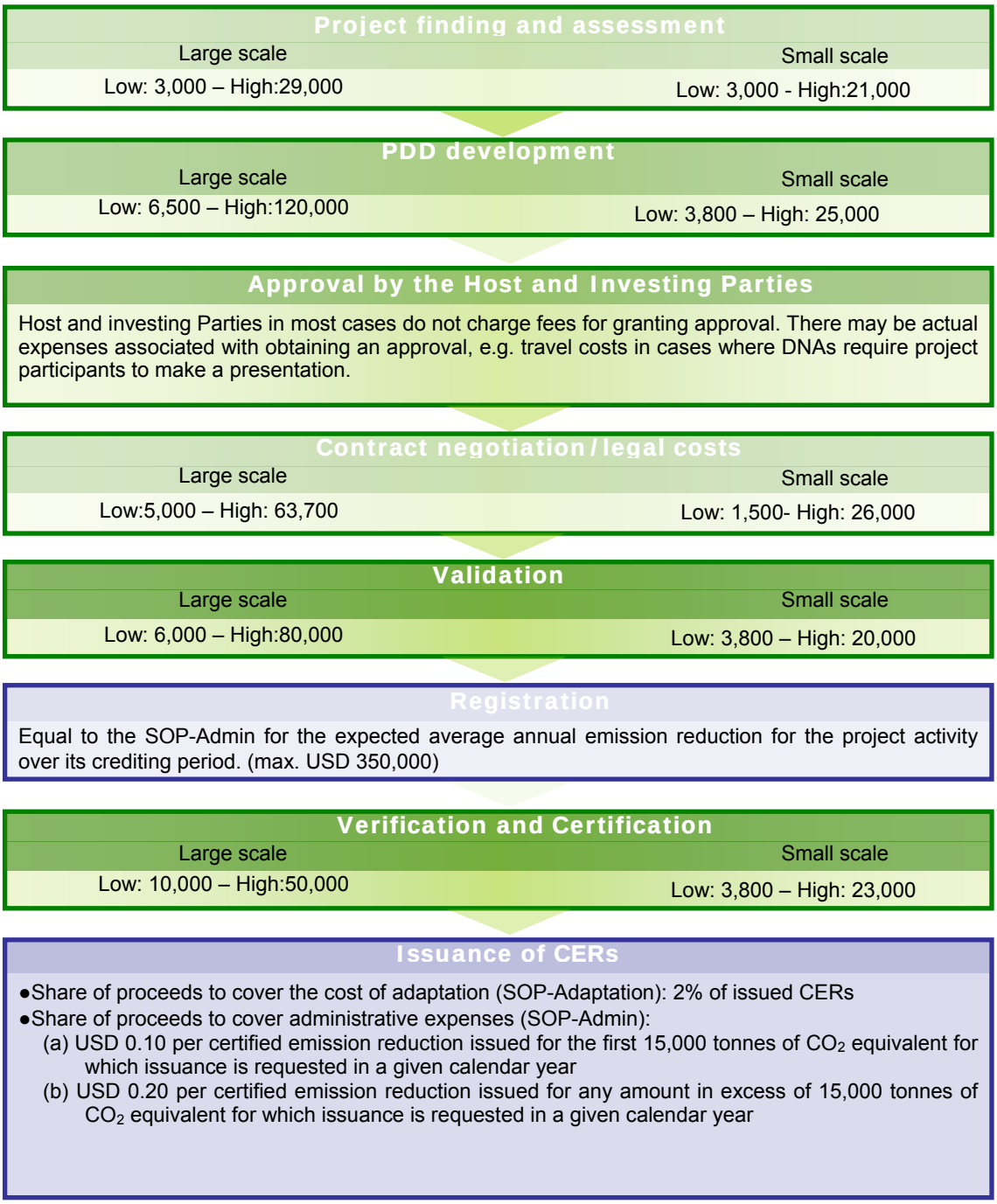
On the other hand, the following costs that are borne by project participants vary depending on the specific circumstances of the project at hand and the service providers. It is also possible that project participants absorb the costs by carrying out the task in-house, e.g. development of a PDD by its own staff.

Costs for the followings are typically paid to others, e.g. DOEs, consultants, and lawyers:

- Project finding and assessment
- New methodology development and submission
- PDD development
- Validation
- Host country approval
- Contract negotiation and legal costs
- Monitoring
- Verification/Certification

2. CDM Procedures

The ranges of CDM transaction costs are illustrated in Figure 2-7. Registration fee, as well as the share of proceeds incurred at the stage of issuance of CERs, is to be paid to the UNFCCC secretariat. For those costs that are not determined by the UNFCCC process, the figures only indicate possible ranges based on the literature about CDM transaction costs. Furthermore, Figures 2-8-1 to 2-8-4 show some examples of the registration fee and the SOP-Admin, which are interrelated.



(Unit: US dollar)

Note:
The ranges of costs are based on the figures found in the literature listed below and shown only for illustration. It does not guarantee that the actual costs fall within these ranges. Exchange rates used: 1.82 USD/GBP, 1.28USD/Euro

Sources:

1 “Carbon transaction costs and carbon project viability”, Climate Change Projects Office, Department of Trade & Industry, April 2005. http://www.dti.gov.uk/files/file21145.pdf
2 Hanna-Mari Ahonen, Kari Hämekoski, "Transaction Costs under the Finnish CDM/JI Pilot Programme", University of Helsinki, 2005, http://www.mm.helsinki.fi/mmtal/abs/DP12.pdf
3 Matthias Krey, "Transaction costs of unilateral CDM projects in India-results from an empirical survey", Energy Policy 33 (2005) 2385-2397
4 "Transaction Costs of CDM Projects", Ministry of Energy, Water and Communications (MEWC), Malaysia Energy Centre (PTM), DANIDA, 16 September 2004
5 CDM Small-Scale Working Group, Fifth Meeting Report, Annex 7. [http://cdm.unfccc.int/Panels/ssc_wg/SSCWG05_repan_07_Scenario_NRB2RB.pdf]

Figure 2-7 CDM transaction costs

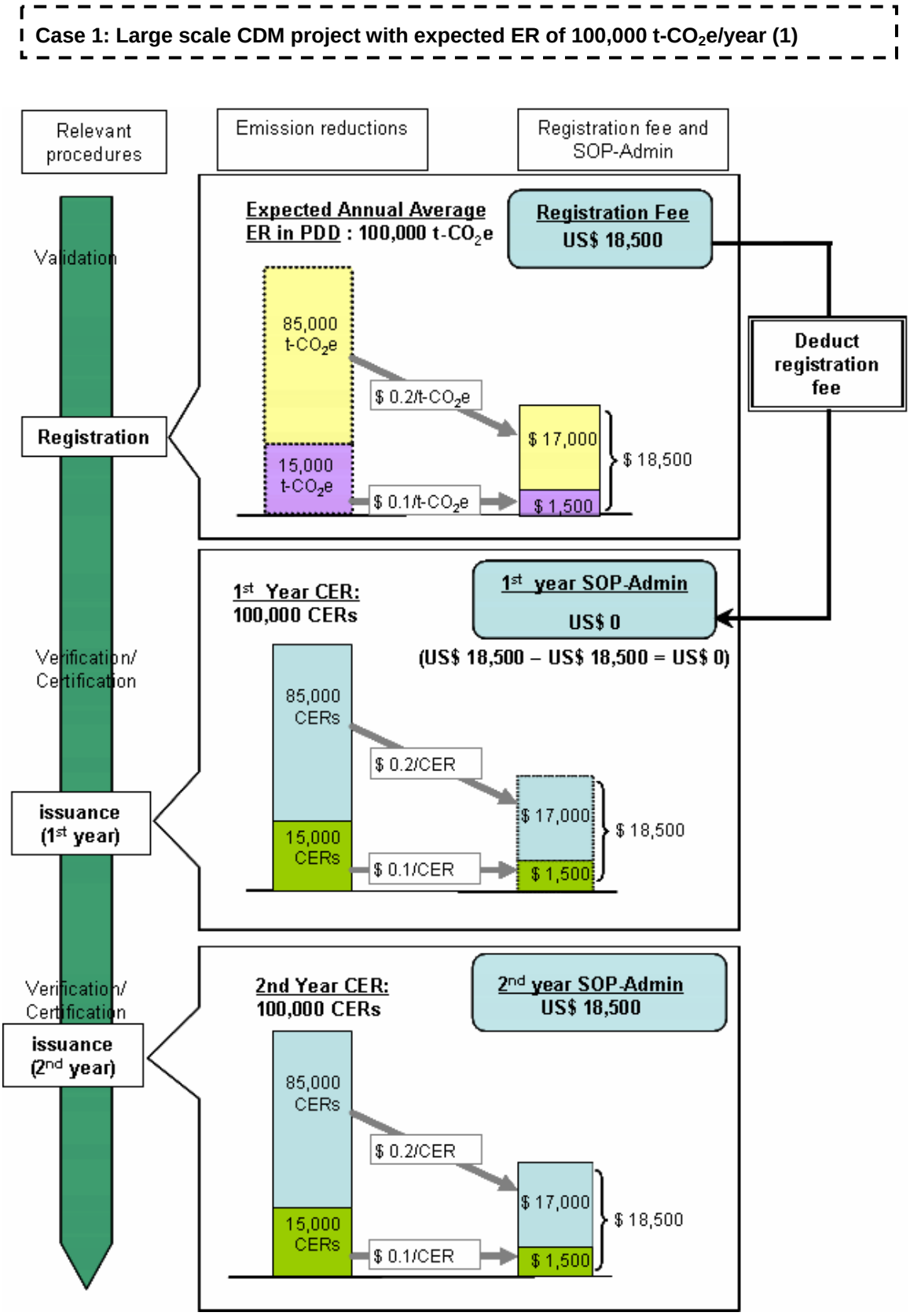


Figure 2-8-1 Costs related to CDM project cycle: Illustration #1 of Registration fee and SOP-Admin

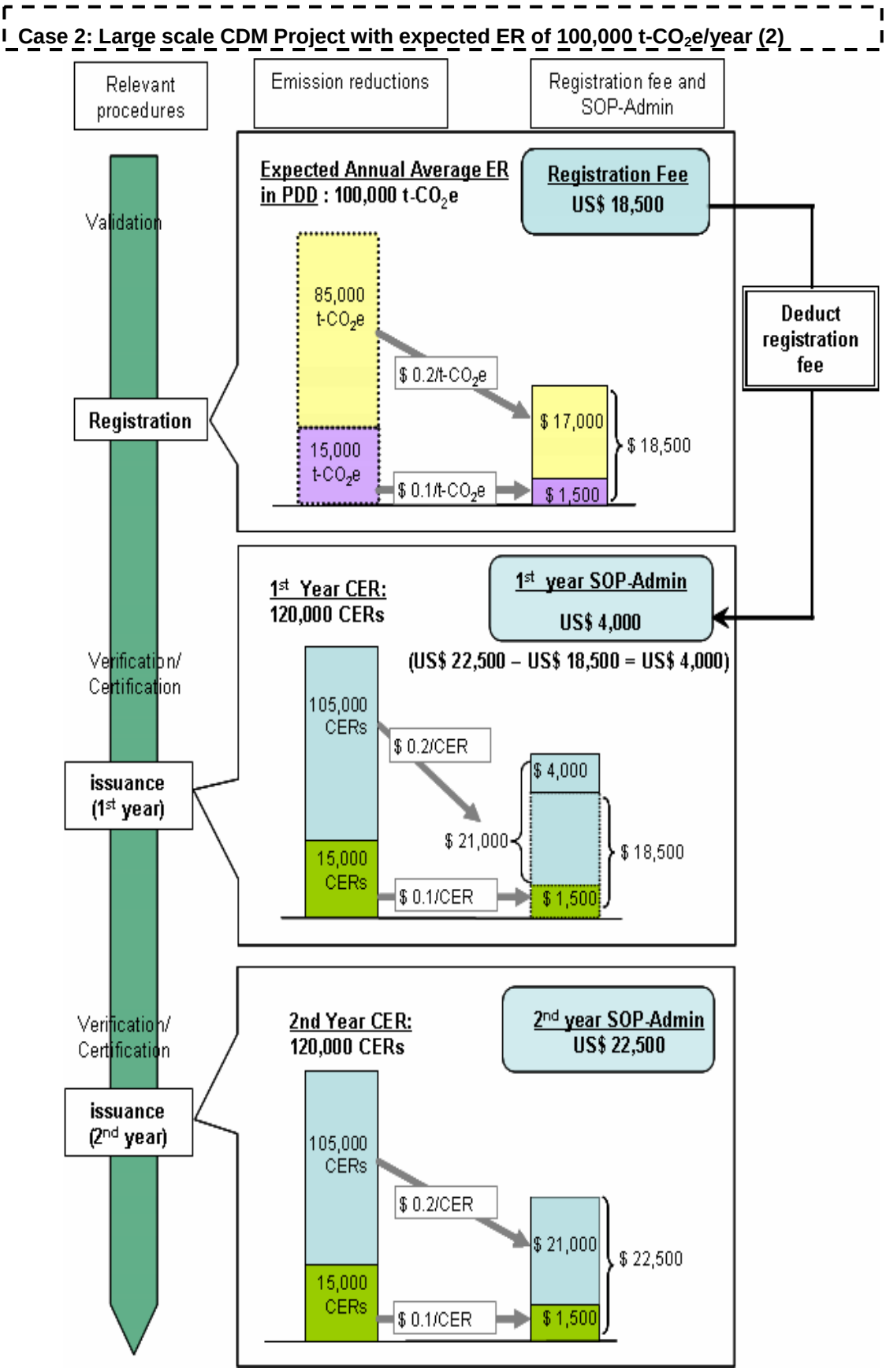


Figure 2-8-2 Costs related to CDM project cycle: Illustration #2 of Registration fee and SOP-Admin

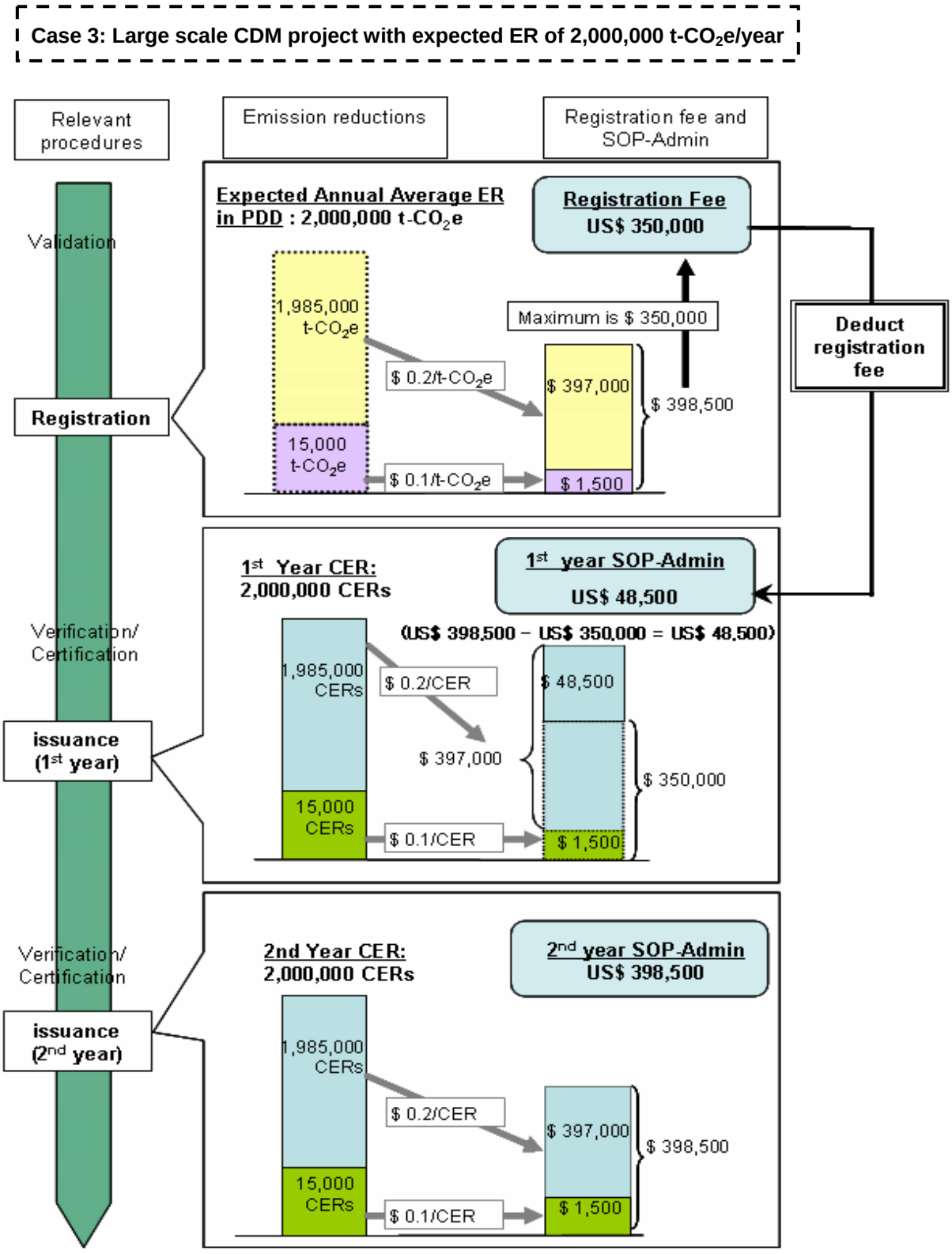


Figure 2-8-3 Costs related to CDM project cycle:

Illustration #3 of Registration fee and SOP-Admin

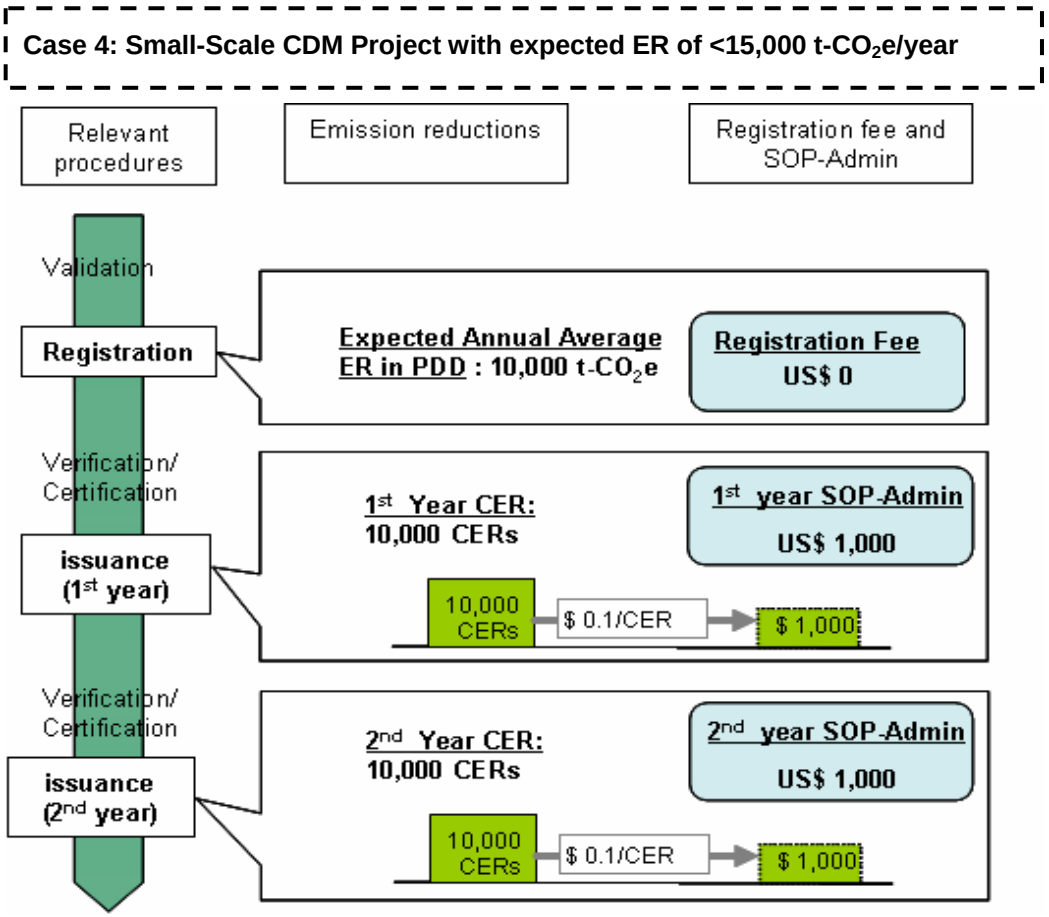


Figure 2-8-4 Costs related to CDM project cycle: Illustration #4 of Registration fee and SOP-Admin

3. Different types of CDM

3.1 CDM typology

CDM project activities can be divided into the following types depending on the size and kinds of activity undertaken. Project participants who wish to develop a CDM project activity should first determine in which of the following categories the project activity would fit, as different modalities and procedures and formats apply to each project type.

Table 3-1 Classification of CDM project activities

CDM project activities (for emission reduction)	
Small-Scale CDM (SSC) Type I: Renewable energy project activities with a maximum output capacity equivalent to up to 15 MW (or an appropriate equivalent) Type II: Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 GWH per year Type III: Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15,000 t-CO_2 equivalent annually Note that definitions for types II and III may be changed if COP/MOP2 adopts EB's recommendations made at EB26[8].	
Modalities and Procedures	Simplified modalities and procedures for small-scale CDM project activities, and its Appendix B [Annex II to Decision 21/CP.8]
Formats	PDD: SSC-CDM-PDD Baseline and Monitoring Meth: F-CDM-SSC-Subm
Guidelines	• Guidelines for completing CDM-SSC-PDD, F-CDM-SSC-Subm, F-CDM-SSC-BUNDLE • Principles for bundling [EB21, Annex 21] • Clarifications relating to bundling of small-scale CDM project activities [EB20, para. 60] • Further clarifications on definition of eligible activities [extract of Decision 21/CP.8]
Large scale CDM CDM project activities that are not SSC or A/R project activities	
Modalities and Procedures	CDM Modalities and Procedures [CDM M&P; Decision 3/CMP.1]
Formats	PDD: CDM-PDD Baseline and monitoring Meth: CDM-NM
Guidelines	Guidelines for completing CDM-PDD and CDM-NM

[8] The EB, at its 26th meeting, agreed to recommend the following revisions to the definitions of small-scale project activities referred to in paragraph 6 (c):of decision 17/CP.7:
(a) Type I project activities: Renewable energy project activities with a maximum output capacity of 15MW (or an appropriate equivalent);
(b) Type II project activities: Energy efficiency improvement project activities, which reduce energy consumption, on the supply and/or demand side, by up to a maximum of 60GWh per year (or an appropriate equivalent);
(c) Type III project activities: Other project activities that result in emission reduction of less than or equal to 60kt-CO_2e annually.
[EB26, para. 63]

3. Different types of CDM

Afforestation and Reforestation CDM project activities (A/R CDM)	
Small-Scale A/R CDM Those that are expected to result in net GHG removals by sinks of less than 8 kilotonnes of CO_2 per year Developed or implemented by low-income communities and individuals as determined by the host Party	
Modalities and Procedures	Simplified methodologies for small-scale afforestation and reforestation CDM project activities [Decision 6/CMP.1]
Formats	PDD: CDM-SSC-AR-PDD Baseline and monitoring Meth: F-CDM-SSC-AR-Subm
Guidelines	Guidelines for completing CDM-AR-SSC-PDD and F-CDM-SSC-AR-Subm
Large scale A/R CDM A/R CDM project activities that are not Small-Scale A/R CDM	
Modalities and Procedures	Modalities and procedures for afforestation and reforestation project activities under the CDM [Decision 19/CP.9]
Formats	PDD: CDM-AR-PDD Baseline and Monitoring Meth: CDM-AR-NM
Guidelines	Guidelines for completing CDM-AR-PDD, and CDM-AR-NM

The most recent version of guidelines and formats are available on the CDM website at:

- [PDD forms] http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs
- [Methodology forms] http://cdm.unfccc.int/Reference/PDDs_Forms/Methodologies
- [Guidelines, clarifications and tools] http://cdm.unfccc.int/Reference/Guidclarif

3.2 Small-Scale CDM Project Activities

3.2.1 Overview of Small-Scale CDM project activities

The framework of Small-Scale CDM would enable project participants to use a fast-track approach for CDM procedures which could help reduce transaction costs compared to those of large scale CDM.
Small-Scale CDM project activities are to meet certain eligibility criteria. Once a project activity is classified as Small-Scale CDM, then it can benefit from being able to use the simplified modalities and procedures for Small-Scale CDM project activities, use a simplified PDD form (SSC-PDD), apply a shortened review period, and have the same operational entity undertake validation as well as verification and certification.

To use the simplified modalities and procedures for Small-Scale CDM project activities, a proposed project activity shall:

(a) Meet the eligibility criteria for Small-Scale CDM project activities set out in paragraph 6(c) of CDM M&P (types I to III described below);
(b) Conform to one of the project categories in appendix B to Annex II to Decision 21/CP.8 (refer to Table 3-3 for the categories); and
(c) Not be a debundled component of a larger project activity, as determined through appendix C to Annex II to Decision 21/CP.8 (refer to section 3.2.3 (3) below).

3.2.2 Definition of Small-Scale CDM project activities

Three project types are currently recognized as eligible Small-Scale CDM project activity in emission reduction sector. Each type is divided into different categories. Each category consists of several technologies and measures. The three types of Small-Scale CDM project activities are the following:

(1) Type I: Renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent).

Type I covers renewable energy project activities, including solar, wind, hybrid systems, biogas or biomass, water, geothermal, and waste.

The total capacity of a plant used for the project activity should not exceed 15 MW in output. Maximum "output" is defined as installed/rated capacity, as indicated by the manufacturer of the equipment or plant, disregarding the actual load factor of the plant.

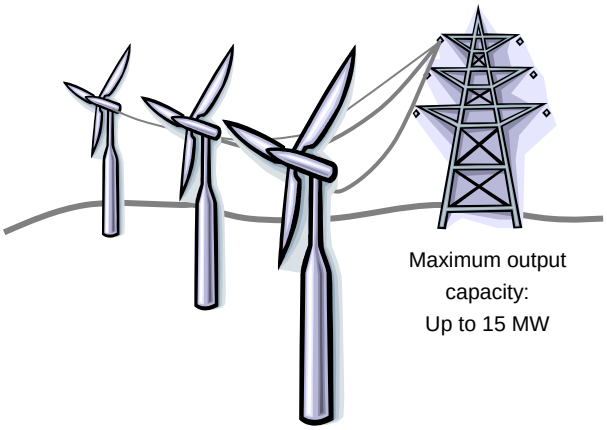


Figure 3-1 Type I - Renewable energy project activities

"Appropriate equivalent" of 15 MW is defined as "appropriate equivalent" of 15 MW (electric). As MW (electric) is the most common domination, projects referring to MW (peak) or MW (thermal) will have to use a conversion factor to MW (electric).

(2) Type II: Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 GWh/year.

The EB agreed, at its 26th meeting, to recommend the following revision to the definition of Type II project activity for adoption by the COP/MOP at its second session:

"Energy efficiency improvement project activities, which reduce energy consumption, on the supply and/or demand side, by up to a maximum of 60 GWh per year (or an appropriate equivalent)" [EB26 report, para.63 (b)].

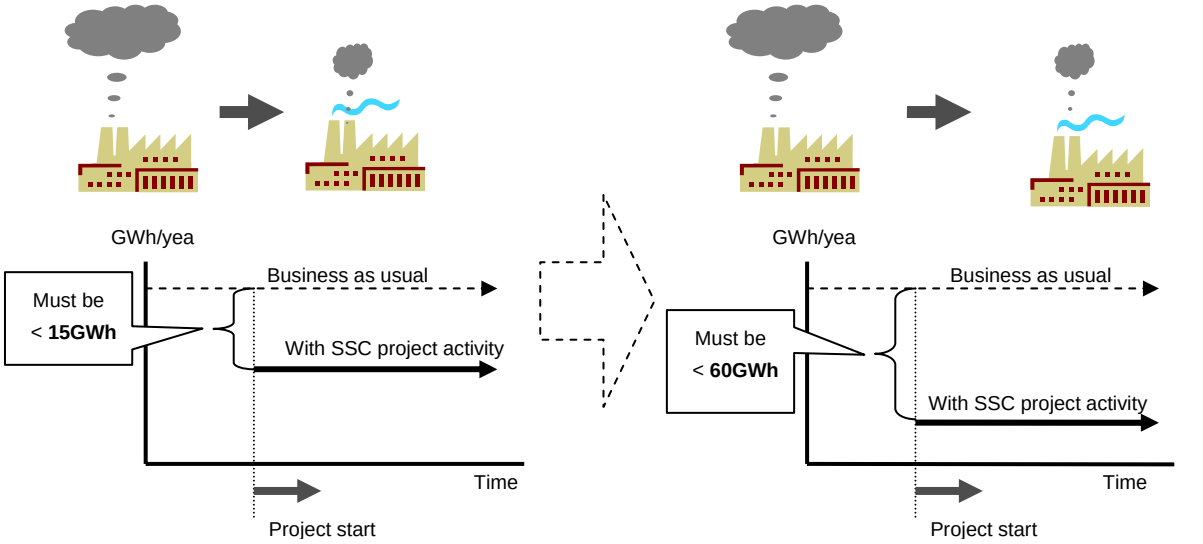
Type II covers supply side project activities and end-use project activities concerning residential, service, industry, transport, agricultural machineries and cross-cutting technologies, which result in improvement in per unit power for the service provider or in reduction of energy consumption in watt-hours in comparison with the approved baseline.

Energy efficiency improvement is the improvement in the service provided per unit power. It corresponds to project activities which increase unit output of traction, work, electricity, heat, light (or fuel) per MW input are energy efficiency project activities.

Energy consumption is the consumption reduced and measured in watt-hours with reference to an approved baseline. Lower consumption as a result of lower activity shall not be taken into consideration. This means that when energy consumption is reduced due to the reduction in activity level and not due to higher energy efficiency, the resulting emission reduction cannot be attributed to the CDM project activity.

Demand side as well as supply side projects shall be taken into consideration, provided that a project activity results in a reduction of maximum 15 GWh (or 60 GWh as recommended by the EB, if adopted by COP/MOP 2), as illustrated in Figure 3-2.

A total saving of 15 GWh is equivalent to 1000 hours of operation of a 15 MW plant or 15 X 3.6 TJ = 54 TJ (terajoules). On the other hand, a total saving of 60 GWh is equivalent to 1000 hours of operation of a 60 MW plant or 60 X 3.6 TJ =216 TJ (terajoules).



- Reduction in energy consumption up to 15 GWh/year (Definition according to decision 17/CP.7)
- Reduction in energy consumption up to 60 GWh/year (Recommended by EB26 for adoption by COP/MOP2)

Figure 3-2 Type II - Energy efficiency improvement project activities

(3) Type III: Other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually

The EB agreed, at its 26th meeting, to recommend the following revision to the definition of Type III project activity for adoption by COP/MOP2:

"Other project activities that result in emission reduction of less than or equal to 60 kt-CO_2e annually" [EB26 report, para.63 (b)].

As Figure 3-3 illustrates, in the definition according to decision 17/CP.7, Type III projects shall not exceed total direct emissions of 15 kt-CO_2e/year, and must reduce greenhouse gas emissions.

At EB24, as an interim solution to the problem that Type III project activities may be able to achieve significant emission reductions, without exceeding the direct emissions limits i.e.15 kt-CO_2e, the EB agreed to include the following text in the applicability conditions of all current Type III categories: "This category is applicable for project activities resulting in annual emission reductions lower than 25,000 t-CO_2e. If the emission reduction of a project activity exceeds the reference value of 25,000 t-CO_2e in any year of the crediting period, the annual emission reduction for that particular year is capped at 25,000 t-CO_2e" [EB24, para. 64].

Type III covers project activities concerning agriculture, fuel switching, industrial processes, and waste management. Possible examples in the agricultural sector include improved manure management, reduction of enteric fermentation, improved fertilizer usage, and improved water management in rice cultivation.

Other project activities that could qualify include CO_2 recycling, carbon electrodes, adipic acid production and the use of HFCs, PFCs and SF_6, making reference to the emission reductions generated by such projects expressed in CO_2 equivalent.

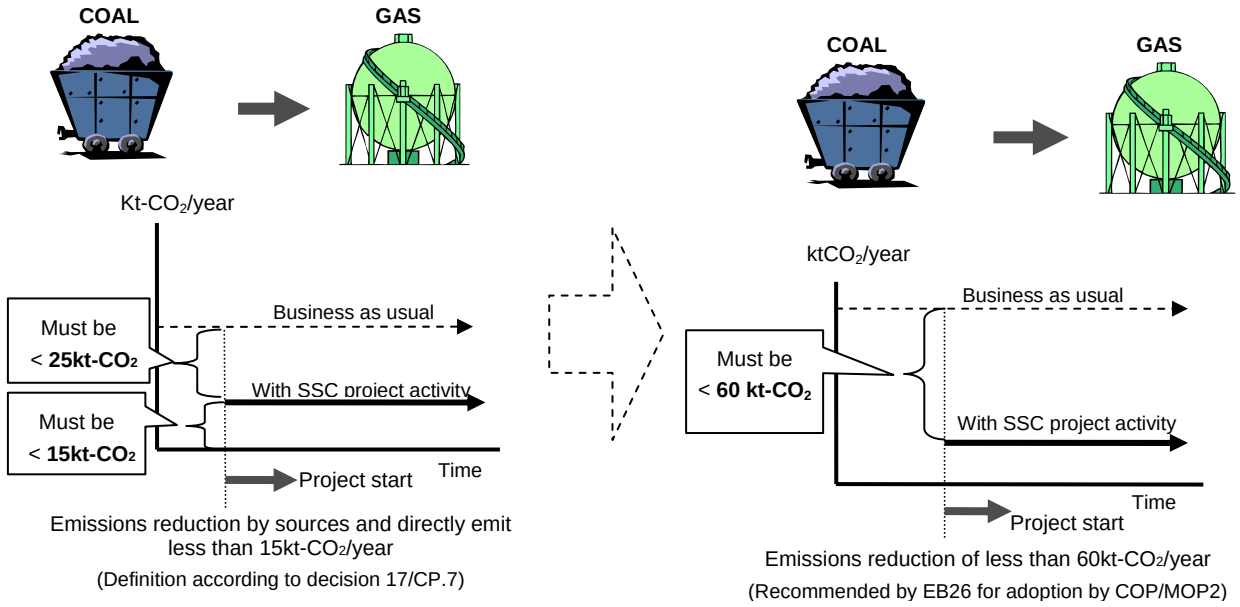


Figure 3-3 Type III - Other project activities

A project activity falling into one of the project types above and in conformity with the threshold of the project type is eligible to use a simplified baseline and monitoring methodology.

The three types of project activities outlined above are mutually exclusive. In a project activity with more than one component that will benefit from the simplified modalities and procedures for Small-Scale CDM project activities, each component shall meet the threshold criterion of each applicable type, e.g. for a project with both a renewable energy and an energy efficiency component, the renewable energy component shall meet the criterion for "Type I: renewable energy" and the energy efficiency component shall meet that for "Type II: energy efficiency improvement".

3.2.3 Rules of Small-Scale CDM

It should be noted when developing a Small-Scale CDM project activity, project participants need to follow the stages of the project cycle specified in the CDM modalities and procedures as mentioned in Chapter 2. However, simplified methodologies can be applied to Small-Scale CDM project activities, which are usually less cumbersome and easier to apply than methodologies for large scale project activities. The list of categories of the Small-Scale CDM project activity is available to project participants and will be explained in section 3.2.5 below.

There are other benefits that project participants can receive from applying the scheme of Small-Scale CDM. In order to reduce transaction costs modalities and procedures are simplified as follows:

(a) Project activities may be bundled or portfolio bundled at the following stages in the project cycle: the project design document, validation, registration, monitoring, verification and certification. The size of the total bundle should not exceed the limits set out for the three project types above;
(b) The requirements for the project design document are reduced;
(c) Baseline methodologies by project category are simplified to reduce the cost of developing a project baseline;
(d) Monitoring plans are simplified, including simplified monitoring requirements, to reduce monitoring costs; and
(e) The same DOE may undertake validation, and verification and certification.

(1) Limits for Small-Scale CDM project activity types [EB20, para. 58]

Small-Scale CDM project activities shall remain under the limits for Small-Scale CDM project activities types, as explained above, every year during the crediting period.

If a project activity goes beyond the limit of its type in any year of the crediting period, the emission reductions that can

be claimed by the project activity during this particular year will be capped by the maximum emission reduction estimated in the CDM-SSC-PDD by the project participants for that year during the crediting period.

Project participants shall demonstrate in the CDM-SSC-PDD that the project activity characteristics are defined in a way that precludes project activities to go beyond the limits:

(a) For type I: project participants shall provide proof that the installed capacity of the proposed project activity will not increase beyond 15 MW;

(b) For type II: project participants shall provide proof that the efficiency improvements do not exceed the equivalent of 15 GWh per year every year throughout the crediting period;

(c) For type III: project participants shall provide an estimation of emissions of the project activity over the crediting period and proof that the emissions every year will not go beyond the limits of 15 kt-CO_2e/year over the entire crediting period.

A project activity using a renewable crediting period shall reassess their compliance with the limits at the time when they request renewal of the crediting period.

(2) Bundling of Small-Scale project activities

Bundle is defined as bringing together of several Small-Scale CDM project activities to form a single CDM project activity or portfolio without the loss of distinctive characteristics of each project activity. Project activities within a bundle can be arranged in one or more sub-bundles, with each project activity retaining its distinctive characteristics. Such characteristics include its technology/measure, location, and application of simplified baseline methodology. Project activities within a sub-bundle belong to the same type. The sum of the output capacity of projects within a sub-bundle must not be more than the maximum output capacity limit for its type.

Sub-bundle is defined as an aggregation of project activities within a bundle having the characteristics that all project activities within a sub-bundle belong to the same type.

Table 3-2 Information on bundling of Small-Scale CDM project activities

General Characteristics
Project activities wishing to be bundled shall indicate this when making the request for registration. Project participants shall at registration provide a written statement along with the submission of the bundle indicating: • That all project participants agreed that their individual project activities are part of the bundle; • One project participant who represents all project participants in order to communicate with the Board in accordance with approved Modalities and Procedures for Communication. **Composition of bundles:** The composition of bundles shall not change over time (i.e. the submission of project activities to be used in a bundle shall be made at the same time). A project activity shall not be taken out of a bundle nor shall a project activity be added to the bundle after registration. **Crediting period:** All project activities in the bundle shall have the same crediting period (i.e. the same length and same starting date of the crediting period). **Modalities and procedures:** Each Small-Scale CDM project in the bundle should comply with the simplified modalities and procedures for Small-Scale CDM project activities and use an approved simplified baseline and monitoring methodology included in Appendix B of the simplified modalities and procedures for Small-Scale CDM project activities. **Submission to the EB:** Bundled project activities shall be submitted in a single submission to the Board and pay only one fee proportional to the amount of expected average annual emission reductions of the total bundle; **Request for review:** If three Board members or a Party involved in a component project activity requests the review of the component project activity, the total bundle remains under review and the implications and recommendations on the review of project activity shall lead to a decision by the Board to register or not register the bundle.

Form
• A form with information related to the bundle must be included in the submission. • The form should cover issues such as the title of the bundle, general description, project participants, locations, types and categories, estimated amount of emission reduction, crediting period and monitoring plans.
Small-Scale limits
• The sum of the size (capacity for Type I, energy saving for Type II, and direct emissions of project activity for Type III) of the technology or measure utilized in the bundle should not exceed the limits for Small-Scale CDM project activities as set in paragraph 6 (c) of the decision 17/CP.7. • It should be demonstrated that the bundle will remain under the limit for the type every year during the crediting period. The total emission reduction estimated for the crediting period must be included in the draft SSC-CDM-PDD and further monitored. • If a bundle goes beyond the limits for the selected Small-Scale CDM project activities type, the emission reduction that can be claimed for this particular year will be capped at the maximum emission reduction level estimated for the bundle by the project participants in the "Bundle" form for that year during the crediting period.
Validation and verification
• One DOE can validate this bundle. • One verification report is adequate, one issuance will be made at the same time for the same period, and a single serial number will be issued for all the project. • For projects submitting multiple CDM-SSC-PDDs, all CDM-SSC-PDDs shall be made publicly available for comments at validation stage at the same time. If, for corrective actions the DOE considers that major changes would be required in any of the project activities of the bundle, and that this would require the CDM-SSC-PDD to be made publicly available for comments another time, the whole bundle would need to be made publicly available for public comments. The DOE validating the bundle shall consider the public comments for each of the CDM-SSC-PDDs.
Letter of approval
The letter of approval by the host Party(ies) has to indicate that the Party is aware that the component project activity(ies) taking place in its territory is part of the bundle.
Issuance
If a bundle of project activities is submitted with a single or different CDM-SSC-PDDs it shall have only one identifier for purposes of issuance of CERs.
Use of a single PDD covering all activities
• If all project activities in the bundle belong to the same type, same category and technology/measure, project participants may submit a single CDM-SSC-PDD covering all activities in the bundle. If project participants use the same baseline for all the project activities in the bundle, it should be justified by considering the particular situation of each project activity in the bundle. As an example two project activities using the same technology to produce electricity but connected to different grids must use different baselines. A common monitoring plan can be utilized for the bundle with the submission of one monitoring report, under conditions to be specified. If different baselines are used, the proposed procedure for sampling must consider this situation, including the proportionate representative samples of each baseline used. In this case (a single PDD is used) a single verification and certification report shall be submitted by the DOE. • In all other cases (if the bundle includes project activities with (a) the same type, same category and different technology/measure; (b) same type, different categories and technologies/measures; and (c) different types). • Project participants would have to make the submission of the bundle using a CDM-SSC-PDD for each of the component project activities contained in the bundle. Different monitoring plans will be required for project activities in the bundle and separate monitoring reports must be prepared. In these cases a single verification and certification report can be submitted for the bundle provided that it appraises each of the component project

activities of the bundle separately and covers the same verification period.

Source: Guidelines for completing the simplified project design document (CDM-SSC-PDD), the form for submissions on methodologies for small-scale CDM project activities (F-CDM-SSC-Subm), and the form for submission of bundled small-scale CDM project activities (F-CDM-SSC-BUNDLE) Version03

Box 3-1: What does "same technology/measure" mean?

"Same technology/measure" is often used in the small-scale CDM, especially when considering bundling. At EB26, the term was defined as follows:

(a) Two different project activities will be considered to be applying the same technology if they provide the same kind of output and use the same kind of equipment and conversion process.

(b) Two different project activities will be considered to be using the same measure if they constitute the same course of action and result in the same kind of effect (e.g. two projects using the same management practice such as fuel switch). [EB 26 report, para. 62]

(3) Debundling

As mentioned above, the proposed project activity shall not be a debundled component of a large scale project activity if it aims at using the simplified modalities and procedures for Small-Scale CDM project activities. Debundling is defined as "the fragmentation of a large project activity into smaller parts". A proposed Small-Scale project activity is considered to be a debundled component of a large project activity if there is a registered Small-Scale CDM project activity or an application to register another Small-Scale CDM project activity:

- with the same project participants;
- in the same project category and technology/measure;
- registered within the previous 2 years; and
- whose project boundary is within 1 km of the project boundary of the proposed Small-Scale activity at the closest point.

However, even though a proposed Small-Scale project activity is considered to be a debundled component, if total size of such an activity combined with the previously registered Small-Scale CDM project activity does not exceed the limits for Small-Scale CDM project activities as shown in the types I through III explained above, the project activity can qualify to use the simplified modalities and procedures for Small-Scale CDM project activities.

3.2.4 Additionality in Small-Scale CDM project activities

A simplified baseline and monitoring methodology listed in Appendix B of Annex II to Decision 21/CP.8 (FCCC/CP/2002/7/Add.3) may be used for a Small-Scale CDM project activity if the project participants are able to demonstrate to a DOE that the project activity would otherwise not be implemented due to the existence of one or more of the barriers listed below.

Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

(a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;

(b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(c) Barrier due to prevailing practice: prevailing practice, existing regulatory, or policy requirements would have led to implementation of a technology with higher emissions;

(d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

3.2.5 Categories of Small-Scale CDM

There are simplified methodologies developed for 20 categories of Small-Scale CDM project activities. The methodologies are included in Appendix B of the simplified modalities and procedures for Small-Scale CDM project activities.

Table 3-3 Categories of Small-Scale CDM

TYPE I - RENEWABLE ENERGY PROJECTS	
I.A.	Electricity generation by the user
I.B.	Mechanical energy for the user
I.C.	Thermal energy for the user
I.D.	Renewable electricity generation for a grid
TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS	
II.A.	Supply side energy efficiency improvements - transmission and distribution
II.B.	Supply side energy efficiency improvements - generation
II.C.	Demand-side energy efficiency programmes for specific technologies
II.D.	Energy efficiency and fuel switching measures for industrial facilities
II.E.	Energy efficiency and fuel switching measures for buildings
II.F.	Energy efficiency and fuel switching measures for agricultural facilities and activities
TYPE III - OTHER PROJECT ACTIVITIES	
III.A.	Agriculture
III.B.	Switching fossil fuels
III.C.	Emission reductions by low-greenhouse gas emitting vehicles
III.D.	Methane recovery in agricultural and agro industrial activities
III.E.	Avoidance of methane production from biomass decay through controlled combustion
III F.	Avoidance of methane production from biomass decay through composting
III G.	Landfill methane recovery
III H.	Methane recovery in wastewater treatment
III I.	Avoidance of methane production in wastewater treatment through replacement of anaerobic lagoons by aerobic systems
III J.	Avoidance of fossil fuel combustion for carbon dioxide production to be used as raw material for industrial processes

Source: http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

Project participants may propose changes to the simplified baseline and monitoring methodologies or propose additional project categories for consideration by the EB. Project participants willing to submit a new Small-Scale project activity category or revisions to a methodology shall make a request in writing to the EB providing information about the technology/activity and proposals on how a simplified baseline and monitoring methodology would be applied to this category. The EB shall expeditiously, if possible at its next meeting, review the proposed methodology. Once approved, the EB shall amend the indicative list of simplified baseline and monitoring methodologies contained in Appendix B.

3.3 Afforestation or reforestation project activity under the CDM (A/R CDM project activity)

It has been determined in the Marrakech Accords that Land use, Land-use Change and Forestry (so called LULUCF or sink) under the CDM is limited to afforestation and reforestation during the first commitment period. Forest management and revegetation are therefore not allowed under the Afforestation/Reforestation CDM (A/R CDM) scheme.
A/R CDM and emission reduction CDM project activities have similar aspects, such as provisions for participation requirements, project cycle and procedures. However, the unique characteristic of A/R CDM project activities originating from the issue of temporal storage of GHG removals in forest, which is referred to as “non-permanence”, results in a distinctive crediting scheme for A/R CDM project activities.

In this section, a brief overview is provided on what project participants need to know in order to plan an A/R CDM project activity. Following the overview, more technical information is explained with respect to key points covered in a project design document for A/R CDM project activities (CDM-AR-PDD), such as baseline, additionality, monitoring, calculation of GHG removals by sinks, and issue of non-permanence, as well as Small-Scale A/R CDM project activities.

3.3.1 Participation requirements

As mentioned above, all provisions of Section F (“Participation requirements”) of the CDM M&P apply to A/R CDM project activities (i.e. Participation in a CDM project activity is voluntary; Parties involved have to be a Party to Kyoto Protocol; Parties need to establish DNA; Annex I Party has to calculate and record assigned amount as well as maintains national registry, etc.).

In order to host an A/R CDM project activity, a non-Annex I Party needs to determine thresholds for forest definition in addition to the participation requirements mentioned above, and report to the EB through its DNA. The thresholds are:

(a) A single minimum tree crown cover value between 10 and 30 per cent;
(b) A single minimum land area value between 0.05 and 1 hectare; and
(c) A single minimum tree height value between 2 and 5 metres.

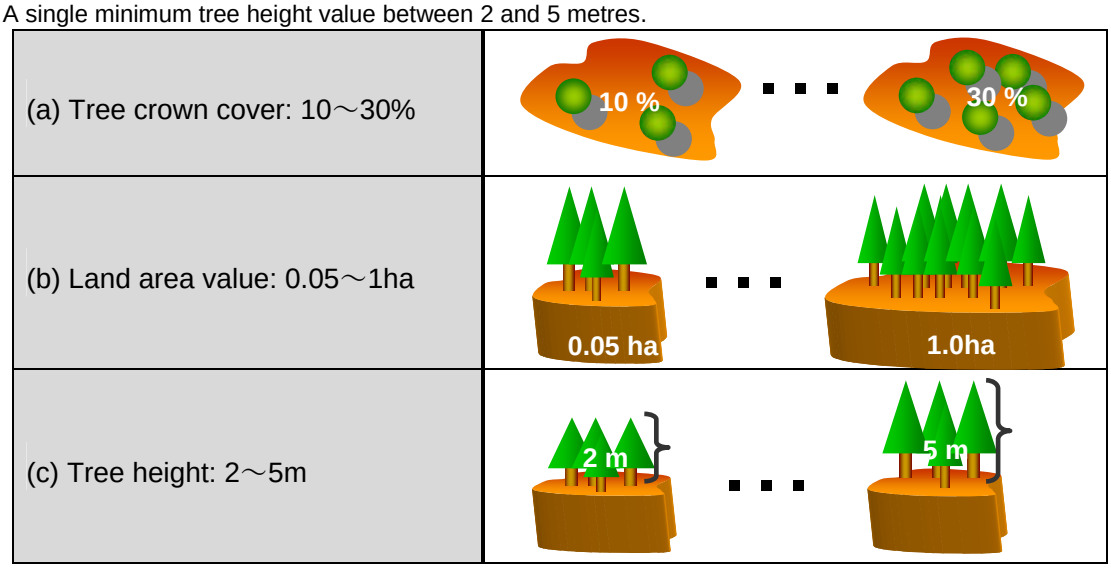


Figure 3-4 Thresholds for forest definition

3.3.2 Definitions of terms used in A/R CDM

(1) Afforestation and reforestation

The Marrakech Accords decide the eligibility of LULUCF project activities under the CDM is limited to afforestation and reforestation for the first commitment period. The definition of afforestation and reforestation are as follows:

(a) Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources;

(b) Reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.

(2) Carbon pools

Carbon pools are above-ground biomass, below-ground biomass, litter, dead wood and soil organic carbon.

(3) Project boundary

When project participants start an A/R CDM project activity, a project boundary needs to be clearly defined to calculate GHG removals by sinks per unit of area or in the total area.

The project boundary geographically delineates the afforestation or reforestation project activity under the control of the project participants. The project activity may contain more than one discrete area of land.

In another word, the project boundary is a physical line surrounding piece(s) of land, and one A/R CDM project activity could be composed of different pieces of land.

(4) Baseline net GHG removals by sinks

Baseline net GHG removals by sinks are the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the A/R CDM project activity.

(5) Actual net GHG removals by sinks

Actual net GHG removals by sinks are the sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in emissions of the GHGs measured in CO_2 equivalents by the sources that are increased as a result of the implementation of the afforestation or reforestation project activity, while avoiding double counting, within the project boundary, attributable to the A/R CDM project activity.

(6) Net anthropogenic GHG removals by sinks

Net anthropogenic GHG removals by sinks are the actual net GHG removals by sinks minus the baseline net GHG removals by sinks minus leakage.

(7) Temporary CER (tCER)

Temporary CER (tCER) is a CER issued for an A/R CDM project activity which expires at the end of the commitment period following the one during which it was issued. For example, if 100 tons of tCERs are issued in the first commitment period, the tCERs will expire at the end of the second commitment period.

(8) Long-term CER (lCER)

Long-term CER (lCER) is a CER issued for an A/R CDM project activity which expires at the end of the crediting period of the A/R CDM project activity for which it was issued.

(9) Starting date of an A/R CDM project activity

An A/R CDM project activity starting after 1 January 2000 can also be validated and registered after 31 December 2005 as long as the first verification of the project activity occurs after the date of registration of this project activity. Given that the crediting period starts at the same date as the starting date of the project activity, the projects starting 2000 onwards can accrue tCERs/lCERs as of the starting date [EB21, para. 64]. In other words, provisions of paragraphs 12 and 13 of Decision 17/CP.7 do not apply to A/R CDM project activities.

3.3.3 Other relevant decisions made by EB

(1) Pre-project GHG emissions

When the baseline scenario is expected to correspond to approaches of paragraph 22 (a) and (c) of the modalities and procedures for A/R CDM project activities:

(a) A/R CDM project activities, only the increase of pre-project GHG emissions as a consequence of the implementation of the project activity has to be taken into account in the calculation of net anthropogenic GHG removals by sinks.

(b) Pre-project GHG emissions by sources which are displaced outside the project boundary in order to enable an afforestation or reforestation project activity under the CDM shall not be included under leakage if the displacement does not increase these emissions with respect to the pre-project conditions. Otherwise, leakage for the displacement of pre-project activities is equal to the incremental GHG emissions compared with the pre-project conditions.

(2) Renewable biomass

The EB adopted a definition of renewable biomass, as shown below. The EB also agreed that the use of biomass is not necessarily excluded if it does not meet the definition of renewable biomass. In such cases the possible negative impact on carbon stocks of such use, shall be accounted for as leakage in baseline and monitoring methodologies.

Biomass is “renewable” if one of the following five conditions applies in Table 3-4:

Table 3-4 Conditions for renewable/non-renewable biomass [EB23 Annex18]

1. The biomass is originating from land areas that are forests where:	The land area remains a forest; and
	Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
	Any national or regional forestry and nature conservation regulations are complied with.
2. The biomass is woody biomass and originates from croplands and/or grasslands where:	The land area remains cropland and/or grasslands or is reverted to forest; and
	Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
	Any national or regional forestry, agriculture and nature conservation regulations are complied with.
3. The biomass is non-woody biomass and originates from croplands and/or grasslands where:	The land area remains cropland and/or grasslands or is reverted to forest; and
	Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and
	Any national or regional forestry, agriculture and nature conservation regulations are complied with.
4. The biomass is a biomass residue and the use of that biomass residue in the project activity does not involve a decrease of carbon pools, in particular dead wood, litter or soil organic carbon, on the land areas where the biomass residues are originating from. For example, if bagasse from sugar production would in the absence of the CDM be dumped or left to decay and is used for energy generation under the CDM, it can be assumed that the use of the bagasse does not affect the sugar cane cultivation practices and hence the carbon pools of the respective soils. In contrast, where a CDM project involves the collection of dead wood from a forest, which would not be collected in the absence of the CDM, the extracted biomass cannot be regarded as renewable, since it would result in a decrease of carbon stocks.	
5. The biomass is the non-fossil fraction of an industrial or municipal waste.	

Note: In case none of these conditions applies, the biomass is considered as “non-renewable”.

(3) Guidance of national and/or sectoral policies and circumstances

The EB provided guidance on national and/or sectoral policies and circumstances in the baseline scenario particular for A/R CDM project activities [EB23, Annex 19], as follows:

1. A baseline scenario shall be established taking into account relevant national and/or sectoral policies and circumstances, such as historical land use practices and the economic situation in the project sector.
2. As a general principle, national and/or sectoral policies and circumstances are to be taken into account on the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention.
3. National and/or sectoral land-use policies or regulations, which give comparative advantages to afforestation/reforestation activities and that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place).

(4) Procedures to demonstrate the eligibility of lands for A/R project activities

The EB revised the procedures to define the eligibility of lands for afforestation and reforestation project activities, and changed the document title to the "procedures to demonstrate the eligibility of lands for afforestation and reforestation project activities" [EB26, Annex 18], as shown below.

1. Project participants shall provide evidence that the land within the planned project boundary is eligible for an A/R CDM project activity by following the steps outlined below.
   (a) Demonstrate that the land at the moment the project starts is not forest by providing transparent and complete information that:
      (i) Woody vegetation on the land is below the forest thresholds (crown cover or equivalent stocking level, tree height at maturity in situ, minimum land area, and minimum width(*1)) adopted for the definition of forest by the host country under decisions 11/CP.7 and 19/CP.9 as communicated by the respective DNA; and

      (*1) The Marrakesh Accords define forest as a minimum area of land of 0.05–1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10%–30% with trees with the potential to reach a minimum height of 2–5 m at maturity in situ. In addition to the minimum area of forest, it is good practice that countries specify the minimum width that they will apply to define forest and units of land subject to afforestation, reforestation and deforestation activities.

      (ii) The land is not covered by young natural stands or plantations which have the potential to reach — without direct human intervention — the thresholds adopted for definition of forest by the host country; and
      (iii) The land is not temporarily unstocked, for a period consistent with common forest practices in the host country, as a result of either direct human intervention such as harvesting or indirect natural causes such as fire or insect damage; and
      (iv) Environmental conditions, anthropogenic pressures, or lack of available seed sources prevent significant encroachment or regeneration of natural woody vegetation to an extent that could be expected to exceed—without human intervention— the thresholds adopted by the host country for definition of forest.
   (b) Demonstrate that the activity is a reforestation or afforestation project activity:
      (i) For reforestation project activities, demonstrate that the land was not forest by demonstrating that the conditions outlined under (a) above also applied to the land on 31 December 1989.
      (ii) For afforestation project activities, demonstrate that any woody vegetation on the land has for at least 50 years been below the thresholds adopted by the host country for definition of forest. For this purpose, project participants should provide evidence that the land was below the national thresholds for at least four single representative years within the time period of 50 years (e.g. 10 years, 25 years, 40 years and 50 years before the project start).
      (iii) The land has not been forest land at any time since 1 January 1990, that is, there is no time since 1 January 1990 at which woody vegetation on the land has met the thresholds adopted for the definition of forest by the host country(*2).

(*2) According to IPCC GPG for LULUCF, “deforestation land cannot become afforestation/reforestation land in the first commitment period. That is, if a forest is established on land deforested since 1990, the carbon removals cannot be reported as a reforestation activity during the first commitment period because of time limits in the definition for reforestation agreed in the Marrakesh Accords, designed not to credit reforestation on lands that were forest land in 1990.”

2. In order to demonstrate steps 1 (a) and 1 (b), project participants shall provide one of the following types of verifiable information:

(a) Aerial photographs or satellite imagery(*3) complemented by ground reference data; or

(*3) If remote sensing, based either on satellite imagery or aerial photographs, is used to determine whether land is eligible for CDM A/R projects, the project participants shall demonstrate that the approach taken is capable of discriminating between forest and non-forest land according to the thresholds adopted for forest land by the host country, including demonstration that any imagery used has adequate spatial and spectral resolution.

(b) Land use or land cover information(*4) from maps or digital spatial datasets; or

(*4) Caution should be exercised when interpreting land use or land cover from maps or other information, as the information may not have been prepared for CDM-related purposes. Project participants shall demonstrate that the information in any maps, datasets, or other documents used is fit for the purpose of discriminating between forest and non-forest land-use especially according to the crown cover thresholds adopted by the host country for definition of forest.

(c) Ground based surveys (land use or land cover information[4] from permits, plans, or information from local registers such as cadastre, owners registers, or other land registers); or

(d) If options (a), (b), and (c) are not available/applicable, project participants shall submit a written testimony which was produced by following a Participatory Rural Appraisal (PRA) methodology(*5).

(*5) Participatory rural appraisal (PRA) is an approach to the analysis of local problems and the formulation of tentative solutions with local stakeholders. It makes use of a wide range of visualisation methods for group-based analysis to deal with spatial and temporal aspects of social and environmental problems. This methodology is, for example, described in:

- Chambers R (1992): Rural Appraisal: Rapid, Relaxed, and Participatory. Discussion Paper 311, Institute of Development Studies, Sussex.
- Theis J, Grady H (1991): Participatory rapid appraisal for community development. Save the Children Fund, London.

3.3.4 Project cycle of A/R CDM project activities

The project cycle of A/R CDM project activities is similar to that of emission reduction CDM project activities, as outlined in Figure 2-2.

Project participants need to check whether their A/R CDM project activity is a large scale A/R CDM project activity or a Small-Scale A/R CDM project activity (see section 3.3.6 below for definition of Small-Scale A/R CDM project activity), and whether an approved methodology is applicable. Then they need to proceed with drafting of a CDM-AR-PDD, submission of a new methodology if necessary, validation, and registration for issuance of credits (in case of A/R CDM project activities, tCERs and lCERs are issued).

3.3.5 Overview of approval process of A/R CDM project activities and A/R CDM methodologies

As described in Chapter 2, the basic steps of approval process of A/R CDM project activities are the same as emission reduction CDM project activities. In this section, brief explanation of the approval process is given in a step-by-step manner.

Step 1: Determine if your project qualifies as a Small-Scale A/R CDM project activity

Project participants should first consider if their project meets the eligibility criteria of Small-Scale A/R CDM project activities as listed below.

(a) Net anthropogenic GHG removals by sinks of less than 8,000 tons of CO_2 per year; and

(b) Developed or implemented by low-income communities and individuals as determined by the host Party

If your project does not qualify as a Small-Scale A/R CDM project activity, proceed to Step 2 below.

Step 2: Determine if an approved baseline and monitoring methodology is applicable to your project

Project participants need to apply one of the methodologies approved by the EB or propose a new baseline and monitoring methodology for A/R CDM project activities in accordance with the Procedures for the Submission and Consideration for a Proposed New Baseline and Monitoring Methodology for A/R CDM Project Activities [EB21, Annex 18]. In case an approved methodology can be used, the DOE may proceed with the validation of the A/R CDM project activity and submit CDM-AR-PDD for registration. If not, project participants must submit a new baseline and monitoring methodology using format CDM-AR-NM, along with the draft CDM-PDD, and have it approved by the EB.

Project participants who wish to apply an approved methodology to their project activity must check the applicability of approved methodologies (AR-AMs). Table 3-5 shows a list of the approved methodologies for A/R CDM project activities. See Appendix 2 of this manual for the applicability of these methodologies.

Table 3-5 List of Approved A/R Methodologies (as of October 2006)

Number	Approval History (Original NM Number)	Methodology Title (including baseline and monitoring methodologies)
AR-AM0001 (ver. 2)	ARNM0010	Reforestation of degraded land
AR-AM0002	ARNM0007-rev	Restoration of degraded lands through afforestation/ reforestation
AR-AM0003 (ver. 2)	ARNM0018	Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing
AR-AM0004	ARNM0019	Reforestation or afforestation of land currently under agricultural use

Source: http://cdm.unfccc.int/methodologies/ARmethodologies/approved_ar.html

Step 3: Propose a new baseline and/or monitoring methodology

The procedure for proposing a new baseline and/or monitoring methodology for an A/R CDM project activity is identical to that for emission reduction of CDM project activity. One difference is that the main body to make analysis/recommendation for proposed methodologies is Afforestation and Reforestation Working Group (AR WG) instead of Methodologies Panel (Meth Panel).

Project participants proposing a new A/R baseline and monitoring methodology should prepare A/R baseline and monitoring methodologies forms (CDM-AR-NMB and CDM-AR-NMM), along with a draft CDM-AR-PDD and submit through a DOE (or an AE).

If the DOE, contracted by the project participants, determines that a proposed CDM A/R project activity intends to use a new baseline or monitoring methodology, it shall, prior to the submission for registration of this project activity, forward the proposed new methodology to the EB for review, i.e. consideration and approval, if appropriate.

3. Different types of CDM

Having checked that the "CDM: Proposed new A/R methodology form" (F-CDM-AR-PNM) has been duly filled by the DOE and documentation provided by the DOE is complete, the secretariat shall forward the documentation to one member of the AR WG. This member is to assess the quality of the submission, grade it between 1 and 2, and substantiate the appraisal (one paragraph). If the member grades the documentation as being 2, the documentation is to be sent back to the project participants. If the grade is 1, the documentation shall be considered as received by the EB and be forwarded by the secretariat for consideration of the EB and the AR WG.

A DOE may voluntarily undertake a pre-assessment of a proposed new methodology before submitting it. If a voluntary pre-assessment has been undertaken, no pre-assessment by the AR WG is needed. Once the secretariat has confirmed that the "CDM: Proposed new A/R methodology form" (F-CDM-AR PNM) has been duly filled by the DOE and documentation provided by the DOE is complete, the submitted methodology may be considered as received.

The secretariat shall make the proposed new A/R methodology publicly available on the CDM website and invite public inputs for a period of 15 working days. Public inputs on a proposed new methodology shall be made using the "Proposed new A/R methodology - public comment form" (F-CDM-AR-NMpu). Comments shall be forwarded to the AR WG at the moment of receipt and made available to the public at the end of the 15 working day period.

Upon receipt of a proposed new A/R methodology, two members of the AR WG will be selected on a rotational basis in alphabetical order. The two members are responsible for compiling different inputs, including those from other members of the AR WG and public inputs, and prepare draft recommendations by the AR WG to the EB.

Reference documents for "Procedure for the Submission and Consideration of a Proposed New Methodology for A/R CDM Project Activities (version 05)" are available on the CDM website [http://cdm.unfccc.int/Reference/Procedures/AR_PNMs_proced_ver05.pdf].

Step 4: Draft an A/R Project Design Document (CDM-AR-PDD)

Project participants then need to fill out an A/R PDD (CDM-AR-PDD), which includes information such as general description of the project activity, the baseline methodology and additionality, the monitoring methodology and plan, and calculations of GHG removals by sinks. The information required in the CDM-AR-PDD will be discussed in section 4.6 below.

Step 5: Validate the A/R CDM project activity

Validation is the process of independent evaluation of a proposed A/R project activity by a DOE against the requirements of the A/R CDM project activities as set out in the modalities and procedures for A/R CDM project activities (CDM A/R M&P) and relevant decisions of the COP/MOP, on the basis of the A/R PDD.

Step 6: Register the CDM project activity

Registration is the formal acceptance by the EB of a validated project as an A/R CDM project activity. Registration is the prerequisite for the verification, certification and issuance of tCERs or lCERs related to the A/R project activity.

3.3.6 Small-Scale A/R project activities under the CDM

As briefly mentioned above, Small-Scale A/R CDM project activities are those that are expected to result in net anthropogenic GHG removals by sinks of less than 8 kilotonnes of CO_2 per year and are developed or implemented by low-income communities and individuals as determined by the host Party. If a Small-Scale A/R CDM project activity results in net anthropogenic GHGs removals by sinks greater than 8 kilotonnes of CO_2 per year, the excess removals will not be eligible for the issuance of tCERs or lCERs.

The CDM-AR-SSC-PDD form and guidelines can be downloaded from:

- CDM-AR-SSC-PDD: http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs
- Guidelines for completing CDM-AR-PDD and CDM-AR-NM: http://cdm.unfccc.int/Reference/Guidclarif

4. CDM Project Design Document (CDM-PDD)

4.1 Overview of the CDM-PDD Version 3

Project participants who wish to develop a CDM project activity must first prepare a fully completed Project Design Document (CDM-PDD) and submit it for validation and registration. The CDM-PDD describes the project activity as well as application of a baseline and monitoring methodology to the project activity. Project participants should check with the CDM web site for the most recent version of the CDM-PDD. As of October 2006, CDM-PDD version 03 is the most recent version[9]. At the same time, project participants are recommended to refer to the most recent version of the "Guidelines for completing CDM-PDD and CDM-NM" for detailed guidance of how to fill out these formats, as well as for explanation of key terms used in the CDM, which is found in the Glossary of CDM terms. Underlined terms in the CDM-PDD and CDM-NM forms can be found in the glossary.

CDM-PDD Format: CDM Project Design Document, version 03
Guidelines: Guidelines for completing CDM-PDD and CDM-NM, version 06.1
Download from the CDM web site: http://cdm.unfccc.int/Reference/Documents

Contents of the CDM-PDD, version 03:

A. General description of project activity
B. Application of a baseline and monitoring methodology
C. Duration of the project activity / crediting period
D. Environmental impacts
E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the project activity
Annex 2: Information regarding public funding
Annex 3: Baseline information
Annex 4: Monitoring plan

When completing the CDM-PDD, project participants should be aware of the following general guidelines:

- The CDM-PDD shall be completed and submitted in English language to the EB.
- The CDM-PDD template shall not be altered, that is, shall be completed using the same font without modifying its format, font, headings or logo.
- Tables and their columns shall not be modified or deleted. Rows may be added, as needed.
- The CDM-PDD shall include in section A.1 the version number and the date of the document.
- If sections of the CDM-PDD are not applicable, it shall be explicitly stated that the section is left blank on purpose.

The guidelines explain the CDM-PDD as follows:

1. The CDM-PDD presents information on the essential technical and organizational aspects of the project activity and is

[9] Revisions of the CDM-PDD come into effect once adopted by the EB, bearing in mind the provisions that revisions to the CDM-PDD do not affect project activities, (a) already validated, or already submitted to the OE for validation, prior to the adoption of the revised CDM-PDD, (b) submitted to the OEs within a month following the adoption of the revised CDM-PDD, and (c) the EB will not accept documentation using the previous version of the CDM-PDD six months after the adoption of a new version.

a key input into the validation, registration, and verification of the project as required under the Kyoto Protocol to the UNFCCC. The relevant modalities and procedures are detailed in decision 17/CP.7 contained in document FCCC/CP2001/13/Add.2.

2. The CDM-PDD contains information on the project activity, the approved baseline methodology applied to the project activity, and the approved monitoring methodology applied to the project. It discusses and justifies the choice of baseline methodology and the applied monitoring concept, including monitoring data and calculation methods.
3. Project participants should submit the completed version of the CDM-PDD, together with attachments if necessary, to an accredited DOE for validation. The DOE then examines the adequacy of the information provided in the CDM-PDD, especially whether it satisfies the relevant modalities and procedures concerning CDM project activities. Based on this examination, the DOE makes a decision regarding validation of the project.
4. Bearing in mind paragraph 6 of CDM M&P[10], project participants shall submit documentation that contains confidential /proprietary information in two versions:
   - One marked up version where all confidential/proprietary parts shall be made illegible by the project participants (e.g. by covering those parts with black ink) so that this can be made publicly available.
   - A second version containing all information which shall be treated as strictly confidential by all handling this documentation (DOEs/AEs, EB members and alternates, panel/committee and working group members, external experts requested to consider such documents in support of work for the EB, and the secretariat).
5. In accordance with paragraph 6 of CDM M&P information used to determine additionality, to describe the baseline methodology and its application, and to support an environmental impact assessment, shall not be considered proprietary or confidential. Project participants shall therefore, in accordance with paragraph 45 (b) of CDM M&P describe the choice of approaches, assumptions, methodologies, parameters, data sources, key factors and additionality in a transparent and conservative manner. The scope and detail of the description in the PDD should allow interested parties to reproduce the rationale of the project.

4.2 Application of a baseline methodology

Project participants can find instructions about how to complete the CDM-PDD in the “Guidelines for completing CDM-PDD and CDM-NM”, in section B. “Specific guidelines for completing the Project Design Document (CDM-PDD)”. This manual does not repeat the information contained in the Guidelines, but tries to give supplementary information that may assist project participants in completing the CDM-PDD.

4.2.1 Selecting the methodology [PDD section B.1, B.2]

Project participants, when applying an approved methodology, must be careful in assessing the applicability of the methodology to the proposed project activity. Project participants can find the most recent list of approved methodologies and approved consolidated methodologies on the CDM web site[11] in order to check if there is an approved methodology applicable to the project activity. If there is no applicable approved methodology, project participants should propose a new methodology.

Following are the points that project participants should check:

- The proposed project activity meets all the conditions set out in the “Applicability” part of an approved methodology.
- Some approved methodologies state that they are applicable to project activity with a certain baseline scenario.

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[10] Paragraph 6 of CDM M&P states: Information obtained from CDM project participants marked as proprietary or confidential shall not be disclosed without the written consent of the provider of the information, except as required by national law. Information used to determine additionality as defined in paragraph 43 below, to describe the baseline methodology and its application, and to support an environmental impact assessment referred to in paragraph 37(c) below, shall not be considered as proprietary or confidential.

[11] http://cdm.unfccc.int/methodologies/approved

An example is ACM0006 “Consolidated baseline methodology for grid-connected electricity generation from biomass residues”, which provides a list of baseline scenarios to which the methodology can be applied.

Request for deviation

In cases where a project activity does not quite meet the applicability of an approved methodology, but project participants think the difference is not substantial enough to propose a new methodology, it is possible to submit the project for validation using the approved methodology. In such case, in the process of validation, the DOE may find that project participants deviated from an approved methodology when applying it to a proposed project activity. If the DOE does not consider that the deviation implies a revision of the methodology it may seek guidance on the acceptability of the deviation from the EB prior to requesting registration of the proposed project activity. If a DOE finds that the deviation from the approved methodology requires revision of this methodology the procedures provided for revision of approved methodology shall be used [EB24, Annex 30].

Propose a revision to an approved methodology

If project participants intend to propose a revision to an approved baseline or monitoring methodology for consideration and approval by the EB, they shall submit to a DOE the following:

(a) form for submission of requests for revisions of approved methodologies to the Methodologies Panel (F-CDMAM-Rev);
(b) a draft revised version of the approved methodology highlighting proposed changes; and
(c) a draft project design document (CDM-PDD) with complete sections A to C, including relevant annexes applying to a proposed revision to the methodology.

[Procedures for the Revision of an Approved Baseline and Monitoring Methodology by the Executive Board (version 04)]

4.2.2 Project boundary [PDD section B.3]

As defined in the Glossary of CDM terms, project boundary shall “encompass all anthropogenic emissions by sources of greenhouse gases (GHG) under the control of the project participants that are significant and reasonably attributable to the CDM project activity”.

Project boundary is defined in approved methodologies, usually with regard to the spatial extent and gases to be included. To illustrate the spatial extent included in the project boundary, it is useful to include a schematic of the project site and relevant equipments, delineating the project boundary. As for the gases to be included, use the table format in the CDM-PDD. If the methodology gives an option to include or exclude certain sources and gases from the project boundary, project participants should explain and justify the choice.

4.2.3 Baseline identification [PDD section B.4]

Baseline, a fundamental concept in the CDM, is defined as “the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity” [CDM M&P, para. 44]. A baseline shall cover emissions from all gases (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6), sectors and source categories listed in Annex A of the Kyoto Protocol within the project boundary. Project participants must identify a baseline scenario for the proposed project activity, according to the methods and steps specified in the baseline methodology that is applied to the project activity.

A baseline shall be deemed to reasonably represent the anthropogenic emissions by sources that would occur in the absence of the proposed project activity if it is derived using an approved baseline methodology or a proposed new baseline methodology that has been approved by the EB. Different scenarios may be elaborated as potential evolutions of the situation existing before the proposed CDM project activity. The continuation of the current activity could be one of them; implementing the proposed project activity may be another; and many others could be envisaged. Baseline methodologies shall require narrative descriptions of all reasonable baseline scenarios. Based on the selected baseline

methodology, which could be either a methodology already approved by the EB or a proposed new methodology, project participants must describe how a baseline scenario is identified among possible baseline scenarios in the CDM-PDD. To elaborate the different scenarios, different elements shall be taken into consideration, including related guidance issued by the EB. For instance, the project participants shall take into account national/sectoral policies and circumstances, ongoing technological improvements, investment barriers, etc. Upon request by the EB, the Meth Panel is developing an optional tool to assist in selecting a baseline scenario from among a set of alternatives. Once this tool for selection of a baseline is approved by the EB, the existing additionality tool should make reference to it.

There are different patterns of baseline identification depending on the approved methodologies.

(1) The methodology presents an already identified baseline scenario. In this case, project participants should demonstrate that the baseline scenario as presented in the methodology is the only relevant and plausible business-as-usual scenario.

Example:

ACM0001
The baseline is the atmospheric release of the gas and the baseline methodology considers that some of the methane generated by the landfill may be captured and destroyed to comply with regulations or contractual requirements, or to address safety and odour concerns.

ACM0002
For project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following: Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, ….

(2) The methodology presents possible baseline options for various components of the project activity, and project participants are required to identify the most plausible baseline scenario, which is a combination of baseline options.

Example:

ACM0006
Realistic and credible alternatives should be separately determined regarding:
• how power would be generated in the absence of the CDM project activity (P1-P6);
• what would happen to the biomass in the absence of the project activity (B1-B6); and
• in case of cogeneration projects: how the heat would be generated in the absence of the project activity (H1-H8).
16 combinations of baseline options P, B, and H are identified (scenarios 1 through 16) as possible baseline scenarios, to which ACM0006 can be applicable.

(3) The methodology requires a step-wise approach resembling the additionality tool for the identification of a baseline scenario.

Example:

ACM0003
1. Define alternative scenarios for the fuel mix
2. Option 1: Select baseline scenario through financial analysis or Option 2: Select baseline scenario through barriers analysis
Each fuel selection scenario should be processed via the barriers analysis step of the latest version of the "Tool for demonstration assessment and of additionality" agreed by the CDM Executive Board, which is available on the UNFCCC CDM web site. The baseline scenario should take into account relevant national/local and sectoral policies and circumstances, and the proponent should demonstrate that the key factors, assumptions and parameters of the baseline scenario are conservative.

Treatment of national and/or sectoral policies and regulations [EB22, Annex3]

The EB, at its 16th meeting agreed on clarifications on the treatment of national and/or sectoral policies and regulations in determining a baseline scenario. The EB acknowledged that there should be differentiated ways to address types of national and/or sectoral policies in determining a baseline scenario and had agreed to a number of definitions. At its 22nd meeting, the EB agreed to revise the clarifications provided at EB16 as outlined below:

- A baseline scenario shall be established taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector.
- As a general principle, national and/or sectoral policies and circumstances are to be taken into account on the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention.

(1) Type E+: National and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels over less emissions intensive technologies or fuels

Only "Type E+" national and/or sectoral policies or regulations that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997) shall be taken into account when developing a baseline scenario. If "Type E+" national and/or sectoral policies were implemented since the adoption of the Kyoto Protocol, the baseline scenario should refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place.

(2) Type E-: National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs).

"Type E-" national and/or sectoral policies or regulations that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place).

4.2.4 Additionality [PDD section B.5]

Project participants should follow the prescription of the baseline methodology to be applied to the project activity, in order to demonstrate additionality of the project activity. Project participants are asked to explain and justify key assumptions and rationales used in demonstrating additionality, as well as to provide relevant documentation of references.

If the starting date of the project activity is before the date of validation, project participants are asked to provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available at, or prior to, the start of the project activity.

Approved methodologies often require the use of the "Tool for the demonstration and assessment of additionality[12]" (additionality tool), which was adopted by the EB. The additionality tool provides a general framework for demonstrating and assessing additionality and is to be applicable to a wide range of project types, though some project types may require adjustments. Project participants proposing new baseline methodologies may incorporate this additionality tool, but may also propose other tools for the demonstration of additionality. The additionality tool provides for a step-wise approach to demonstrate and assess additionality, as shown in Figure 4-1 below.

[12] http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf

Step 0: Preliminary screening based on the starting date of the project activity

This step is only relevant to project activities requesting retroactive crediting. Refer Box 4-2 for more details on retroactive crediting.

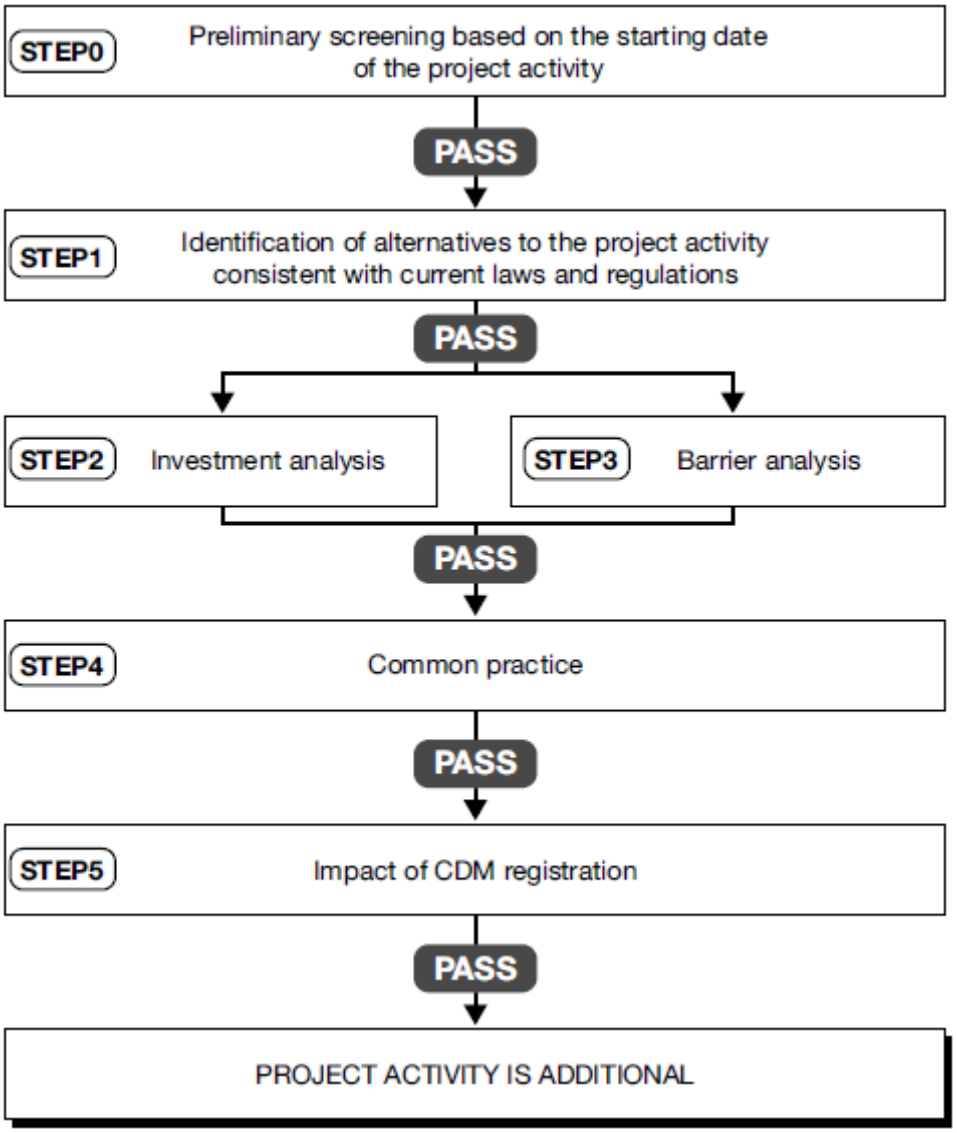


Figure 4-1 Overview of the additionality tool

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

- Sub-step 1a. Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives are to include:
  - The proposed project activity not undertaken as a CDM project activity;
  - All other plausible and credible alternatives to the project activity that deliver outputs and on services (e.g. electricity, heat or cement) with comparable quality, properties and application areas;
  - If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

- Sub-step 1b. Enforcement of applicable laws and regulations:
  - The alternative(s) identified in sub-step 1a. shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

- If an alternative does not comply with all applicable legislation and regulations, then show that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that noncompliance with those requirements is widespread in the country. If this cannot be shown, then eliminate the alternative from further consideration.

Step 2: Investment analysis

Project participants can choose the appropriate analysis method from the following three options:

- Option I - Simple cost analysis: the CDM project activity generates no financial or economic benefits other than CDM related income.
- Option II - Investment comparison analysis: the CDM project activity has non-CER financial or economic benefits. Select an appropriate financial indicator and compare the indicator value for the CDM project activity and that for the other alternatives. Conduct a sensitivity analysis.
- Option III - Benchmark analysis: the CDM project activity has non-CER financial or economic benefits. Select an appropriate financial indicator and compare the indicator value for the CDM project activity and the value of the identified benchmark, e.g. government bond rates. Conduct a sensitivity analysis.

Project participants should present the investment analysis in a transparent manner and provide all the relevant assumptions in the CDM-PDD, so that a reader can reproduce the analysis and obtain the same results. Clearly present critical techno-economic parameters and assumptions (such as capital costs, fuel prices, lifetimes, and discount rate or cost of capital).

Step 3: Barrier analysis

Project participants should determine whether the proposed project activity faces barriers that:

(a) Prevent the implementation of this type of proposed project activity; and

(b) Do not prevent the implementation of at least one of the alternatives.

- Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity. Project participants should provide transparent and documented evidence, and offer conservative interpretations of this documented evidence, as to how it demonstrates the existence and significance of the identified barriers.

  Barriers include:

  - Investment barriers, other than the economic/financial barriers in Step 2 above, inter alia:
    - Debt funding is not available for this type of innovative project activities.
    - No access to international capital markets due to real or perceived risks associated with domestic or foreign direct investment in the country where the project activity is to be implemented.
  - Technological barriers, inter alia:
    - Skilled and/or properly trained labour to operate and maintain the technology is not available and no education/training institution in the host country provides the needed skill, leading to equipment disrepair and malfunctioning;
    - Lack of infrastructure for implementation of the technology.
  - Barriers due to prevailing practice, inter alia:
    - The project activity is the “first of its kind”: No project activity of this type is currently operational in the host country or region.

- Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity).

  Assume the alternatives remaining after step 1 are:

  (1) the continuation of the current situation; and

  (2) the proposed project activity.

  In sub-step 3b, project participants should state that the continuation of the current situation, i.e. continuing to use the existing equipments without any changes, does not face any of the barriers that alternative (2) are facing. For example, if the proposed project activity is facing a technology barrier due to lack of skilled labour to operate the technology, it is

clear that the current practice does not face this barrier since the equipment is actually being operated by an adequately skilled labour.

Step 4: Common practice analysis

- Sub-step 4a. Analyze other activities similar to the proposed project activity:
  Project participants should provide an analysis of any other activities implemented previously or currently underway that are similar to the proposed project activity. There is no definition or threshold of what is and is not common practice, project participants should demonstrate in the PDD what they consider as common practice and why, based on the technology, scale, regional distribution, regulatory framework, investment climate, access to financing, etc.
  If there are other CDM project activities, they are not to be included as similar activities in this analysis. For example, let us assume a proposed project activity that introduces bagasse-based cogeneration system. Assume there are 10 other bagasse-based cogeneration projects, but 3 of them are carried out under the CDM scheme. In such case, only the 7 non-CDM projects should be included in the common practice analysis. The CDM projects can be at different stages of CDM project cycle, e.g. PDD development, validation, registration request, already registered, etc. The additionality tool does not give clear guidance as to what can be considered "CDM project activities".

- Sub-step 4b. Discuss any similar options that are occurring:
  If similar activities are identified above, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the proposed project activity is financially unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially attractive (e.g. subsidies or other financial flows) or did not face the barriers to which the proposed project activity is subject.

Step 5: Impact of CDM registration

Explain how the approval and registration of the project activity as a CDM activity, and the attendant benefits and incentives derived from the project activity, will alleviate the economic and financial hurdles (Step 2) or other identified barriers (Step 3) and thus enable the project activity to be undertaken.

4.2.5 Calculating emission reductions [PDD section B.6]

Baseline methodologies specify how emission reductions must be calculated in the PDD. In section B.6.1. "Explanation of methodological choices", project participants are required to state which equations will be used in calculating emission reductions, as well as to explain and justify their choices made among different options presented in the baseline methodology applied to the project activity.

Choice of scenarios/cases

Project participants are to explain and justify which scenario or case applies to the project activity. For example, the applied baseline methodology presents different components for baseline emissions and project emissions. Project participants should choose which components are included in the calculation and why, based on the proposed project activity and baseline scenario identified in section B.4.

Choice of methodological approach

In case the applied baseline methodology offers different methodological approaches, project participants should explain and justify their choice. For example, in ACM0002, four methods are presented for the calculation of the "operating margin". Project participants should explain their choice and give reasons why that choice is appropriate for the proposed project activity.

Choice of default values

Baseline methodologies sometimes present different default values to be chosen according to the specific circumstances of each project activity. Project participants are to make a choice, explain the choice and give reasons why that choice

has been made.

Some of the default values frequently used in emission reduction calculations are shown below. For such values, e.g. net calorific value and CO_2 emission factor of fuels, that the methodology recommends the use of local values, project participants may want to explain why they chose to use default values instead of local values. A typical reason would be that such local values are not available for the proposed project activity. When such local values are not available, baseline methodologies tend to prefer the use of country-specific values rather than IPCC world-wide default values, which are shown below for net calorific values and CO_2 emission factors.

At EB26, it was clarified that the '2006 IPCC Guidelines for National Greenhouse Gas Inventories' would be published on the IPCC website on 24 October 2006 after which this version shall be considered as the latest version [EB26, para.68].

(1) Global Warming Potential (GWP)

Global Warming Potential (GWP) values	
CO_2- Carbon dioxide	1
CH_4 - Methane	21
N_2O - Nitrous Oxide	310
SF_6- Sulphur hexafluoride	23,900
HFCs - Hydrofluorocarbons	140 – 11,700
PFCs - Perfluorocarbons	6,500 – 9,200

Source: GWP for a 100 year time horizon in table 4, p.22, *Climate Change 1995: The Science of Climate Change*, Intergovernmental Panel on Climate Change (IPCC), 1996

(2) Oxidation factor of fuel

Fraction of Carbon Oxidised (Recommended Default Assumptions)	
Coal[(a)]	0.98
Oil and Oil Products	0.99
Gas	0.995
Peat for electricity generation [(b)]	0.99

(a) This figure is a global average but varies for different types of coal, and can be as low as 0.91.

(b) The fraction for peat used in households may be much lower.

Source: Table 1-6, p. 1.29, *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*.

(3) Carbon emission factor per unit of energy of fuel (tC/TJ)

A) Liquid Fossil		B) Solid Fossil		C) Gaseous Fossil	
Primary Fuels		Primary Fuels		Natural Gas (Dry)	15.3
Crude Oil	20.0	Anthracite	26.8		
Orimulsion	22.0	Coking Coal	25.8		
N. Gas Liquids	17.2	Other Bit. Coal	25.8		
Secondary Fuels/Products		Sub-bit. Coal	26.2		
Gasoline	18.9	Lignite	27.6		
Jet Kerosene	19.5	Oil Shale	29.1		
Other Kerosene	19.6	Peat	28.9		
Shale Oil	20.0	Secondary Fuels			
Gas/Diesel Oil	20.2	BKB & Patent Fuel	(25.8)		
Residual Fuel Oil	21.1	Coke Oven /Gas Coke	29.5		
LPG	17.2				
Ethane	16.8				
Naphtha	(20.0)				

Bitumen	22.0
Lubricants	(20.0)
Petroleum Coke	27.5
Refinery Feedstocks	(20.0)
Other Oil	(20.0)

Note: If value is in parenthesis it is a default value until a fuel-specific CEF is determined.

Source: Table 1-1, p. 1.13, *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*.

(4) Net calorific value (NCV) per mass or volume unit of fuel

Table 1-2 of the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (IPCC Guidelines) provides "1990 Country-Specific Net Calorific Values for Selected Non-OECD Countries". The fuels covered are Oil (Crude Oil and NGL) and Coal (Hard Coal, Lignite and Sub-Bituminous Coal, and Coal Products). It shows country-specific NCVs in terajoule per kilotonne (TJ/kt). Project participants should refer to the values for the specific fuels used in the calculation of emission reductions.

For refined products the NCVs do not normally vary greatly by country and global default values are provided in Table 1-3 of the IPCC Guidelines, which is shown below.

Net Calorific Values for Other Fuels (TJ/10^3 tonnes)			
Refined Petroleum Products			
Gasoline (aviation and auto)	44.80	Ethane	47.49
Jet Kerosene	44.59	Naphtha	45.01
Other Kerosene	44.75	Bitumen	40.19
Shale Oil	36.00	Lubricants	40.19
Gas/Diesel Oil	43.33	Petroleum Coke	31.00
Residual Fuel Oil	40.19	Refinery Feedstocks	44.80
LPG	47.31	Refinery Gas	48.15
		Other Oil Products	40.19
Other Products			
Coal Oils and Tars derived from Coking Coal			28.00
Oil Shale			9.40
Orimulsion			27.50

Source: Table 1-3, p. 1.23, *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual*.

In section B.6.2. "Data and parameters that are available at validation", project participants should present information on the data and parameters available at validation using a table form provided in the CDM-PDD format. Detailed information should be included in Annex 3 "Baseline information".

Here, only include data that are:

- Determined only once and remains fixed throughout the crediting period,
- Available at the time of validation, and
- Not monitored throughout the crediting period.

Do not include data:

- Data that is calculated with equations provided in the methodology, or
- Default values specified in the methodology.

In section B.6.3. "Ex-ante calculation of emission reductions", project participants are to document how each equation is applied, in a manner that enables the reader to reproduce the calculation. The results of emission reduction calculation for the crediting period should be summarized in section B.6.4., using the table format provided CDM-PDD format.

Box 4-1: Flare Efficiency

For project activities that involve flaring of collected methane, flare efficiency can be an important factor that affects the resulting emission reductions. The EB has adopted the following method to account for flare efficiency in methodologies that involve flaring of methane. The following example is taken from ACM0001 version 04 [EB25, Annex 6]. The way it is written slightly varies among relevant AMs and ACMs, but the concept and the default values for flare efficiency are common.

The flare efficiency shall be calculated as product of

(i) fraction of time the gas is combusted in the flare; and

(ii) the efficiency of the flaring process. Efficiency of the flaring process is defined as fraction of methane completely oxidized by the flaring process.

- If an enclosed flare is used, the project participants shall measure and quantify the efficiency of the flare (% of methane completely oxidized by combustion in the flare) on a yearly basis, with the first measurement to be made at the time of installation. The measured value of the efficiency of the flare shall be applicable for the period up to the next measurement. In case the yearly measurement of efficiency of the flare is not performed, the efficiency of the flare shall be a default value of 90%. If the last measured value of the efficiency of the flare is lower than 90%, then the last lower measured value shall be used.
- For open flares, if the efficiency of the flare is not measured, a conservative destruction efficiency factor of 50% should be used.

  Note that in ACM0008 and ACM0010, it is stated “In case open flares are used, since flare efficiency cannot be measured in a reliable manner (i.e. external air will be mixed and lower the concentration of methane) a default value of 50% may be used”, whereas in ACM0001, it is stated “for open flares, if the efficiency of the flare is not measured, a conservative destruction efficiency factor of 50% should be used”.

4.3 Application of a monitoring methodology

PDD Section B.7 describes the application of the monitoring methodology and the monitoring plan, the results of which are subject to verification by the DOE and used for the calculation of the emission reductions achieved through the project activity. Since the difference between the baseline emissions and actual project emissions is to be claimed as CERs, it is very important to develop a detailed and realistic monitoring plan.

The monitoring methodology specifies which parameters and data are to be monitored. Project participants should provide information about how such parameters and data are collected during monitoring for the project activity. It is important that project participants strictly follow the monitoring procedures set out in the monitoring methodology, including recording frequency and measurement methods, if specified. If project participants are not able to follow all the requirements strictly, the differences should be explained and justified. For each data and parameter, a table should be filled out that includes information such as:

(1) Data unit

(2) Description of the data

(3) Source of data

The source(s) of data that will be actually used for the proposed project activity (e.g. which exact national statistics). Where several sources may be used, explain and justify which data sources should be preferred.

(4) Value of data applied for the calculation of ex-ante emission reduction estimation

(5) Measurement methods and procedures

Where data or parameters are supposed to be measured, specify the measurement methods and procedures, including a specification which accepted industry standards or national or international standards will be applied, which measurement equipment is used, how the measurement is undertaken, which calibration procedures are applied, what is the accuracy of the measurement method, who is the responsible person / entity that should undertake the measurements and what is the measurement interval.

(6) QA/QC procedures

A description of the QA/QC procedures (if any) that should be applied.

Below are examples of QA/QC procedures to be applied from some of the registered CDM project activities.

Parameter	QA/QC procedures to be applied
Total amount of landfill gas captured	The gas management information and monitoring system will be certified under the ISO 9000 Quality Management System
Methane fraction in the landfill gas	The gas management information and monitoring system will be certified under the ISO 9000 Quality Management System
Electricity generation of the Project delivered to grid	Meters will be subject to a regular maintenance and testing to ensure accuracy. Readings will be doublechecked.
Quantity of HFC 23 supplied to the destruction process after purity adjustment	A QA/QC organization will be formed and QA/QC procedures that are equivalent to JIS (Japanese Industrial Standard) in terms of equipment and analytical method will be set. Will be measured using two flowmeters in parallel with weekly calibration.
Electricity supplied to the grid by the Project	These data will be directly used for calculation of emission reductions. Sales record and other records are used to ensure the consistency. The electricity meter will be calibrated on a yearly basis by the electricity distributor in order to accurately monitor electricity sales.
Gross electricity produced	Meters will be subject to a regular maintenance and testing regime to ensure accuracy. Their readings will be double-checked by the electricity distribution company.

In addition, many PDDs make general statements about the QA/QC procedures in place. Below are some examples:

- Description of the quality assurance practices such as how monitoring records are taken and kept, how often the site is audited, how the personnel are trained, etc.
- Statement that the project developer has a quality assurance system, e.g. ISO series, in place.

(7) Comments

Any comments should be stated here. Relevant background documentation should be provided in Annex 4.

Project participants should also indicate the operational and management structure to implement the monitoring activities proposed in the PDD. A chart showing the organizational structure, as well as a description of the responsibilities of relevant parties and personnel, would be useful.

4.4 Duration of the project activity / Crediting period

Project participants should state the duration of the project activity in section C.1 and their choice of crediting period in section C.2 of the PDD.

In section C.1, the starting date of a CDM project activity and expected operation lifetime of the project activity are to be stated. The starting date of a CDM project activity is defined as the date on which the implementation or construction or real action of a project activity begins. Project participants can choose and explain which date they treat as the starting date of the project activity. Project participants should also state the expected operational lifetime of the project activity in years and months.

In section C.2, project participants state their choice regarding the crediting period. The crediting period for a CDM project activity is the period for which reductions from the baseline are verified and certified by a DOE for the purpose of issuance of certified emission reductions (CERs).

The project participants may choose between two options for the length of a crediting period:

(i) Fixed crediting period

The length and starting date of the period is determined once for a project activity with no possibility of renewal or extension once the project activity has been registered. The length of the period can be a maximum of ten years for a proposed CDM project activity.

(ii) Renewable crediting period

A single crediting period may be of a maximum of seven years. The crediting period may be renewed at most two times (maximum 21 years), provided that, for each renewal, a DOE determines that the original project baseline is still valid or has been updated taking account of new data, where applicable, and informs the EB accordingly.

Project participants should note the following points regarding crediting period:

- A crediting period shall not extend beyond the operational lifetime of the project activity.
- The starting date of a CDM project activity does not need to correspond to the starting date of the crediting period for this project activity.
- The starting date and length of the first crediting period has to be determined before registration. The crediting period may only start after the date of registration of the proposed activity as a CDM project activity, except when requesting "retroactive crediting" (refer to Box 4-2 below).
- Be sure to state the dates in "DD/MM/YYYY" format, which means that if the date is "1 June 2006", it should be written as "01/06/2006"

Box 4-2: Retroactive crediting

It was decided in the Marrakech Accords that a project activity starting in the period between 1 January 2000 and 18 November 2004 shall be eligible for validation and registration as a CDM project activity if submitted for registration before 31 December 2005. If registered, the crediting period for such project activities may start prior to the date of its registration but not earlier than 1 January 2000.

At COP/MOP 1, it was decided to postpone the deadline for retroactive crediting as follows:

- Project activities that started in the period between 1 January 2000 and 18 November 2004 and have not yet requested registration but have either submitted a new methodology or have requested validation by a designated operational entity by 31 December 2005 can request retroactive credits if they are registered by the Executive Board by 31 December 2006 at the latest [Decision 7/CMP.1 "Further guidance relating to the clean development mechanism", para. 4].
- It was further decided by the EB at its 23rd meeting [EB23, para. 90], that "Requesting validation" requires that a project design document has been submitted to a designated operational entity by 31 December 2005. It also agreed that 11 January 2006 is the effective deadline for submitting proposed new methodologies. With regard to proposed new methodologies that were submitted before the deadline and which are not approved ("C" cases) and submitted again, the EB agreed that:
  (i) If the project activity is not changed and is registered before 31 December 2006 using an approved methodology which was submitted based on the non-approved proposed methodology, it would qualify for retroactive crediting in accordance with the relevant decision of COP/MOP 1.
  (ii) The resubmitted methodology would not be granted any type of special considerations on resubmission.

The EB provided the following further clarifications [EB26, para. 86]:

In order to operationalize paragraph 4 of Decision 7/CMP.1 the Board clarified that project activities that started in the period between 1 January 2000 and 18 November 2004 that have either submitted a new methodology by 11 January 2006 or have requested validation by a designated operational entity by 31 December 2005 can request retroactive credits if:

(a) The request for registration of the project activity is submitted by the DOE through the electronic interface 31 December 2006, midnight Greenwich mean time;

(b) Any required registration fee is received by the secretariat before 31 January 2007; and
(c) The request is complete and, hence published on the UNFCCC CDM website, by 15 February 2007.

4.5 Environmental impacts and stakeholders' comments

4.5.1 Environmental impacts [PDD section D]

Project participants are requested to attach documentation on the analysis of the environmental impacts, including transboundary impacts. Here, project participants should state the possible environmental impacts of the project activity, as well as relevant legal requirements.

The environmental impact section of PDDs of some of the registered project activities contain information on:

- Name and description of relevant national laws and regulations on the environmental impact (Environmental Impact Assessment / standards) required by the national or local authority and applicability of these to CDM project activity,
- Description of environmental impacts study on environment and local community,
- Analysis of environmental impacts (positive or negative) of before and after project implementation,
- Results of impacts in each category such as air and water quality, noise level, natural resources, human settlement etc.,
- Result of monitoring of EIA required on CDM activity,
- Conclusion of whether the project activity leads to any significant negative impact or not,
- Summary of the EIA (including the scopes of EIA, the magnitude and frequency of impacts, the result of EIA and actions to mitigate impacts).

4.5.2 Stakeholders' comments [PDD section E]

In this section, project participants should clearly describe the procedures taken for compiling the stakeholders' comments, as well as relevant legal requirements in the host country.
Below are examples from the stakeholders' comments section of PDDs of some of the registered project activities.

<u>Brief description how comments by local stakeholders have been invited and compiled.</u>

- Identification of stakeholders at different stages of the project (the local governments, relevant committees, local people, consultants, project participants etc.)
- Process of invitation and announcement of the stakeholders' meeting/consultation
- Description of the meeting/consultation (presentation of the CDM project, the objectives, exchange of comments)
- Description and result of survey given to each stakeholder regarding the project activity

<u>Summary of the comments received.</u>

- Summary and/or list of comments received by each party of stakeholders such as suggestions, concerns, complaints etc.)
- Analysis of the comments (whether stakeholders agree with the project activity or not)

<u>Report on how due account was taken of any comments received.</u>

- Description of how relevant comments and important mentions were considered in the preparation of CDM-PDD
- Description of consultation with stakeholders and efforts to respond to their expectations
- Description of measures taken or will be taken by the project entity to answer the comments of stakeholders

4.6 CDM-AR-PDD: Technical aspects

4.6.1 Overview of CDM-AR-PDD

This section discusses technical aspects of A/R CDM project activities and key items to be covered in the CDM-AR-PDD format. First, this section overlooks the structure of the CDM-AR-PDD, followed by more detailed explanations on Sections of the PDD. The explanations focus on key issues that are specific to A/R CDM project activities rather than covering every item.

PDD Format: CDM-AR-PDD, version 03
Guidelines: Guidelines for completing CDM-AR-PDD, CDM-AR-NM, version 05
Download from the CDM web site: http://cdm.unfccc.int/Reference/Documents

The basic structure of the CDM-AR-PDD is shown below:

Contents of CDM-AR-PDD, version 03:

A. General description of the proposed A/R CDM project activity
B. Duration of the project activity/crediting period
C. Application of an approved baseline and monitoring methodology
D. Estimation of ex ante net anthropogenic GHG removals by sinks and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period
E. Monitoring plan
F. Environmental impacts of the proposed A/R CDM project activity
G. Socio-economic impacts of the proposed A/R CDM project activity
H. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the proposed A/R CDM project activity
Annex 2: Information regarding public funding
Annex 3: Baseline information
Annex 4: Monitoring plan

4.6.2 Sections of CDM-AR-PDD

(1) Section A. General description of the proposed A/R CDM project activity

In Section A, project participants are expected to provide overview and general information of their project activities. The items that are specific to CDM-AR-PDD and not required in the CDM-PDD template will be explained in the followings.

Section A.4.5. Approach for addressing non-permanence

In accordance with paragraph 38 and section K of the A/R CDM M&P, project participants need to select one of the following approaches to address non-permanence:

- Issuance of tCERs
- Issuance of lCERs

The approach chosen to address non-permanence shall remain fixed for the crediting period including any renewals.
Non-permanence issue is explained in detail below.

Addressing non-permanence

The issue of non-permanence arises from nature of GHG removals in forest. Unlike emission reductions, GHGs removed by forest may be released back into the atmosphere in an occasion of forest fires, die back from pests or even harvesting.

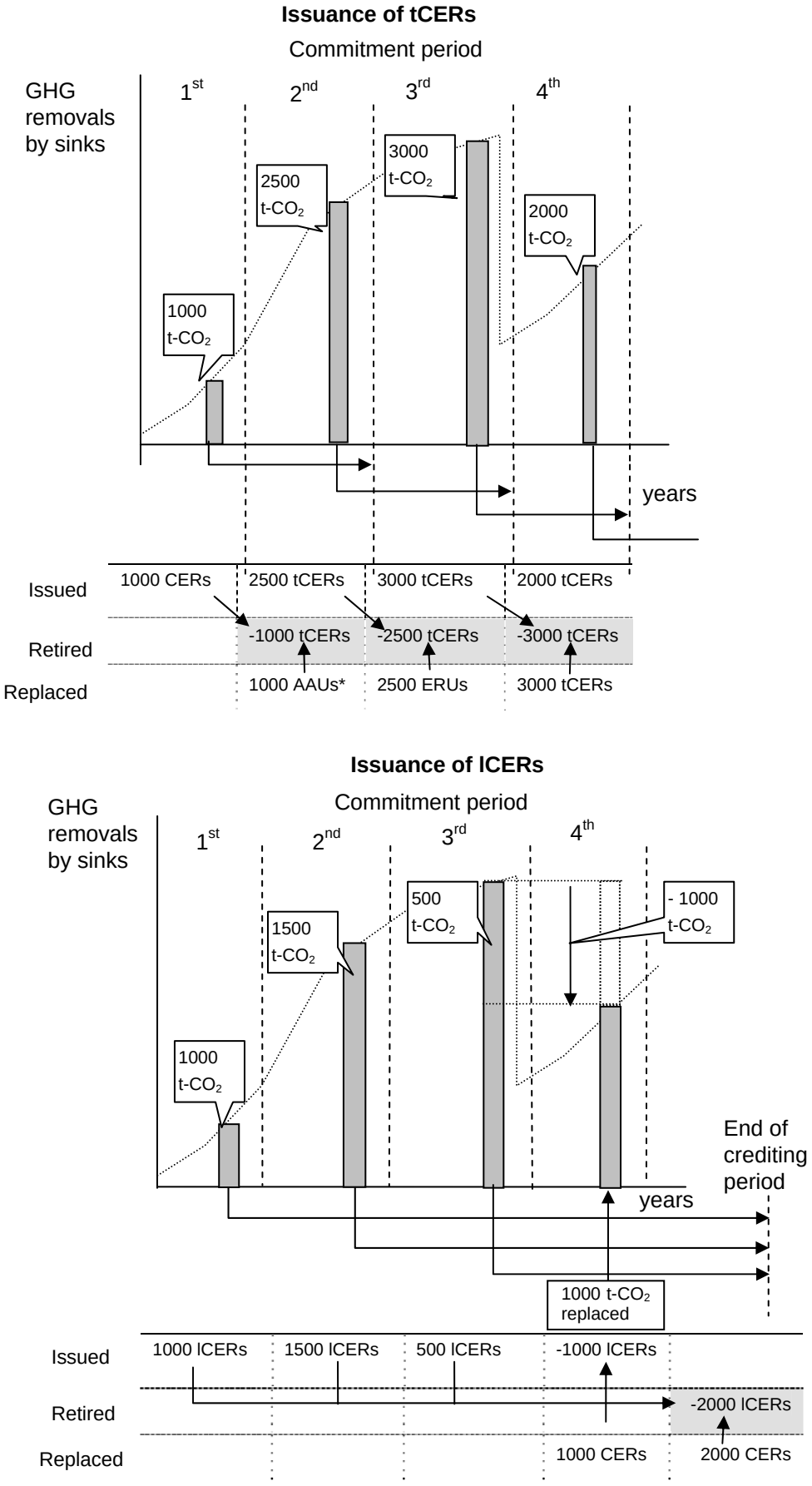


Figure 4-2 Differences between tCER and lCER

The issue of non-permanence should be addressed through two different crediting systems named tCER and lCER. The differences between the two are illustrated with a hypothetical project case shown in Figure 4-2. Each graph has the same changes in net anthropogenic GHG removals while issuance of the credits is different reflecting the differences between tCERs and lCERs. The assumptions made here are:

- Commitment periods would be of 5-year interval after the first commitment period,
- Credits would be used (and retired) for achieving the target of a Party, and
- Replacement of the credits expired would be done by the concerned Party (this situation would vary among countries and the project participants themselves may be held responsible for replacement).

Each lCER shall expire at the end of the crediting period or, where a renewable crediting period is chosen, at the end of the last crediting period of the project activity. Each tCER shall expire at the end of the commitment period subsequent to the commitment period for which it was issued.

Section A.4.6. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:
Project participants need to provide estimation of net anthropogenic GHG removals by sinks as well as annual estimates for the chosen crediting period in the table below:

Summary of results obtained in Sections C.5., D.1. and D.2.				
Years	Estimation of baseline net GHG removals by sinks (tonnes of CO_2e)	Estimation of actual net GHG removals by sinks (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2e)
Year A				
Year B				
Year C				
Year …				
Total (tonnes of CO_2e)				

Figure 4-3 depicts the calculation of net anthropogenic GHG removals by sinks.

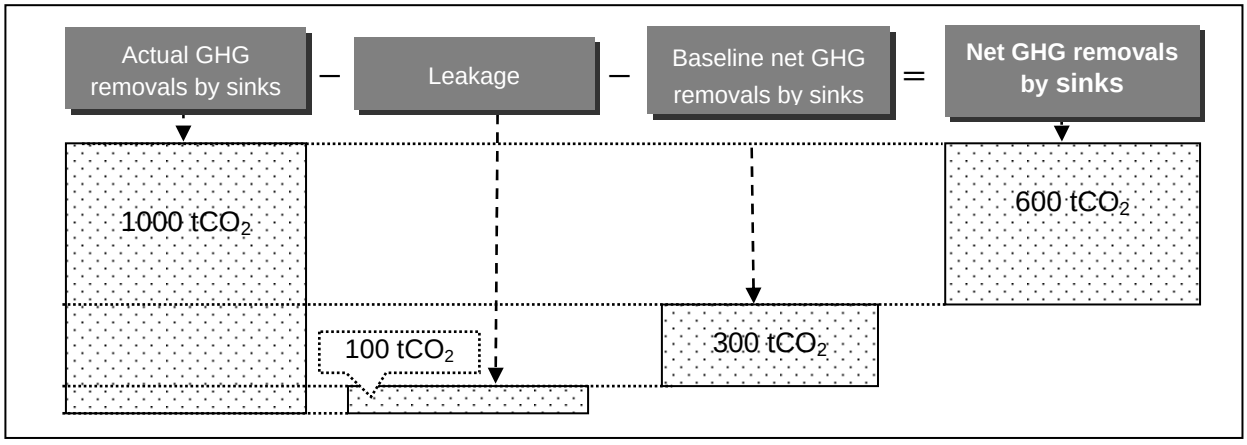


Figure 4-3 Calculation of the net anthropogenic GHG removals by sinks

The EB gave the following clarification on equations for the calculation of net anthropogenic GHG emissions by sinks [EB22, Annex 15].

Equations for the calculation of net anthropogenic GHG emissions by sinks
tCERs reflect the difference of carbon stock in the carbon pools in the project and baseline at the time of verification

less cumulative project GHG emissions within the project boundary less cumulative GHG emissions outside the project boundary due to afforestation or reforestation difference in carbon stocks in the carbon pools outside the project boundary (t-CO_2), affected by afforestation or reforestation activity, in the baseline and project at the time of verification, i.e,

$$t-CER(t_v) = C_P(t_v) - C_B(t_v) - \sum_0^{t_v} E(t) - \sum_0^{t_v} L_E(t) - \left(L_{P\_B}(t_v) - L_{P\_P}(t_v)\right)$$

lCERs reflect the difference of increment of the carbon stock in the carbon pools, between two verification period, in the project and the baseline less project GHG emissions between two verification period less GHG emissions outside the project boundary less difference of increment in carbon stock in the carbon pools outside the project boundary (t-CO_2), affected by afforestation or reforestation project activity, in the baseline and project, i.e,

$$l-CER(t_v) = \left[C_P(t_v) - C_P(t_v - \kappa)\right] - \left[C_B(t_v) - C_B(t_v - \kappa)\right] - \sum_{t_v-\kappa}^{t_v} E(t) - \sum_{t_v-\kappa}^{t_v} L_E(t) -$$

$$- \left[\left(L_{P\_B}(t_v) - L_{P\_B}(t_v - \kappa)\right) - \left(L_{P\_P}(t_v) - L_{P\_P}(t_v - \kappa)\right)\right]$$

where:

t-CER(tv) t-CERs emitted at time of verification *tv* (t-CO_2)

l-CER(tv) l-CERs emitted at time of verification *tv* (t-CO_2)

CP(tv) Existing carbon stocks at the time of verification *tv* (t CO2)

CB(tv) Estimated carbon stocks of the baseline scenario at time of verification *tv* (t-CO_2)

E(t) Project emissions in year *t* (t-CO_2)

LE(t) Leakage: estimated emissions by sources outside the project boundary in year *t* (t-CO_2)

LP_B(tv) Leakage: estimated carbon pools outside the project boundaries in the baseline scenario on areas that will be affected due to the implementation of a project activity at time of verification tv (t-CO_2)

LP_P(t) Leakage: existing carbon pools outside the project boundaries that have be affected by the implementation of a project activity at time of verification tv (t-CO_2)

tv Year of verification

κ Time span between two verifications

(2) Section B. Duration of the project activity/crediting period

Section B.3 Choice of crediting period and related information

Project participants need to state whether the proposed A/R CDM project activity will use a renewable or a fixed crediting period (They must choose only one crediting period).

- Renewable crediting period: A maximum of 20 years which may be renewed at most two times
- Fixed crediting period: A maximum of 30 years

Project participants who choose a renewable crediting period should be aware that, for each renewal, a DOE determines and informs the EB that the original project baseline is still valid or has been updated taking account of new data where applicable.

(3) Section C. Application of an approved baseline and monitoring methodology

As described above, project participants need to refer to the CDM website for approved methodologies applicable to their project activities. In case an applicable methodology for the project activity does not exist, project participants need to propose a new baseline and/or monitoring methodology.

In any case, the following sections need to be filled out with information taken from the methodology (either approved or proposed new ones) applied to the project activity.

Section C.1. Assessment of the eligibility of land

The EB revised the procedures to define the eligibility of lands for afforestation and reforestation project activities, as explained in section 3.3.3 (4) above. These procedures were incorporated into part of the CDM-AR-PDD and are mandatory. As the consequence, the "step 0" of the "Tool for the demonstration and assessment of additionality for afforestation and reforestation CDM project activities" will be deleted as the procedures replace it.

Section C.5. Identification of the baseline scenario

- C.5.1: Description of the application of the procedure to identify the most plausible baseline scenario (separately for each stratum defined in C.4., if procedures differ among strata):
- C.5.2: Description of the identified baseline scenario (separately for each stratum defined in Section C.4.)

The detailed information regarding baseline is given as follows:

Baseline

The baseline for a proposed A/R CDM project activity is the scenario that reasonably represents the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the proposed project activity. A baseline shall be deemed to reasonably represent the sum of the changes in carbon stocks in the carbon pools within the project boundary that would occur in the absence of the proposed A/R CDM project activity if it is derived using a baseline methodology referred to in paragraphs 12 and 13 of the CDM A/R M&P.

Establishment of Baseline net GHG removals

The baseline net GHG removals by sinks for a proposed A/R CDM project shall be established:

- By project participants in accordance with provisions for the use of approved and new baseline methodologies (contained in decision 19/CP.9, the CDM A/R M&P and relevant decisions of the COP/MOP);
- In a transparent and conservative manner regarding the choice of approaches, assumptions, methodologies, parameters, data sources, key factors and additionality, and taking into account uncertainty;
- On a project-specific basis;
- In the case of Small-Scale A/R CDM project activities, in accordance with simplified modalities and procedures developed for such activities;
- Taking into account relevant national and/or sectoral policies and circumstances, such as historical land uses, practices and economic trends.

Carbon pools and baseline net GHG removals

In calculating the baseline net GHG removals by sinks and/or actual net GHG removals by sinks, project participants may choose not to account for one or more carbon pools, and/or emissions of the GHGs measured in CO_2 equivalents, while avoiding double counting. This is subject to the provision of transparent and verifiable information that the choice will not increase the expected net anthropogenic GHG removals by sinks. Project participants shall otherwise account for all significant changes in carbon pools and/or emissions of the GHGs measured in CO_2 equivalents by the sources that are increased as a result of the implementation of the A/R project activity, while avoiding double counting.

Baseline approaches

In choosing a baseline methodology for an A/R CDM project activity, project participants shall select from among the following approaches the one deemed most appropriate for the project activity, taking into account any guidance by the EB, and justify the appropriateness of their choice:

(a) Existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary;
(b) Changes in carbon stocks in the carbon pools within the project boundary from a land use that represents an economically attractive course of action, taking into account barriers to investment;
(c) Changes in carbon stocks in the pools within the project boundary from the most likely land use at the time the project starts.

Section C.6. Assessment and demonstration of additionality

The concept of additionality in A/R CDM project activities is basically the same as that of the emission reduction CDM.

4. CDM Project Design Document (CDM-PDD)

The concept of additionality in A/R CDM is defined in A/R CDM M&P as follows:

"The proposed A/R CDM project activity is additional if the actual net GHG removals by sinks are increased above the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the registered A/R CDM project activities."

The tool for demonstrating additionality of afforestation and reforestation project activities which was agreed at EB 21 has the basic structure similar to that of the emission reduction CDM. The main difference is that the additionality tool for A/R CDM project activities does not have the step for common practice analysis.

Section C.7. Estimation of the ex ante baseline net GHG removals by sinks

Project participants are asked to present final results of their calculations using the following tabular format.

Year	Annual estimation of baseline net anthropogenic GHG removals by sinks in tonnes of CO_2 e
Year A	
Year B	
Year C	
Year …	
Total estimated baseline net GHG removals by sinks (tonnes of CO_2 e)	
Total number of crediting years	
Annual average over the crediting period of estimated baseline net GHG removals by sinks (tonnes of CO_2 e)	

(4) Section D. Estimation of ex ante actual net GHG removals by sinks, leakage and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period

Project participants should calculate the ex ante actual net GHG removals by sinks and leakage for the chosen crediting period using the approach provided in the selected approved baseline and monitoring methodology (annually, for each gas, pool, source, in units of CO_2 equivalent). Use a stepwise approach and name components being calculated. List numerical values and sources of all data used in the above calculation. Refer to, but do not copy, pieces of the selected approved methodology, unless necessary.

The actual net GHG removals by sinks is the sum of verifiable changes in carbon stocks, minus the increase in emissions of the GHGs measured in units of CO_2 equivalent by the sources that are increased as an attributable result of the implementation of the proposed A/R CDM project activity within the project boundary.

Leakage is defined as the increase of anthropogenic emissions by sources of GHG which occurs outside the project boundary, and that is measurable and attributable to the proposed A/R CDM project activity.

The EB has provided further guidance regarding leakage [EB22, Annex 15].

The accounting of decreases of carbon pools outside the project boundary is to be considered as leakage and that, in particular:

(a) In the case of deforestation as land clearance outside the project boundary due to activity shifting, effects on all carbon pools shall be considered;

(b) In the case of fuelwood collection or similar activities outside the project boundary, only the gathered volume of wood that is non-renewable shall be considered as an emission by sources if forests are not significantly degraded due to this activity. The equation (Eq. 3.2.8) for fuelwood gathering as outlined in IPCC GPG (2003) could be applied in combination with household surveys or Participatory Rural Appraisal (PRA). In the case that forests are significantly degraded, accounting rule 1 applies. "Not significantly degraded" means that the extracted volume results in emissions which are between 2% and 5 % of net actual GHG removals by sinks. If the extracted wood volume results in emissions which are below 2% of the net actual GHG removals by sinks, this type of leakage can be ignored.

(5) Section E. Monitoring plan

In the section E of monitoring, project participants describe, according to the monitoring methodology they selected, methods to collect and archive data necessary for estimating net GHG removals by sinks. The results of monitoring will be used to calculate the difference between GHG removals in baseline scenario and in project scenario.

The monitoring plan needs to provide detailed information related to the collection and archiving of all relevant data needed to estimate or measure verifiable changes in carbon stocks in the carbon pools and the emissions of GHG occurring within the project boundary, to determine the baseline, and to identify increased emissions outside the project boundary.

Section E.2. Sampling design and stratification

Project participants need to describe the sampling design that will be used in the project for the ex-post calculation of actual net GHG removals by sinks and, in case the baseline is monitored, the baseline net GHG removals by sinks. The sampling design should describe stratification, determination of number of plots & plot distribution, etc.

Section E.4.1. Data to be collected or used in order to monitor the verifiable changes in carbon stock in the carbon pools within the project boundary resulting from the proposed A/R CDM project activity

Project participants need to archive monitored data for 2 years following the end of the (last) crediting period.

When archiving data, header of tables and titles of columns should not be modified and columns should not be deleted. If necessary, rows are added at the bottom of the table.

(6) Section F. Environmental and socio-economic impacts of A/R CDM project activities

Section F.1. Documentation on the analysis of the environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed A/R CDM project activity:

This analysis should include, where applicable, information on:

- hydrology,
- soils,
- risk of fires, and
- pests and diseases.

(Project participants need to attach the relevant documentation to the CDM-AR-PDD)

(7) Section G. Environmental and socio-economic impacts of A/R CDM project activities

Section G.1. Documentation on the analysis of the socio-economic impacts, including impacts outside the project boundary of the proposed A/R CDM project activity:

This analysis should include, where applicable, information on:

- local communities,
- indigenous peoples,
- land tenure,
- local employment,
- food production,
- cultural and religious sites, and
- access to fuelwood and other forest products.

(Project participants need to attach the documentation to the CDM-AR-PDD)

5. Joint Implementation

5.1 What is JI?

The Joint Implementation (JI)[13] is one of the so-called "Kyoto mechanisms", along with the CDM and Emissions Trading, which allows Annex I Parties to transfer to or acquire from other Annex I Parties emission reduction units (ERUs) resulting from emission reduction or sink projects, as shown in Figure 5-1 [Kyoto Protocol, Article 6].

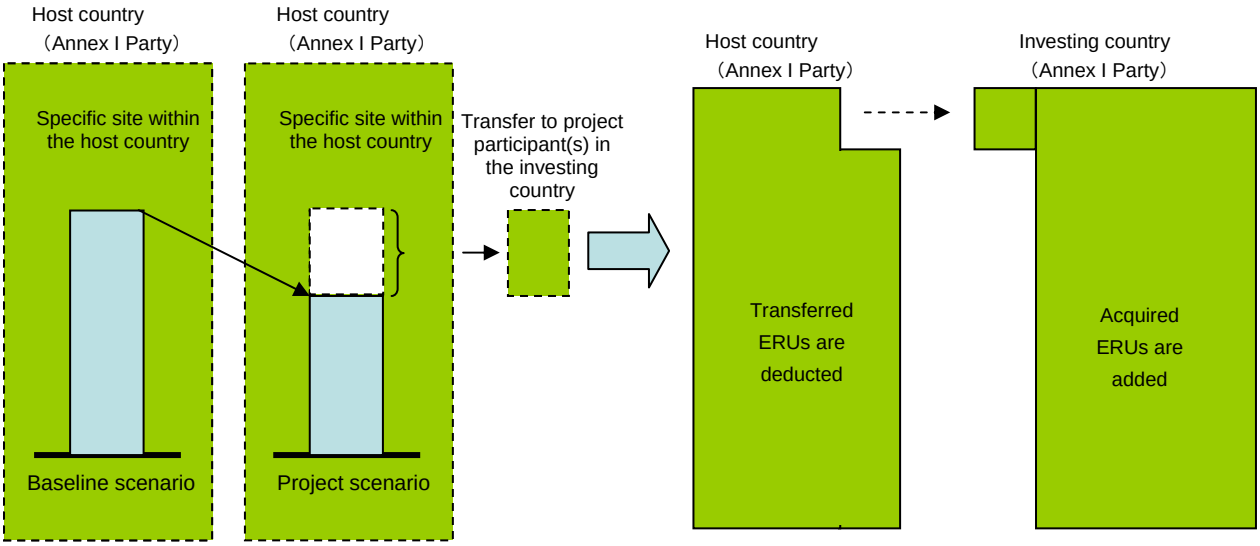


Figure 5-1 Outline of the JI

Whereas the CDM is a mechanism for project activities undertaken in non-Annex I countries that do not have a commitment inscribed in Annex B of the Kyoto Protocol, JI project activities take place in Annex I countries with a commitment inscribed in Annex B. Therefore, undertaking JI projects and transferring ERUs do not increase the total allowable emissions from Annex I countries.

Article 6 of the Kyoto Protocol sets out the following conditions for JI projects:

- Any such project has the approval of the Parties involved;
- Any such project provides a reduction in emissions by sources, or an enhancement of removals by sinks, that is additional to any that would otherwise occur;
- It does not acquire any emission reduction units if it is not in compliance with its obligations under Articles 5 and 7 (of the Kyoto Protocol); and
- The acquisition of emission reduction units shall be supplemental to domestic actions for the purposes of meeting commitments under Article 3 (of the Kyoto Protocol).

The procedures for the issuance of ERUs differ depending on if the host Annex I Party satisfies the eligibility requirements as set out in the "Guidelines for the implementation of Article 6 of the Kyoto Protocol" (hereinafter referred to as "JI guidelines") [Decision 9/CMP.1, Annex, para. 21].

Eligibility requirements[14] for an Annex I Party to transfer and/or acquire ERUs are provided for in paragraph 21 of The

13 Joint Implementation is a term that refers to the mechanism referred to in Article 6 of the Kyoto Protocol.

14 Refer to paragraph 21 of Decision 9/CMP.1 [CMP/2005/8/Add.2, p.6] for the exact wording.

5. Joint Implementation

JI guidelines [Annex to Decision 9/CMP.1], as follows:

(a) It is a Party to the Kyoto Protocol
(b) Its assigned amount has been calculated and recorded
(c) It has in place a national system for the estimation of anthropogenic emissions by sources and anthropogenic removals by sinks
(d) It has in place a national registry
(e) It has submitted annually the most recent required inventory, including the national inventory report and the common reporting format. For the first commitment period, the quality assessment needed for the purpose of determining eligibility to use the mechanisms shall be limited to the parts of the inventory pertaining to emissions of greenhouse gases from sources/sector categories from Annex A to the Kyoto Protocol and the submission of the annual inventory on sinks
(f) It submits the supplementary information on assigned amount and makes any additions to, and subtractions from, assigned amount

The different procedures are commonly referred to as “Track 1” and “Track 2”.

Track 1
If a host Party is considered to meet the eligibility requirements, the host Party may verify reductions in anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks from a JI project as being additional to any that would otherwise occur. Upon such verification, the host Party may issue the appropriate quantity of ERUs.

Track 2
If a host Party does not meet the eligibility requirements, the verification of reductions from a JI project shall occur through the verification procedure under the JI Supervisory Committee (JISC). However, the host Party may only issue and transfer ERUs upon meeting the eligibility requirements of (a), (b), and (d) above.

5.2 JI institutions and procedures

5.2.1 JI institutions[15]

The institutions for the JI consist of the following:

COP/MOP
The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) shall provide guidance regarding the implementation of Article 6 and exercise authority over the JI Supervisory Committee [JI guidelines, para. 2].

Designated Focal Point
A Party involved in a JI project shall inform the secretariat of its designated focal point for JI approving projects.
In addition, a Party involved in a JI project shall inform the secretariat of its national guidelines and procedures for approving JI projects, including the consideration of stakeholders’ comments, as well as monitoring and verification.

JI Supervisory Committee (JISC)
The JI Supervisory Committee (JISC) shall comprise 10 members from Parties to the Kyoto Protocol, as follows:

[15] The JISC, AIE, JI-AP and JISC-RTs are only relevant for JI Track 2.

Annex I Parties that are undergoing the process of transition to a market economy	3
Annex I Parties that are not undergoing the process of transition to a market economy	3
Non-Annex I Parties	3
Small island developing States	1
Total	10

The JISC shall supervise, inter alia, the verification of ERUs generated by JI project activities, and be responsible for:

- Reporting on its activities to each session of the COP/MOP;
- The accreditation of independent entities in accordance with standards and procedures contained in appendix A of the JI guidelines;
- The review of standards and procedures for the accreditation of independent entities in appendix A of the JI guidelines, giving consideration to relevant work of the CDM EB and, as appropriate, making recommendations to the COP/MOP on revisions to these standards and procedures;
- The review and revision of reporting guidelines and criteria for baseline and monitoring in appendix B of the JI guidelines, for consideration by the COP/MOP, giving consideration to relevant work of the CDM EB, as appropriate;
- The elaboration of the JI project design document (PDD), for consideration by the COP/MOP, taking into consideration appendix B of the annex on modalities and procedures for a clean development mechanism and giving consideration to relevant work of the CDM EB, as appropriate;
- The review procedures set out in paragraph 35 and 39 of the JI guidelines;
- The elaboration of any rules of procedure additional to those contained in the JI guidelines, for consideration by the COP/MOP.

In addition, the COP/MOP, at its first session, requested the JISC to establish and execute a work programme including the following tasks:

- To develop rules of procedure, and to recommend them for adoption by the COP/MOP at its second session, and to apply them provisionally until they are so adopted;
- To further elaborate standards and procedures for the accreditation of independent entities;
- To accredit independent entities;
- To elaborate and agree on a JI project design document (PDD);
- To develop guidance with regard to criteria for baseline setting and monitoring contained in appendix B of the JI guidelines, including provisions for small-scale projects as defined in paragraph 6 (c) of decision 17/CP.7, as appropriate;
- To develop JISC's management plan including a budget plan for the period 2006-2007, and keep it under review;
- To develop provision for the charging of fees to cover administrative costs relating to the activities of JISC.

Accredited Independent Entity (AIE)

An accredited independent entity (AIE) is an entity accredited by the JISC in accordance with standards and procedures contained in appendix A of the JI guidelines. In accordance with decision 10/CMP.1, the JISC, at its fourth meeting, agreed on JI accreditation procedure and relevant documents recommended by JI-AP.

Under the verification procedure of the JISC, an AIE is responsible for the determination of whether a project and the ensuing reductions of anthropogenic emissions by sources or enhancements of anthropogenic removals by sinks meet the relevant requirements of Article 6 of the Kyoto Protocol and the JI guidelines. In short, the AIE under the JI scheme has similar functions with the DOE under the CDM, but is more responsible for its determination. Under the CDM, the DOE is responsible to validate the PDD, and to check the applicability of the approved methodology to the proposed project. Under the JI, the AIE has to assess the concepts of baseline setting and monitoring in accordance

with the criteria for baseline setting and monitoring set out in appendix B of JI guidelines because there are no approved methodologies. In the case the project participants select to use the CDM approved methodology to the proposed JI project, the AIE shall assess whether all explanations, descriptions and analyses refer to the selected CDM methodology.

The assessment of an applicant independent entity under the JI accreditation process consists of three main elements: desk review, on-site assessment, and witnessing. Those elements are the same as CDM accreditation process. The scope of accreditation of an AIE refers to both its functions (determination regarding PDDs or determination of emission reductions or enhancements of removals by sinks) and its sectoral scope. The list of sectoral scopes was adopted at JISC fourth meeting, as shown in Table 5-1. The listing of scopes is the same as the one for the accreditation under the CDM except for the scope 14, reflecting the difference in the relevant provisions in the Marrakesh Accords.

Table 5-1 List of Sectoral Scopes (Version 01)

1	Energy industries (renewable/non-renewable sources)
2	Energy distribution
3	Energy demand
4	Manufacturing industries
5	Chemical industries
6	Construction
7	Transport
8	Mining/mineral production
9	Metal production
10	Fugitive emissions from fuels (solid, oil and gas)
11	Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
12	Solvent use
13	Waste handling and disposal
14	Land-use, land-use change and forestry
15	Agriculture

Source: “List of sectoral scopes (version 01)” [JISC03, Annex 2]

Applicant independent entities may choose to apply for one or more sectoral scopes.

The COP/MOP, at its first session, decided that DOEs under the CDM may act provisionally as AIEs under JI, until the JISC has approved its procedures for accreditation, and that those DOEs that apply for accreditation under the approved JI accreditation procedure may continue to act provisionally as AIEs until a final accreditation decision is taken.

The JISC, at its fourth meeting, decided to start the JI accreditation process on 15 November 2006, in order to avoid a potential time vacuum derived from paragraphs 3 (a)-(c) of decision 10/CMP.1. The JISC understands that its procedures for accreditation will be effective as of that day, to allow sufficient time for DOEs acting provisionally as AIEs to prepare their applications for the JI accreditation process, so that the DOEs can continue to act provisionally as AIEs in the mean time.
Moreover, the JISC clarified that DOEs may act provisionally as AIEs only for the same sectoral scope(s) and corresponding function(s) for which they are designated under the CDM. The JISC further clarified that DOEs designated for the sectoral scope of afforestation and reforestation may act as AIEs for the sectoral scope of land use,

land-use change and forestry for the designated function(s).

JI Accreditation Panel (JI-AP)

The JI-AP shall make recommendations to the JISC regarding:

(a) The accreditation of an applicant independent entity;
(b) The suspension of accreditation of an accredited independent entity (AIE);
(c) The withdrawal of accreditation of an AIE; and
(d) The re-accreditation of an AIE.

The JI-AP shall operate under the guidance of the JISC, in accordance with the general guidelines for panels and working groups under the JISC. The JI-AP shall be established as a standing panel of the JI accreditation process, and its mandate may be revised or terminated by the JISC, if necessary.

JISC review team (JISC-RT)

"Terms of Reference for Experts Appraising Determinations or Participating in Review Teams under the Verification Procedure under the Joint Implementation Supervisory Committee" was adopted at the JISC third meeting (JISC03, Annex 4). According to it, experts selected to participate in a JISC-RT shall fulfill the tasks assigned to them within the team.

When the JISC decides that a more detailed review is required after receiving request(s) of review from a Party involved or three JISC members, JISC sets up a review team (JISC-RT) on a case-by-case basis to assist JISC in conducting reviews in accordance with paragraphs 35 and 39 of the JI guidelines. A JISC-RT shall consist of two JISC members, including alternate members, who will be responsible for supervising the review, and outside experts, as appropriate. One of those JISC members shall be identified as lead member of the JISC-RT, and will be responsible for, inter alia, drafting the final recommendation to the JISC. A JISC-RT, under the guidance of JISC members, including alternate members, responsible for supervising the review, shall:

(a) provide inputs;
(b) prepare requests for clarification and/or further information to the AIE and/or project participants; and
(c) analyse information received during the review.

In addition to conducting review within a JISC-RT, experts listed on a roster for appraising determinations or participating in review teams might be selected to appraise determinations referred to in paragraph 33 of the JI guidelines. The experts selected to make inputs to the appraisal of the determination shall prepare inputs that shall indicate whether the requirements of Article 6 of the Kyoto Protocol and the JI guidelines and further relevant requirements defined by the COP/MOP or the JISC with regard to determinations are met and appropriately dealt with by the AIE and provide reasons in case these conditions are not fulfilled.

5.2.2 JI procedures

Figure 5-2 describes the verification procedure under the JISC, or Track 2 procedure. The procedure involves two kinds of determinations by the AIE(s). The first determination is according to paragraph 33 of the JI guidelines (often referred to as "determination" or "determination of PDD"), which corresponds to validation under the CDM. The other is according to paragraph 37 of the JI guidelines (often referred to as "verification" or "determination of ERUs"), which corresponds to verification under the CDM.

The JISC will undertake appraisals of the first determinations with inputs from experts, as appropriate.

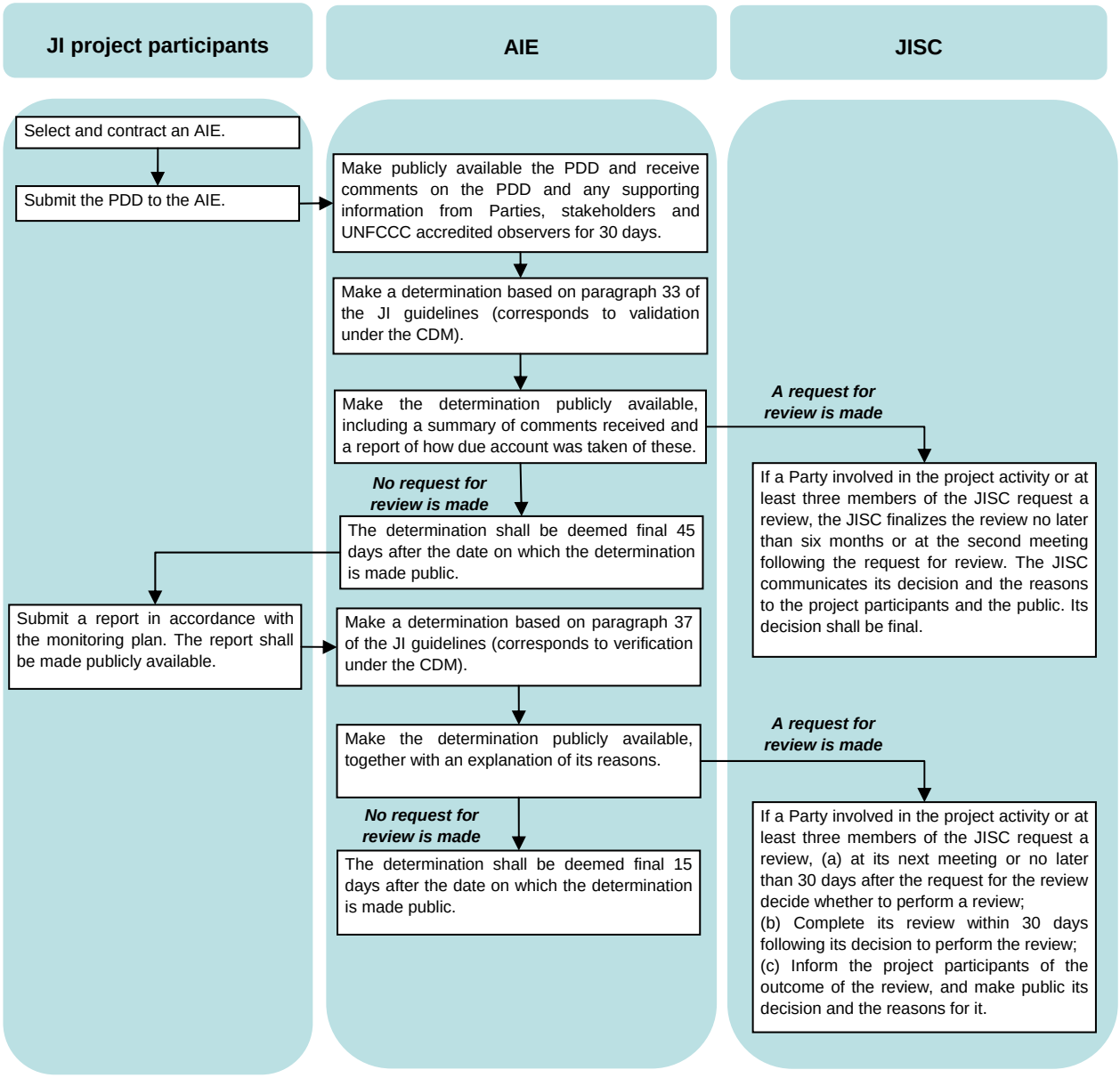


Figure 5-2 Verification procedure under the JISC (Track 2 procedure)

Fees to cover administrative costs

The fees to cover administrative costs relating to the activities of the JISC, which are described below, are in line with the share of proceeds to cover administrative expenses (SOP-Admin) under the CDM (refer to section 2.6).

1. Fee for processing of verification report (in place of SOP-Admin under the CDM)
   (a) USD 0.10 per tonne of CO_2 equivalent of emission reductions or enhancements of removals for the first 15,000 tonnes of CO_2 equivalent generated by the project in question in a given calendar year;
   (b) USD 0.20 per tonne of CO_2 equivalent of emission reductions or enhancements of removals for any amount in excess of 15,000 tonnes of CO_2 equivalent generated by the project in question in a given calendar year.

2. Advance payment (similar to registration fee under the CDM)
   - A fee equivalent to the expected average annual generation of emission reductions or enhancements of removals for the project over its crediting period as described in "1. Fee for processing of verification report" above shall be paid as an advance payment when a determination report regarding the PDD is submitted to the secretariat in accordance with paragraph 34 of the JI guidelines.
   - The advance payment shall be deducted from the fee for processing the first verification report on the same

project submitted to the secretariat in accordance with paragraph 38 of the JI guidelines.

- If a verification report is not submitted, the advance payment above USD 30,000 shall be reimbursed.
- No advance payment shall be paid for projects with an expected average annual generation of emission reductions or enhancements of removals over the crediting period below 15,000 tonnes of CO_2 equivalent.
- Maximum fee payable as advance payment shall be USD 350,000.

In addition to these two categories of fees, the fees are charged for accreditation procedure paid by the independent entity to apply the JI accreditation process, as following:

(a) Application fee: USD 15,000 per application (one-off payment, non-reimbursable);

(b) Cost of the work by assessment teams: direct payment from applicant or accredited independent entities.

5.3 JI-PDD and guidelines

5.3.1 JI-PDD format

The JISC has agreed on the draft JI PDD form (in effect as of 15 June 2006), similar to version 02 of the CDM PDD form[16], and the draft guidelines for users of the JI PDD form, which shall be applied provisionally until the COP/MOP adopts it in accordance with the JI guidelines. As shown in Table 5-2, the contents of JI-PDD and CDM-PDD version 02 are quite similar. The draft JI PDD form and the draft guidelines are available on:
http://ji.unfccc.int/Ref/Docs.html

Projects with written approvals from Parties of the JI guidelines dated before 15 June 2006 shall use either the JI-PDD form or the CDM-PDD forms. In the latter case, the AIE selected by the project participants to perform the determination shall confirm that the PDD submitted provides all the information covered by the JI-PDD form and related JISC guidance [JISC03, para. 8].

Table 5-2 Comparison of JI-PDD version 01 and CDM-PDD version 02

JI-PDD version 01	**CDM-PDD version 02**
A. General description of the project	A. General description of project activity
B. Baseline	B. Application of a baseline methodology
C. Duration of the project / crediting period	C. Duration of the project activity / Crediting period
D. Monitoring plan	D. Application of a monitoring methodology and plan
E. Estimation of greenhouse gas emission reductions	E. Estimation of GHG emissions by sources
F. Environmental impacts	F. Environmental impacts
G. Stakeholders' comments	G. Stakeholders' comments
Annexes	
Annex 1: Contact information on project participants	Annex 1: Contact information on participants in the project activity
	Annex 2: Information regarding public funding
Annex 2: Baseline information	Annex 3: Baseline information
Annex 3: Monitoring plan	Annex 4: Monitoring plan

Main differences of JI-PDD version 01 from CDM-PDD version 02

(1) A.4.2. "Category(ies) of project activity" of the CDM-PDD is not included in the JI-PDD.

[16] When the draft JI-PDD form was approved by the JISC, the most recent version of CDM-PDD form was version 02.

(2) Annex 2 “Information regarding public funding” of the CDM-PDD is not included in the JI-PDD since the constraints regarding public funding is not applicable to JI.

(3) In A.5. “Project approval by the Parties involved”, written approvals by the Parties involved should be attached to the JI-PDD. The approval should be unconditional and in writing and shall be attached to the JI-PDD at the latest before the final determination report is made publicly available. Such written approval constitutes the authorization by a designated focal point of a specific legal entity to participate in the specific JI project.

(4) In section B “Baseline”, a baseline has to be set in accordance with appendix B of the JI guidelines and further guidance on criteria for baseline setting and monitoring developed by the JISC. As appropriate, project participants may, but are not obliged to, apply approved CDM baseline and monitoring methodologies. If an approved CDM baseline and monitoring methodology is used, all explanations, descriptions and analyses shall refer to the selected methodology. In particular, the following steps should be adhered to:

1. Referencing of the approved baseline and monitoring methodology applied to the project,
2. Justification of the choice of the methodology and why it is applicable to the project, and
3. Description of how the methodology is applied in the context of the project.

(5) In section G “Stakeholders’ comments”, provide

- A list of stakeholders from whom comments on the project have been received;
- Nature of the comments; and
- Whether and how the comments have been addressed.

5.3.2 Criteria for baseline setting and monitoring[17]

The JISC is responsible for "the review and revision of reporting guidelines and criteria for baselines and monitoring in Appendix B [of the JI guidelines] for consideration by the COP/MOP, giving consideration to relevant work of the Executive Board of the CDM, as appropriate" [JI guidelines, para. 3(d)]. Project participants should follow Appendix B of the JI guidelines regarding criteria for baseline setting and monitoring, as well as guidance on criteria for baseline setting and monitoring provided by the JISC[18], both of which are described below.

Note that it has been decided by the COP/MOP that methodologies for baselines and monitoring, including methodologies for small-scale project activities, approved by the CDM EB, may be applied by project participants under JI, as appropriate [Decision 10/CMP.1, para. 4(a)] .

Criteria for baseline setting

I. Criteria for baseline setting (in Appendix B of the JI guidelines)

1. The baseline for an Article 6 project is the scenario that reasonably represents the anthropogenic emissions by sources or anthropogenic removals by sinks of greenhouse gases that would occur in the absence of the proposed project. A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A, and anthropogenic removals by sinks, within the project boundary.

2. A baseline shall be established:

(a) On a project-specific basis and/or using a multi-project emission factor;

(b) In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors;

(c) Taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector;

(d) In such a way that emission reduction units (ERUs) cannot be earned for decreases in activity levels outside the project activity or due to force majeure;

(e) Taking account of uncertainties and using conservative assumptions.

[17] This term corresponds to “baseline and monitoring methodologies” in the CDM.

[18] Guidance on criteria for baseline setting and monitoring can be found in Annex 6 of the report of JISC04. The document is to be reviewed by the JISC periodically.

3. Project participants shall justify their choice of baseline.

Regarding the criteria for baseline setting shown above, the JISC has given the following guidance.

Project boundary

In the case of a JI project aimed at reducing emissions, the project boundary shall:

(a) Encompass all anthropogenic emissions by sources of GHGs which are:

(i) Under the control of the project participants;

(ii) Reasonably attributable to the project; and

(iii) Significant, i.e., as a rule of thumb, would by each source account on average per year over the crediting period for more than 1 per cent of the annual average anthropogenic emissions by sources of GHGs, or exceed an amount of 2,000 tonnes of CO_2 equivalent, whichever is lower; and

(b) Be defined on the basis of a case-by-case assessment with regard to the criteria referred to in (a) above. If an approved CDM baseline and monitoring methodology is used the project boundary shall be defined in line with the approved methodology.

Refer to section 5.5 for project boundary in the case of JI project aimed at enhancing net anthropogenic removals by sinks of GHGs (JI LULUCF project).

Leakage

- Leakage is the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project.
- Project participants must undertake an assessment of the potential leakage of the proposed JI project and explain which sources of leakage are to be calculated, and which can be neglected. Leakage to be included shall be quantified and a procedure provided for an ex ante estimate.

Basic features of a baseline

- The baseline for a JI project:

(a) Is the scenario that reasonably represents the anthropogenic emissions by sources or net anthropogenic removals by sinks of GHGs that would occur in the absence of the project;

(b) Shall cover emissions from all gases, sectors and source categories listed in Annex A of the Kyoto Protocol, and/or anthropogenic removals by sinks, within the project boundary.

Basic options for the establishment of a baseline

- A baseline shall be established on a project-specific basis and/or using a multi-project emission factor, taking into account the project boundary.
- A multi-project emission factor may be used and its application shall be justified. Sector-wide baselines may e.g. be used if:

(a) The physical characteristics of the sector justify the application of a standard emission factor across the sector (e.g. in the case of an integrated electricity network with no major transmission constraints, the physical characteristics of the system may imply that the impact of a project on emissions can be assessed irrespective of its location); and/or

(b) The emissions intensity does not vary significantly across the sector (e.g. in the case of diesel power generation in off-grid electricity systems, the emission factor for electricity generation may be based on standard factors with a reasonable degree of accuracy).

- The following two options are applicable if a baseline is established on a project-specific basis:

(a) Project participants may apply methodologies for baselines and monitoring approved by the CDM EB, including methodologies for small-scale project activities, as appropriate. If an approved CDM baseline and monitoring methodology is used, all explanations, descriptions and analyses shall be made in accordance with the selected

methodology;

(b) Alternatively, the project participants may establish a baseline that is in accordance with appendix B of the JI guidelines. In doing so, selected elements or combinations of approved CDM baseline and monitoring methodologies or approved CDM methodological tools may be used, as appropriate.

Identification of a baseline

- Taking into account the options for the establishment of a baseline referred above, a baseline can be identified, inter alia:
  (a) By using an approved CDM baseline and monitoring methodology. In this case all explanations, descriptions and analyses, inter alia with regard to the identification of a baseline, shall be made in accordance with the methodology chosen;
  (b) By identifying and listing plausible future scenarios on the basis of conservative assumptions and identifying the most plausible one.
- A baseline shall be established taking into account relevant national and/or sectoral policies and circumstances, such as sectoral reform initiatives, local fuel availability, power sector expansion plans, and the economic situation in the project sector. Key factors that affect a baseline shall be taken into account, e.g.:
  (a) Sectoral reform policies and legislation;
  (b) Economic situation/growth and socio-demographic factors in the relevant sector as well as resulting predicted demand. Suppressed and/or increasing demand that will be met by the project can be considered in the baseline as appropriate (e.g. by assuming that the same level of service as in the project scenario would be offered in the baseline scenario);
  (c) Availability of capital (including investment barriers);
  (d) Local availability of technologies, skills and know-how and availability of best available technologies in the future;
  (e) Fuel prices and availability;
  (f) National and/or subnational expansion plans for the energy sector, as appropriate; and
  (g) National and/or subnational forestry or agricultural policies, as appropriate.
- Furthermore, each baseline shall be established:
  (a) In a transparent manner with regard to the choice of approaches, assumptions, methodologies, parameters, data sources and key factors;
  (b) Taking account of uncertainties and using conservative assumptions; and
  (c) In such a way that ERUs cannot be earned for decreases in activity levels outside the project activity or due to force majeure.
- In establishing a baseline the project participants shall draw on the list of standard variables contained in appendix B to the guidance on criteria for baseline setting and monitoring, as appropriate.
- The project participants shall justify their choice of baseline taking into account annex 1 to the guidance on criteria for baseline setting and monitoring, which explains about additionality. If the baseline approach chosen differs from approaches already taken in comparable cases (same GHG mitigation measure, same country, similar technology, similar scale) that an AIE has positively determined, the differences shall be explained and justified.
- In any case:
  (a) The project participants shall set a baseline in accordance with appendix B of the JI guidelines;
  (b) The host Party/Parties (as well as the other Parties involved) has/have to approve the project; and
  (c) The AIE has to determine whether the project has an appropriate baseline in accordance with the criteria set out in appendix B of the JI guidelines.

Monitoring

II. Monitoring [Appendix B of the JI guidelines] 4. Project participants shall include, as part of the project design document, a monitoring plan that provides for: (a) The collection and archiving of all relevant data necessary for estimating or measuring anthropogenic

emissions by sources and/or anthropogenic removals by sinks of greenhouse gases occurring within the project boundary during the crediting period;

(b) The collection and archiving of all relevant data necessary for determining the baseline of anthropogenic emissions by sources and/or anthropogenic removals by sinks of greenhouse gases within the project boundary during the crediting period;

(c) The identification of all potential sources of, and the collection and archiving of data on increased anthropogenic emissions by sources and/or reduced anthropogenic removals by sinks of greenhouse gases outside the project boundary that are significant and reasonably attributable to the project during the crediting period. The project boundary shall encompass all anthropogenic emissions by sources and/or removals by sinks of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the Article 6 project activity;

(d) The collection and archiving of information on environmental impacts, in accordance with procedures as required by the host Party, where applicable;

(e) Quality assurance and control procedures for the monitoring process;

(f) Procedures for the periodic calculation of the reductions of anthropogenic emissions by sources and/or enhancements of anthropogenic removals by sinks by the proposed Article 6 project, and for leakage effects, if any. Leakage is defined as the net change of anthropogenic emissions by sources and/or removals by sinks of greenhouse gases which occurs outside the project boundary, and that is measurable and attributable to the Article 6 project;

(g) Documentation of all steps involved in the calculations referred to in subparagraphs (b) and (f) above.

5. Revisions, if any, to the monitoring plan to improve its accuracy and/or completeness of information shall be justified by project participants and shall be submitted for the determination referred to in paragraph 37 of the present annex on guidelines for the implementation of Article 6 of the Kyoto Protocol by the accredited independent entity.

6. The implementation of the monitoring plan and its revisions, as applicable, shall be a condition for verification.

Regarding the above criteria for monitoring, the JISC has given the following guidance.

- As part of the PDD of the project a monitoring plan has to be established by the project participants in accordance with appendix B of the JI guidelines (shown above):
  - (a) Project participants may apply methodologies for baselines and monitoring approved by the CDM EB, including methodologies for small-scale project activities, as appropriate. If an approved CDM baseline and monitoring methodology is used, all explanations, descriptions and analyses shall be made in accordance with the selected methodology;
  - (b) In other cases, a monitoring plan established in accordance with appendix B of the JI guidelines may, inter alia, use selected elements or combinations of approved CDM baseline and monitoring methodologies, if deemed appropriate.
- The monitoring plan shall, inter alia:
  - (a) Describe all relevant factors and key characteristics that will be monitored, and the period in which they will be monitored, in particular also all decisive factors for the control and reporting of project performance;
  - (b) Specify the indicators, constants and variables used;
  - (c) Draw on the list of standard variables contained in appendix B to the guidance on criteria for baseline setting and monitoring, as appropriate;
  - (d) Describe the methods employed for data monitoring (including its frequency) and recording;
  - (e) Present the quality assurance and control procedures for the monitoring process. This includes, as appropriate, information on calibration and on how records on data and/or method validity and accuracy are kept and made available on request;
  - (f) Clearly identify the responsibilities and the authority regarding the monitoring activities;

(g) On the whole, reflect good monitoring practices appropriate to the project type. In the case of JI LULUCF projects, this includes applying the good practice guidance, as developed by the IPCC; and

(h) Provide a complete compilation of the data that needs to be collected for its application. This includes data that is measured or sampled and data that is collected from other sources (e.g. official statistics, expert judgment, proprietary data, IPCC, commercial and scientific literature etc.). Data that is calculated with equations should not be included in the compilation. The information in the monitoring plan shall be provided in tabular form.

- The indicators, constants, variables and/or models used shall be reliable (i.e. provide consistent and accurate values) and valid (i.e. be clearly connected with the effect to be measured), and shall provide a transparent picture of the emission reductions or enhancements of net removals (to be) monitored. In particular, it is recommended with regard to:
  (a) Project-specific indicators to use, to the extent possible, indicators that are already used in normal business practice and/or have to be reported e.g. to local authorities. Such indicators might also be used to cross-check project operations (e.g. changes in the ratio of fuel input and energy output could indicate that the project equipment is not working properly and leakage effects have occurred);
  (b) Leakage indicators to use data from suppliers/utilities and/or available public statistics and/or to conduct surveys, as business-linked indicators might not be available and leakage effects can be controlled less effectively by the project participants.
- Default values may be used as appropriate. In the selection of default values, accuracy and reasonableness shall be carefully balanced. The default values chosen should originate from recognized sources, be supported by statistical analyses providing reasonable confidence levels and be presented in a transparent manner.
- Emission reductions or enhancements of net removals shall be estimated/calculated in accordance with annex 2 of the guidance on criteria for baseline setting and monitoring, which is described further down.
- If a national or international monitoring standard has to be and/or is applied to monitor certain aspects of the project, this standard shall be identified and a reference as to where a detailed description of the standard can be found shall be provided. Whenever possible, internationally recognized standards/methods with regard to monitoring (as well as calibration, as appropriate) should be applied.
- In any case:
  (a) The project participants shall set a monitoring plan in accordance with appendix B of the JI guidelines;
  (b) The host Party/Parties (as well as the other Parties involved) has/have to approve the project; and
  (c) The AIE has to determine whether the project has an appropriate monitoring plan in accordance with the criteria set out in appendix B of the JI guidelines.
- Project participants shall ensure that monitoring occurs in accordance with the monitoring plan.
- If statistical techniques are used for monitoring, these shall be documented and used in a conservative manner.
- In accordance with paragraph 36 of the JI guidelines, project participants shall submit to an AIE a monitoring report on reductions in anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks that have already occurred. This report will be made publicly available.
- The project participants are encouraged to improve the monitoring process and its results. Revisions, if any, to the monitoring plan to improve its accuracy and/or completeness of information shall be justified by project participants and shall be submitted for the determination referred to in paragraph 37 of the JI guidelines by the AIE. In this case the AIE shall determine whether the proposed revisions improve the accuracy and/or completeness of information of the original monitoring plan without changing conformity with the relevant rules and regulations for the establishment of monitoring plans and, in case of a positive determination, shall proceed with the determination referred to in paragraph 37 of the JI guidelines.
- Data monitored and required for determination according to paragraph 37 of the JI guidelines are to be kept for two years after the last transfer of ERUs for the project.

Additionality [Annex 1 to the Guidance of criteria for baseline setting and monitoring (JISC04, Annex 6)]

- In accordance with Article 6 of the Kyoto Protocol a JI project has to provide a reduction in emissions by sources, or an enhancement of net removals by sinks, that is additional to any that would otherwise occur.
- Having identified a baseline, additionality can be demonstrated, inter alia, by using one of the following approaches:
  (a) In case an approved CDM baseline and monitoring methodology is used, all explanations, descriptions and

analyses, inter alia with regard to additionality, shall be made in accordance with the selected methodology;

(b) In all other cases, inter alia, one of the following options may be applied:

(i) Application of the most recent version of the "Tool for the demonstration and assessment of additionality" approved by the CDM EB;

(ii) Application of any other method for proving additionality approved by the CDM EB;

(iii) Provision of traceable and transparent information showing that the baseline was identified on the basis of conservative assumptions, that the project scenario is not part of the identified baseline scenario and that the project will lead to reductions of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of GHGs;

(iv) Provision of traceable and transparent information that an accredited independent entity has already positively determined that a comparable project (to be) implemented under comparable circumstances (same GHG mitigation measure, same country, similar technology, similar scale) would result in a reduction of anthropogenic emissions by sources or an enhancement of net anthropogenic removals by sinks that is additional to any that would otherwise occur and a justification why this determination is relevant for the project at hand.

- The approach chosen, including its appropriateness, shall be justified as a basis for the determination referred to in paragraph 33 of the JI guidelines.

Calculation of emission reductions or enhancements of net removals [Annex 2 to the Guidance of criteria for baseline setting and monitoring (JISC04, Annex 6)]

- The emission reductions or enhancements of net removals generated by the project have to be estimated ex ante in the project design document (PDD) of the project and calculated ex post according to the monitoring plan included in the PDD:

(a) On a periodic basis;

(b) At least from the beginning until the end of the crediting period;

(c) On a source-by-source/sink-by-sink basis;

(d) In tonnes of CO2 equivalent, using global warming potentials defined by decision 2/CP.3 or as subsequently revised in accordance with Article 5 of the Kyoto Protocol.

- Reductions of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of greenhouse gases (GHGs) generated by joint implementation (JI) projects are estimated/calculated by comparing the quantified anthropogenic emissions by sources or net anthropogenic removals by sinks within the project boundary in the baseline scenario with those in the project scenario and adjusting for leakage. In practice, this estimation/calculation can be conducted, as appropriate, in one of the following two ways:

(a) Assessment of emissions or net removals in the baseline scenario and in the project scenario:

(i) Estimation/calculation of anthropogenic emissions by sources or net anthropogenic removals by sinks within the project boundary in the baseline scenario;

(ii) Estimation/calculation of anthropogenic emissions by sources or net anthropogenic removals by sinks within the project boundary in the project scenario;

(iii) Difference of the results of the estimations/calculations referred to in subparagraphs (i) and (ii) above;

(iv) Adjustment of the result of subparagraph (iii) above for leakage;

(b) Direct assessment of emission reductions:

(i) Direct estimation/calculation of the difference between the anthropogenic emissions by sources within the project boundary in the baseline scenario and in the project scenario (e.g. in the case of landfill gas projects, the emission reductions can be calculated by multiplying the methane captured with an appropriate factor based on the global warming potential of methane);

(ii) Adjustment of the result of subparagraph (i) above for leakage.

- The project boundary chosen affects the identification of sources/sinks for which emissions or net removals have to be assessed when estimating/calculating reductions of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of GHGs.

Crediting period

- The period for which reductions in anthropogenic emissions by sources or enhancements of anthropogenic

removals by sinks may be determined by an AIE.

- Projects starting as of 2000 may be eligible as JI projects if they meet the requirements of the JI guidelines. ERUs shall only be issued for a crediting period starting after the beginning of 2008.
- The project participants shall choose the starting date of the crediting period to be on or after the date the first emission reductions are generated by the JI project. The crediting period shall not extend beyond the operational lifetime of the project.
- The end of the crediting period can be after 2012, subject to the approval by the host Party. The status of emission reductions generated by JI projects after the end of the first commitment period may be determined by any relevant agreement under the UNFCCC.

5.4 Small-scale JI projects[19]

5.4.1 Small-scale thresholds

The following three types of Small-scale JI (JI SSC) projects are defined:

(a) Renewable energy projects with a maximum output capacity equivalent of up to 15 megawatts (MW) (or an appropriate equivalent) (type I JI SSC projects);

(b) Energy efficiency improvement projects which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 gigawatt hours (GWh) per year (type II JI SSC projects);

(c) Other projects that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes (kt) of carbon dioxide (CO_2) equivalent annually (type III JI SSC projects)[20].

5.4.2 Project categories

JI SSC projects have to conform to one of the project categories for the small-scale CDM project activities (Refer to section 3.2.5). Additional project categories under JI may be approved by the JISC either on its own initiative or based on submissions by project participants. Project participants may make a substantiated request in writing to the JISC providing information about the project/technology and a definition of the new project category proposed.

5.4.3 Bundling and debundling

JI-SSC projects can be bundled at the following stages in the project cycle under the verification procedure under the JISC:

(a) Project design document;

(b) Determination referred to in paragraph 33 of the JI guidelines (so-called determination);

(c) Monitoring;

(d) Determination referred to in paragraph 37 of the JI guidelines (so-called verification).

The provisions for bundling and debundling are similar to those for the small-scale CDM project activities, including the following:

- Bundled JI SSC projects may, but do not necessarily, pertain to the same project category.
- All projects in the bundle shall:
  (a) Have the same crediting period; and
  (b) Comply with the provisions for JI SSC projects defined in the document “Provisions for Joint Implementation Small-Scale Projects”, in particular the thresholds referred above; and

[19] This section is based on the Annex 7 (“Provisions for Joint Implementation Small-Scale Projects”) to the report of JISC04.

[20] The decision made at EB 24 about Type III project activities that the category is applicable for project activities resulting in annual emission reductions lower than 25,000 tonnes CO_2equivalent is not mentioned in the provisions for JI SSC projects.

(c) Retain their distinctive characteristics (i.e. location, technology/measure etc.).

- The composition of a bundle shall not change over time.
- A single SSC PDD may be used for the whole bundle provided that all the projects pertain to the same JI SSC project category, apply the same technology or measure and are located in the territory of the same host Party. Otherwise, separate SSC PDDs have to be submitted for each project in the bundle. All SSC PDDs pertaining to a particular bundle shall be published at the same time, whenever the publication of PDDs is required under the verification procedure under the JISC.
- A debundled component of a large project is not eligible to benefit from the specific provisions for JI SSC projects.

However, one major difference of JI SSC from small-scale CDM is that no limit for a whole bundle is set if each project composed of a bundle meet the threshold of JI SSC abovementioned.
In addition, other benefit from the JI SSC provisions is the requirements of monitoring section in PDD are reduced.
In the different context from the JI SSC provisions, the JISC decided that no advance payment upon submitting the determination report shall be paid for projects with an expected average annual generation of emission reductions or enhancements of removals over the crediting period below 15,000 tonnes of CO_2 equivalent [JISC04, Annex 16, para. 3].

5.4.4 Baseline setting and monitoring

- In baseline setting and monitoring appendix B of the JI guidelines and guidance of the JISC shall be taken into account. In particular, project participants may, but are not obliged to, use the most recent versions of the simplified baseline and monitoring methodologies for SSC project activities approved by the CDM EB, as appropriate. In this case, all explanations, descriptions and analyses shall be made in accordance with the selected methodology.
- Leakage only has to be considered within the boundaries of non-Annex I Parties, if applicable.
- If projects in a bundle use the same baseline, this has to be justified by considering the particular situation of each project in the bundle.
- If projects are bundled, a separate monitoring plan shall apply for each of the constituent projects or an overall monitoring plan, which, inter alia, may also propose to monitor performance of the constituent projects on a sample basis, shall apply for the bundled projects. In the latter case the projects have to be located in the territory of the same host Party, have to pertain to the same project category and have to apply the same technology or measure, and the AIE shall determine that the overall monitoring plan reflects good monitoring practice appropriate to the bundled projects and provides for collection and archiving of the data needed to calculate the emission reductions achieved by the bundled projects.

5.5 JI Land Use, Land-Use Change and Forestry (LULUCF) projects

Under the CDM, among different activities related to land use, land-use change and forestry (LULUCF), only afforestation and reforestation are eligible as CDM project activities. On the other hand, all kinds of projects based on LULUCF activities that aim at enhancing net anthropogenic removals by sinks can be considered as LULUCF projects under the JI [JISC04, Annex 15, p.9].

LULUCF activities include the following activities referred to in Article 3, paragraphs 3 and 4 of the Kyoto Protocol (see Box 5-1 below): afforestation, reforestation, deforestation, revegetation, forest management, cropland management and grazing land management. Project participants wishing to undertake JI LULUCF projects other than afforestation or reforestation projects are recommended to check which of the other activities the host Party has chosen to account for in the first commitment period [Decision 16/CMP.1, Annex, para 6].

5. Joint Implementation

Definition of LULUCF activities: [Decision 16/CMP.1, Annex, para 1]

Afforestation	The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.
Reforestation	The direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.
Deforestation	The direct human-induced conversion of forested land to non-forested land.
Revegetation	A direct human-induced activity to increase carbon stocks on sites through the establishment of vegetation that covers a minimum area of 0.05 hectares and does not meet the definitions of afforestation and reforestation.
Forest management	A system of practices for stewardship and use of forest land aimed at fulfilling relevant ecological (including biological diversity), economic and social functions of the forest in a sustainable manner.
Cropland management	The system of practices on land on which agricultural crops are grown and on land that is set aside or temporarily not being used for crop production.
Grazing land management	The system of practices on land used for livestock production aimed at manipulating the amount and type of vegetation and livestock produced.

Box 5-1: Kyoto Protocol Article 3, paragraphs 3 and 4

Paragraph 3:
The net changes in greenhouse gas emissions by sources and removals by sinks resulting from direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, measured as verifiable changes in carbon stocks in each commitment period, shall be used to meet the commitments under this Article of each Party included in Annex I. The greenhouse gas emissions by sources and removals by sinks associated with those activities shall be reported in a transparent and verifiable manner and reviewed in accordance with Articles 7 and 8.

Paragraph 4:
Prior to the first session of the Conference of the Parties serving as the meeting of the Parties to this Protocol, each Party included in Annex I shall provide, for consideration by the Subsidiary Body for Scientific and Technological Advice, data to establish its level of carbon stocks in 1990 and to enable an estimate to be made of its changes in carbon stocks in subsequent years. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall, at its first session or as soon as practicable thereafter, decide upon modalities, rules and guidelines as to how, and which, additional human-induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soils and the land-use change and forestry categories shall be added to, or subtracted from, the assigned amounts for Parties included in Annex I, taking into account uncertainties, transparency in reporting, verifiability, the methodological work of the Intergovernmental Panel on Climate Change, the advice provided by the Subsidiary Body for Scientific and Technological Advice in accordance with Article 5 and the decisions of the Conference of the Parties. Such a decision shall apply in the second and subsequent commitment periods. A Party may choose to apply such a decision on these additional human-induced activities for its first commitment period, provided that these activities have taken place since 1990.

Definition of Forest

Definition of forest is the same as the one under the CDM (see section 3.3.1).

(a) A single minimum tree crown cover value between 10 and 30 per cent;

(b) A single minimum land area value between 0.05 and 1 hectare; and
(c) A single minimum tree height value between 2 and 5 metres.

Baseline

A baseline has to be set in accordance with appendix B of the JI guidelines and further guidance on criteria for baseline setting and monitoring developed by the JISC. As appropriate, project participants may, but are not obliged to, apply approved CDM baseline and monitoring methodologies.

Carbon pools

Carbon pools for JI LULUCF projects, which are the same as those for A/R CDM projects, are above-ground biomass, below-ground biomass, litter, dead wood, and soil organic carbon. Project participants may choose not to account for one or more carbon pools if they provide transparent and verifiable information that indicates that the pool is not a source.

Use of IPCC good practice guidance

According to the JI guidelines, JI projects aimed at enhancing anthropogenic removals by sinks shall conform to definitions, accounting rules, modalities and guidelines under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. Decision 16/CMP.1, paragraph 2, states that good practice guidance, and methods to estimate, measure, monitor and report changes in carbon stocks and anthropogenic greenhouse gas emissions by sources and removals by sinks resulting from LULUCF activities, as developed by the Intergovernmental Panel on Climate Change (IPCC), shall be applied by Parties, if decided in accordance with relevant decisions of the COP/MOP. According to decision 17/CMP.1, paragraph 1, Parties included in Annex I to the Convention that have ratified the Kyoto Protocol shall apply for the first commitment period the good practice guidance for LULUCF, as developed by the IPCC [JISC04, Annex 15, p.9].

Project boundary

In the case of a JI LULUCF project, the project boundary shall:

(a) Geographically delineate the JI LULUCF project under the control of the project participants. A JI LULUCF project may contain more than one discrete area of land. In this case:
    (i) Each discrete area of land should have a unique geographical identification;
    (ii) The boundary should be defined for each discrete area and should not include the areas in between these discrete areas of land;
(b) Encompass all anthropogenic emissions by sources and removals by sinks of GHGs which are:
    (i) Under the control of the project participants;
    (ii) Reasonably attributable to the project; and
    (iii) Significant;
(c) Account for all changes in the following carbon pools: above-ground biomass, below-ground biomass, litter, dead wood, and soil organic carbon. Project participants may choose not to account for one or more carbon pools if they provide transparent and verifiable information that indicates that the pool is not a source;
(d) Be defined on the basis of a case-by-case assessment with regard to the criteria referred to in subparagraph (b) above. If an approved CDM baseline and monitoring methodology is used the project boundary shall be defined in line with the approved methodology [JISC04, Annex 6, para 12].

Leakage

Leakage is the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project. In the case of JI LULUCF projects, only the increased anthropogenic emissions by sources and/or reduced anthropogenic removals by sinks of GHGs outside the project boundary shall be taken into account [JISC04, Annex 6, para 14].

Permanence

Whereas tCERs and lCERs have been created to cope with non-permanence under the CDM, the credits issued from JI LULUCF projects are called ERUs, same as credits from emission reduction JI projects. However, there are

following differences from ERUs generated from emission reduction JI projects:

- ERUs are issued by each Party by converting assigned amount units (AAUs)[21] or removal units (RMUs)[22] previously issued by that Party and held in its national registry [Decision 13/CMP.1, Annex, para 29]. Since an AAU or RMU shall be converted into an ERU by adding a project identifier to the serial number and changing the type indicator in the serial number to indicate an ERU, it can be supposed that ERUs from JI LULUCF projects would be converted from RMUs. It has been decided that ERUs that have been converted from RMUs cannot be carried over to subsequent commitment periods [Decision 13/CMP.1, Annex, para 15(a)]. Consequently, it would not be possible to carry over ERUs originating from JI LULUCF projects to subsequent commitment periods.
- In case of net emissions of anthropogenic greenhouse gases resulting from its activities under Article 3, paragraph 3, and its elected activities under Article 3, paragraph 4, each Party included in Annex I shall cancel CERs, ERUs, AAUs and/or RMUs equivalent to such net emissions [Decision 13/CMP.1, Annex, para 32]. This indicates that in case of reversal, the host Party is primarily responsible for replacing that amount in the formal UNFCCC procedures.

JI LULUCF PDD

The draft JI LULUCF PDD form was agreed by JISC at its fourth meeting, and shall be applied provisionally until the COP/MOP adopts it. It was developed based on the draft JI PDD form agreed at JISC second meeting (see section 5.3.1 for detailed information on the draft JI PDD form). Therefore, the structure of the JI LULUCF PDD is almost the same as that of JI PDD, with some modifications, insertions, and deletion along with adjustments to keep the conformity to LULUCF activities. Table 5-3 shows the comparison of contents of JI LULUCF PDD, JI-PDD, and CDM-AR-PDD.

Table 5-3 Comparison of JI LULUCF PDD version 01, JI PDD version 01, and CDM-AR-PDD version 03

JI-PDD version 01	JI LULUCF PDD version 01	CDM-AR-PDD version 03
A. General description of the project	A. General description of the LULUCF project	A. General description of the proposed A/R CDM project activity
B. Baseline	B. Baseline	B. Duration of the project activity / crediting period
C. Duration of the project / crediting period	C. Duration of the LULUCF project / crediting period	C. Application of an approved baseline and monitoring methodology
D. Monitoring plan	D. Monitoring plan	D. Estimation of ex ante net anthropogenic GHG removals by sinks and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period
E. Estimation of greenhouse gas emission reductions	E. Estimation of enhancements of net anthropogenic removals by sinks	E. Monitoring plan
F. Environmental impacts	F. Environmental impacts	F. Environmental impacts of the proposed A/R CDM project activity
G. Stakeholders' comments	G. Stakeholders' comments	G. Socio-economic impacts of the proposed A/R CDM project activity
		H. Stakeholders' comments

[21] Total amount of AAUs of an Annex I Party is calculated from its base year emissions and emission reduction target

[22] Total amount of RMUs of an Annex I Party is calculated from net removal of GHGs by afforestation and reforestation (A/R) activities and additional activities related to GHG removals by sinks

Annexes		
Annex 1: Contact information on project participants	Annex 1: Contact information on project participants	Annex 1: Contact information on participants in the proposed A/R CDM project activity
		Annex 2: Information regarding public funding
Annex 2: Baseline information	Annex 2: Baseline information	Annex 3: Baseline information
Annex 3: Monitoring plan	Annex 3: Monitoring plan	Annex 4: Monitoring plan

Main features of JI LULUCF PDD version 01 compared to CDM-AR-PDD version 03

(1) In A.2. "Description of the LULUCF project" of JI LULUCF PDD, it is not necessary to include the following items:
- Explain how the proposed project activity is undertaken (e.g. what exact measures are undertaken, what is their impact within and beyond the project boundary, list plant species used and state if they belong to the categories of Invasive Alien Species (IAS) or Genetically Modified Organisms (GMO), etc.);
- The view of the project participants on the contribution of the proposed A/R CDM project activity to sustainable development (max. one page).

(2) In A.4.1.4 "Detailed delineation of the project boundary including information allowing the unique identification of the LULUCF project", project participants shall provide information which ensures that areas of land are identifiable.

(3) In A.4.2 "Conformity with the definition of LULUCF activities", project participants should specify how the project conforms to the definitions of LULUCF activities included in paragraph 1 of the annex to decision 16/CMP.1, applying the good practice guidance for LULUCF as decided by the COP/MOP, as appropriate. In the case of afforestation, reforestation and/or forest management projects, project participants shall apply the definition of "forest" selected by the host Party, which specifies:
- A single minimum tree crown cover value between 10 and 30 per cent; and
- A single minimum land area value between 0.05 and 1 hectare; and
- A single minimum tree height value between 2 and 5 metres.

(4) In A.4.4. "Brief explanation of how the net anthropogenic removals by sinks are to be enhanced by the proposed JI LULUCF project, including why these enhancements would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances", explain briefly how the net anthropogenic removals by sinks are to be enhanced (details to be provided in section B.) and provide the estimate(s) of anticipated total enhancements of net anthropogenic removals by sinks in tonnes of CO2 equivalent as determined in section E. (Max. length: one page.)

(5) Section B. "Baseline" shall contain all key elements of the baseline. Annex 2 "baseline information" to JI LULUCF PDD that should be prepared in parallel to completing the remainder of the section B of JI LULUCF PDD shall contain a summary of the key elements in tabular form as well as additional supporting documentation/information.

(6) In B.1. "Description and justification of the baseline chosen", explain how the baseline chosen takes into account the good practice guidance for land use, land-use change and forestry, developed by the Intergovernmental Panel on Climate Change, and how it ensures conformity with the definitions, accounting rules, modalities and guidelines under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

(7) In B.2. "Carbon pools selected", in calculating the net anthropogenic removals by sinks occurring within the

project boundary in the project and in the baseline scenario, project participants may choose not to account for one or more carbon pools, if transparent and verifiable information is provided that these unaccounted pools are not a source. The assessment should be based on conservative assumptions. The same carbon pools shall be considered in the estimation and/or calculation of the net anthropogenic removals by sinks, occurring within the project boundary in the project and in the baseline scenario. The selected carbon pools should be presented in a table shown below, with short explanations and justifications for the choice.

Carbon Pools	Selected (yes/no)	Justification / Explanation (If needed, please use the space at the bottom of the table)
Above-ground biomass		
Below-ground biomass		
Dead wood		
Litter		
Soil organic carbon		
Further justification/explanation		

(8) In B.3. “Specification of the GHG sources whose emissions will be part of the JI LULUCF project”, project participants should use the table below to identify the sources of greenhouse gas emissions within the project boundary of the LULUCF project, e.g. soil preparation, machinery and fertilisation. CO2 emissions or removals resulting from changes in carbon stocks should not be included in this table. Project participants should explain whether any emission sources are excluded and if yes, justify their exclusion.

Source	Gas	Included/ excluded	Justification / Explanation (If needed, please use the space at the bottom of the table)
Use of fertilisers	CO_2		
	CH_4		
	N_2O		
Combustion of fossil fuels used in on-site vehicles	CO_2		
	CH_4		
	N_2O		
Further justification/explanation			

(9) In B.4. “Description of how the net anthropogenic removals by sinks are enhanced above those that would have occurred in the absence of the JI LULUCF project”, project participants should explain how and why the JI LULUCF project is additional, including

- a description of the baseline scenario,
- a description of the project scenario, and
- an analysis showing why the net removals in the baseline scenario would likely lie below the net removals in the project scenario.

If an approved CDM baseline and monitoring methodology is used, all explanations, descriptions and analyses shall refer to the selected methodology.

(10) Section D. “Monitoring Plan” has to be established in accordance with appendix B of the JI guidelines and further guidance on criteria for baseline setting and monitoring developed by the JISC. As appropriate, project participants may, but are not obliged to, apply approved CDM baseline and monitoring methodologies. If an approved CDM methodology used, any guidance contained in the methodology shall be taken into

consideration.

- The monitoring plan needs to provide detailed information on the collection and archiving of all relevant data necessary for determining:
  - project emissions and removals,
  - baseline emissions and removals, and
  - leakage effects.
- The monitoring plan should reflect good monitoring practice appropriate to the project type.
- If a national or international monitoring standard has to be applied to monitor certain aspects of the project, project participants should identify this standard and provide a reference as to where a detailed description of the standard can be found. Project participants shall implement the determined monitoring plan and provide data in accordance with the plan through their monitoring reports. Data monitored and required for determination shall be kept for two years after the last transfer of ERUs for the project.

(11) In D.1. “Description of monitoring plan chosen”, project participants should explain how the monitoring plan chosen takes into account the good practice guidance for LULUCF, developed by the IPCC, and how it ensures conformity with the definitions, accounting rules, modalities and guidelines under Article 3, paragraph 3 and 4, of the Kyoto Protocol.

(12) In D.1.1. “Sampling design and stratification”, project participants should describe the sampling design that will be used for the calculation of the net anthropogenic removals by sinks occurring within the project boundary in the project scenario and, in case the baseline is monitored, in the baseline scenario. The sampling design shall describe, inter alia, stratification, determination of number of plots and plot distribution, etc.

(13) In D.1.5. “Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the LULUCF project”, project participants should provide information on the collection and archiving of information on the environmental impacts of the project, as well as reference to the relevant host Party regulation(s). State if not applicable.

(14) The following sections of CDM-AR-PDD are not found in JI LULUCF PDD:

- A.4.5. “Approach for addressing non-permanence”
- A.4.7. “Public funding of the proposed A/R project activity”
- C.1. “Assessment of the eligibility of land”
- Section G. “Socio-economic impacts of the proposed A/R project activity”

Appendix 1 Applicability of approved methodologies by types of project activities

(The number(s) following the methodology title with parentheses indicates the sectoral scope(s))

Note that it is required, in addition to the requirements listed below, as part of applicability that baseline and monitoring methodologies with the same number shall be used in conjunction with each other. For instance, the baseline methodology and monitoring methodology contained in ACM0001 shall be used together.

(i) Projects involving methane capture and/or avoidance

ACM0001: Consolidated methodology for landfill gas project activities, Version 04 (13)

This methodology is applicable to landfill gas capture project activities, where the baseline scenario is the partial or total atmospheric release of the gas and the project activities include situations such as:

a) The captured gas is flared; or

b) The captured gas is used to produce energy (e.g. electricity/thermal energy), but no emission reductions are claimed for displacing or avoiding energy from other sources*[1]; or

*1: Although in this case no emission reductions are claimed for displacing or avoiding energy from other sources, all possible financial revenues and/or emission leakages shall be taken into account in all the analyses performed.

c) The captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources. In this case a baseline methodology for electricity and/or thermal energy displaced shall be provided or an approved one used, including the ACM0002 "Consolidated Methodology for Grid-Connected Power Generation from Renewable". If capacity of electricity generated is less than 15MW, and/or thermal energy displaced is less than 54TJ (15GWh), small-scale methodologies can be used.

ACM0008: Consolidated baseline methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring, Version 02 (8, 10)

This methodology applies to project activities that involve the use of any of the following extraction activities:

- surface drainage wells to capture CBM associated with mining activities;
- underground boreholes in the mine to capture pre mining CMM ;
- surface goaf wells, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture post mining CMM;
- ventilation CMM that would normally be vented.

This methodology applies to CMM capture, utilisation and destruction project activities at a working coal mine, where the baseline is the partial or total atmospheric release of the methane and the project activities include the following method to treat the gas captured:

- The methane is captured and destroyed through flaring; and/or
- The methane is captured and destroyed through utilisation to produce electricity, motive power and/or thermal energy; emission reductions may or may not be claimed for displacing or avoiding energy from other sources;
- The remaining share of the methane, to be diluted for safety reason, may still be vented;
- All the CBM or CMM captured by the project should either be used or destroyed, and cannot be vented.

Project participants must be able to supply the necessary to data for ex-ante projections of methane demand as described in Sections 7 and 8 to use this methodology.

The methodology applies to both new and existing mining activities.

The methodology **does not apply** to project activities with any of the following features:

- Operate in open cast mines;
- Capture methane from abandoned/decommissioned coalmines;
- Capture/use of virgin coal-bed methane, e.g. methane of high quality extracted from coal seams independently of any mining activities;
- Use CO_2 or any other fluid/gas to enhance CBM drainage before mining takes place.

ACM0010: Consolidated methodology for GHG emission reductions from manure management systems (13,15)

This methodology is applicable generally to manure management on livestock farms where the existing anaerobic manure treatment system, within the project boundary, is replaced by one or a combination of more than one animal waste management systems (AWMSs) that result in less GHG emissions.

This methodology is applicable to manure management projects with the following conditions:

- Farms where livestock populations, comprising of cattle, buffalo, swine, sheep, goats, and/or poultry, is managed under confined conditions;
- Farms where manure is not discharged into natural water resources (e.g. rivers or estuaries);
- In case of anaerobic lagoons treatments systems, the depth of the lagoons used for manure management under the baseline scenario should be at least 1m*[1].

*1: In particular, loading in the waste water streams has to be high enough to assure that the lagoon develops an anaerobic bottom layer and that algal oxygen production can be ruled out.

- The annual average temperature in the site where the anaerobic manure treatment facility in the baseline existed is higher than 5°C.
- In the baseline case, the minimum retention time of manure waste in the anaerobic treatment system is greater than 1 month.

- The AWMS/process in the project case should ensure that no leakage of manure waste into ground water takes place, e.g., the lagoon should have a non-permeable layer at the lagoon bottom.

AM0002: Greenhouse gas emission reductions through landfill gas capture and flaring where the baseline is established by a public concession contract, Version 02 (13)

This methodology is applicable to landfill gas capture and flaring project activities where:

- There exists a contractual agreement that makes the operator responsible for all aspects of the landfill design, construction, operation, maintenance and monitoring;
- The contract was awarded through a competitive bidding process;
- The contract stipulates the amount of landfill gas (expressed in cubic meters) to be collected and flared annually by the landfill operator;
- The stipulated amount of landfill gas to be flared reflects performance among the top 20% in the previous five years for landfills operating under similar social, economic, environmental and technological circumstances; and
- No generation of electricity using captured landfill gas occurs or is planned.

It is assumed that the amount of landfill gas to be collected and flared under the terms of the contract meets or exceeds any regulatory requirements. The landfill is also assumed to meet all other environmental regulations and conditions of its operating permit. The Designated Operational Entity verifying the emission reductions achieved will need to check whether there have been changes to environmental regulations that become effective during the crediting period and that increase the required amount of landfill gas flaring. In the event of such changes to environmental regulations, the baseline will need to be adjusted appropriately.

AM0003: Simplified financial analysis for landfill gas capture projects, Version 03 (13)

This methodology is applicable to landfill gas capture project activities where:

- The captured gas is flared; or
- The captured gas is used to generate electricity, but no emission reductions are claimed for displacing or avoiding electricity generation by other sources.

It is applicable only where the only plausible outcomes are a business-as-usual scenario (with minor changes and modifications) and the proposed project. In other words, the methodology is inapplicable where a plausible outcome is substantial change in practice or technology different from the proposed technology.

AM0010: Landfill gas capture and electricity generation projects where landfill gas capture is not mandated by law (1, 13)

This methodology is applicable to landfill gas capture and electricity generation project activities where:

- The landfill is subject to regulation of methane (CH_4) concentration but landfill gas capture is not mandated by law;
- The captured gas is used to generate electricity and the CO_2 emissions intensity of this electricity is lower than the emissions intensity of the electricity displaced;
- The electricity generation capacity of the project shall not exceed 15 MW.

It is applicable only where the only plausible outcomes are a business-as-usual scenario (with minor changes and modifications) and the proposed project. In other words, the methodology is inapplicable where a plausible outcome is substantial change in practice or technologically different from the proposed technology.

AM0011: Landfill gas recovery with electricity generation and no capture or destruction of methane in the baseline scenario, Version 02 (13)

This methodology is applicable to landfill gas capture and electricity generation project activities where:

- The baseline is atmospheric release of the landfill gas;
- There are no regulations and/or contractual requirements governing the landfill gas emissions;
- The captured gas is used to evaporate leachate, generate electricity for on-site use and/or is flared;
- Emissions reductions associated with generation of the displaced electricity do not generate credits.

AM0013: Avoided methane emissions from organic waste-water treatment , Version 03 (13)

This methodology is applicable to methane avoidance project activities involving organic wastewater treatment plants with the following applicability conditions:

- The existing waste water treatment system is an open lagoon system with an 'active' anaerobic condition, which is characterized as follows:
  + The depth of the open lagoon system is at least 1 m;
  + The temperature of the anaerobic lagoons is higher than 10°C. If monthly average temperature in a particular month is less than 10 °C, this month is not included in the estimations, as it is assumed that no anaerobic activity occurs below such temperature.
  + The residence time of the organic matter should be at least 30 days.
- Sludge produced during project activity is not be stored onsite before land application to avoid any possible methane emissions from anaerobic degradation.

AM0022: Avoided Wastewater and On-site Energy Use Emissions in the Industrial Sector, Version 03 (13)
This methodology is applicable to projects that introduce anaerobic treatment systems in existing industrial lagoon-based water treatment facilities under the following conditions: - Project is implemented in existing lagoon-based industrial waste water treatment facilities for wastewater with high organic loading; - The organic wastewater contains simple organic compounds (mono-saccharides). If the methodology is used for waste water containing materials not akin to simple sugars a CH_4 emissions factor different from 0.21 kg CH_4/kgCOD has to be estimated and applied; - The methodology is applicable only to the improvement of existing wastewater treatment facilities. It is not applicable for new facilities to be built or new build to extend current site capacity; - It can be shown that the baseline is the continuation of a current lagoon system for managing waste water. In particular, the current lagoon based system is in full compliance with existing rules and regulations; - The depth of the anaerobic lagoons should be at least 1m*1; *1: In particular, loading in the waste water streams has to be high enough to assure that the lagoon develops an anaerobic bottom layer and that algal oxygen production can be ruled out. - The temperature of the wastewater in the anaerobic lagoons is always at least 15 °C; - In the project, the biogas recovered from the anaerobic treatment system is flared and/or used on-site for heat and/or power generation, surplus biogas is flared; - Heat and electricity needs per unit input of the water treatment facility remain largely unchanged before and after the project; - Data requirements as laid out in the related Monitoring Methodology are fulfilled. In particular, organic materials flow into and out of the considered lagoon based treatment system and the contribution of different removal processes can be quantified (measured or estimated).
AM0025: Avoided emissions from organic waste through alternative waste treatment processes, Version 04 (13)
The methodology is applicable under the following conditions: - The project activity involves one or a combination of the following waste treatment options for the fresh waste that in a given year would have otherwise been disposed of in a landfill: a) a composting process in aerobic conditions; b) gasification to produce syngas and its use; c) anaerobic digestion with biogas collection and flaring and/or its use. - In case of anaerobic digestion or gasification of waste, the residual waste from these processes is either aerobically composted or delivered to a landfill. - The proportions and characteristics of different types of organic waste processed in the project activity can be determined, in order to apply a multiphase landfill gas generation model to estimate the quantity of landfill gas that would have been generated in the absence of the project activity. - The project activity may include electricity generation and/or thermal energy generation from the biogas or syngas captured, respectively, from the anaerobic digester and the gasifier. - Waste handling in the baseline scenario shows a continuation of current practice of disposing the waste in a landfill despite environmental regulation that mandates the treatment of the waste using any of the project activity treatment options mentioned above; - The compliance rate of the environmental regulations during (part of) the crediting period is below 50%; if monitored compliance with the MSW rules exceeds 50%, the project activity shall receive no further credit, since the assumption that the policy is not enforced is no longer tenable This methodology is **not applicable** to project activities that involve capture and flaring of methane from existing waste in the landfill. This should be treated as a separate project activity due to the difference in waste characteristics of existing and fresh waste, which may have an implication on the baseline scenario determination.
AM0039: Methane emissions reduction from organic waste water and bioorganic solid waste using composting (13)
The methodology is applicable to project activities that avoid methane emissions: - Resulting from anaerobic degradation of the organic wastewater in open lagoons or storage tanks; and - From natural decay of bioorganic solid waste in landfills. The methodology is applicable under the following conditions: - Organic wastewater and bioorganic solid waste can be generated at separate locations; - The bioorganic solid waste can be of a single type or multiple types mixed in different proportions. The proportions and characteristics of different types of bioorganic waste processed in the project activity can be determined, in order to apply a multiphase landfill gas generation model to estimate the quantity of landfill gas that would have been generated in the absence of the project activity; - Project activities shall employ co-composting process for treatment of the organic wastewater and the bioorganic waste; - The anaerobic lagoons or storage tanks utilized for the treatment of the organic wastewater, which is processed in the project co-composting activity, in the baseline shall meet the following conditions: + The monthly average ambient temperatures are greater than 10 ºC ;(the methodology is applicable even if some

of the months during year have monthly average ambient temperature less than 10 ºC, but in such cases only months where monthly average ambient temperature are greater than 10 ºC shall be included in estimation of methane emissions)
+ Depth of the wastewater anaerobic lagoon or storage tank is greater than 1 m;
+ Residence time of the organic matter should be at least 30 days.

NOTE: The methodology is not applicable to waste streams from manure management. This methodology is only applicable if the baseline is:
- Landfilling of the bioorganic solid waste; and
- An existing or new to be built anaerobic lagoons or open tanks for the treatment of organic wastewater.

(ii) Projects involving utilization of renewable energy or low-emission fuels

ACM0002: Consolidated methodology for grid-connected electricity generation from renewable sources, Version 06 (1)

This methodology is applicable to grid-connected renewable power generation project activities under the following conditions:
- Applies to electricity capacity additions from:
  + Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased.
  + New hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m^2.*[1]

    *1: The adoption of this guidance does not prevent project participants from submiting new methodologies for hydroelectric projects, for consideration by the Meth Panel, in particular where reservoirs have no significant vegetative biomass in the catchments area.
  + Wind sources;
  + Geothermal sources;
  + Solar sources;
  + Wave and tidal sources.
- This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available; and
- Applies to grid connected electricity generation from landfill gas capture to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities" (ACM0001).

ACM0003: Emissions reduction through partial substitution of fossil fuels with alternative fuels in cement manufacture, Version 04 (4)

The methodology is applicable to the cement industry with the following conditions:
- Fossil fuel(s) used in cement manufacture are partially replaced by the following alternative fuels:
  (a) Wastes originating from fossil sources, such as tires, plastics, textiles from polymers, or rubber;
  (b) Biomass residues*[1] where they are available in surplus and would in the absence of the project activity be dumped or left to decay or burned in an uncontrolled manner without utilizing them for energy purposes;

  *1: In the context of this methodology, biomass residues means biomass by-products, residues and waste streams from agriculture, forestry and related industries and the non-fossilized and biodegradable organic fractions of industrial and municipal wastes. Biomass means non-fossilized and biodegradable organic material originating from plants, animals and micro-organisms. This shall also include products, by-products, residues and waste from agriculture, forestry and related industries as well as the non-fossilized and biodegradable organic fractions of industrial and municipal wastes.
- In case of project activities using biomass residues, any preparation of the biomass, occurring before usein the project activity, does neither require significant energy quantities (e.g. esterification of waste oils), except from transportation and/or drying of the biomass, nor does it cause significant GHG emissions (such as, for example, methane emissions from anaerobic treatment or char coal production).
- CO_2 emissions reduction relates to CO_2 emissions generated from fuel burning requirements only and is unrelated to the CO_2 emissions from decarbonisation of raw materials (i.e. $CaCO_3$ and $MgCO_3$ bearing minerals);
- The methodology is applicable only for installed capacity (expressed in tonnes clinker/year) that exists by the time of validation of the project activity;
- The amount of alternative fuels available for the project is at least 1.5 times the amount required to meet the consumption of all users consuming the same alternative fuels, i.e. the project and other alternative fuel users.

ACM0006: Consolidated methodology for grid-connected electricity generation from biomass residues, Version 03 (1)

This consolidated methodology covers a number of different project types for power generation with biomass residues. Where a combination of project activity and baseline scenario is not covered by this methodology, project participants are encouraged to submit proposals for revision or further amendment of this consolidated methodology.
This methodology is applicable to grid-connected and biomass residue fired electricity generation project activities, including cogeneration plants. The project activity may include:
- the installation of a new biomass power generation plant at a site where currently no power generation occurs (greenfield power projects); or
- the installation of a new biomass power generation unit, which is operated next to existing power generation

capacity fired with either fossil fuels or the same type of biomass residue as in the project plant (power capacity expansion projects); or
- the improvement of energy efficiency of an existing power generation plant (energy efficiency improvement projects), e.g. by retrofitting the existing plant or by installing a new plant that replaces the existing plant; or
- the replacement of fossil fuels by biomass in an existing power plant (fuel switch projects).

The project activity may be based on the operation of a power generation unit located in an agro-industrial plant generating the biomass residues or as an independent plant supplied by biomass residues coming from the nearby area or a market.

For this specific methodology, biomass residues are defined as biomass that is a by-product, residue or waste stream from agriculture, forestry and related industries. This shall not include municipal waste or other wastes that contain fossilized and/or non-biodegradable material.

The methodology is applicable under the following conditions:
- No other biomass types than biomass residues, as defined above, are used in the project plant and these biomass residues are the predominant fuel used in the project plant (some fossil fuels may be co-fired);
- For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;
- The biomass used by the project facility should not be stored for more than one year;
- No significant energy quantities, except from transportation of the biomass, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology.

It is further noted that the methodology is only applicable for the combinations of project activities and baseline scenarios identified in Table 1*[1].

*1: Table 1 in ACM0006 that shows the combinations of project types and baseline scenarios applicable to the methodology.

AM0007: Analysis of the least-cost fuel option for seasonally-operating biomass cogeneration plants (1, 4)

This methodology is applicable to the refurbishment and fuel-switch of biomass cogeneration projects connected to the grid with the following conditions:
- The proposed project activity has access to biomass that is not currently used for energy purposes;
- The project activity proposes to operate existing equipment using other fuel(s)[1] during the off-season (when biomass associated to the main activity of the unit – for instance bagasse in case of a sugar mill - is not being produced);

  1: In the event that more than one fuel are used, monitoring methodology shall monitor types and quantities used.
- Project must operate in seasonal mode;
- The proposed baseline methodology is applied for each separate plant location.

AM0019: Renewable energy projects replacing part of the electricity production of one single fossil fuel fired power plant that stands alone or supplies to a grid, excluding biomass projects, Version 02 (1)

This methodology is applicable to:
- proposed project activities where electricity production from the zero-emission renewable energy sources: wind, geothermal, solar, run-of-river hydro, wave and/or tidal projects that displaces electricity production from an identified, individual, plant;
- new hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m^2.*[1]

  *1: The adoption of this guidance does not prevent project participants from submitting new methodologies for hydroelectric projects, for consideration by the Meth Panel, in particular where reservoirs have no significant vegetative biomass in the catchments area.
- where the identified baseline plant has sufficient capacity to meet the increase of demand expected during the crediting period.

AM0026: Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid, Version 02 (1)

The methodology is applicable to proposed electricity capacity additions that meet the following conditions:

1) Projects that are renewable electricity generation projects of the following types:
   (a) Run-of-river hydro power plants and hydro electric power projects with existing reservoirs where the volume of the reservoir is not increased;
   (b) New hydro electric power projects with reservoirs having power densities (installed powergeneration capacity divided by the surface area at the full reservoir level) greater than 4 W/m^2.*[1]

   *1: The adoption of this guidance does not prevent project participants from submiting new methodologies for hydroelectric projects, for consideration by the Meth Panel, in particular where reservoirs have no significant vegetative biomass in the catchments area.
   (c) Wind sources;
   (d) Solar sources;
   (e) Geothermal sources;
   (f) Wave and tidal sources.
2) Projects that are connected to the interconnected grids of the Republic of Chile and Projects that fulfils all the legal obligations under the Chilean Electricity Regulation; or Proposed projects implemented in countries other than Chile

provided the country has a regulatory framework for electricity generation and dispatch that meets the following conditions:

(a) An identifiable independent identity is responsible for optimal operation of the system based on the principle of lowest marginal costs.
(b) The data for merit order based on marginal costs is publicly made available by the authority responsible for operation of the system.
(c) The data on specific fuel consumption for each generation source in the system is publicly available.
(d) It is possible with the information available, to ensure that power plants dispatched for other considerations (e.g. safety conditions, grid stability, transmission constraints, and other electrical reasons) are not identified as marginal plants.

The methodology is **not applicable** to:

1) The proposed CDM project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, and
2) if the baseline is the continued use of fossil fuels at the site.

AM0029: Methodology for Grid Connected Electricity Generation Plants using Natural Gas (1)

The methodology is applicable under the following conditions:

- The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation plant*[1].

*1: Natural gas should be the primary fuel. Small amounts of other startup or auxiliary fuels should be used, but can comprise no more than 1% of total fuel use.

- The geographical/ physical boundaries of the baseline grid can be clearly identified and information pertaining to the grid and estimating baseline emissions is publicly available.
- Natural gas is sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity*[2].

*2: In some situations, there could be price-inelastic supply constraints (e.g. limited resources without possibility of expansion during the crediting period) that could mean that a project activity displaces natural gas that would otherwise be used elsewhere in an economy, thus leading to possible leakage. Hence, it is important for the project proponent to document that supply limitations will not result in significant leakage as indicated here.

(iii) Projects involving energy efficiency improvement or fuel/material switch

ACM0004: Consolidated methodology for waste gas and/or heat for power generation, Version 02 (1)

This methodology is applicable to project activities that generate electricity from waste heat or the combustion of waste gases in industrial facilities. The methodology applies to electricity generation project activities:

- that displace electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels, electricity;
- where no fuel switch is done in the process where the waste heat or the waste gas is produced after the implementation of the project activity

The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity, as well as to planned increases in capacity during the crediting period. If capacity expansion is planned, the added capacity must be treated as a new facility.

ACM0005: Consolidated Methodology for Increasing the Blend in Cement Production, Version 03 (4)

This methodology is applicable to projects that increase the share of additives (i.e. reduce the share of clinker) in the production of cement types beyond current practices in the country. Additives are defined as materials blended with clinker to produce blended cement types and include fly ash, gypsum, slag, etc. The methodology is applicable under the following conditions:

- There is no shortage of additives related to the lack of blending materials. Project participants should demonstrate that there is no alternative allocation or use for the additional amount of additives used in the project activity. If the surplus availability of additives is not substantiated the project emissions reductions (ERs) will be discounted as outlined below.
- This methodology is applicable to domestically sold output of the project activity plant and excludes export of blended cement.
- Adequate data are available on cement types in the market.

ACM0007: Methodology for conversion from single cycle to combined cycle power generation (1)

This methodology is applicable:

- When project developers utilize previously-unused waste heat from a power plant, with a single-cycle capacity, and utilize the heat to produce steam for another turbine – thus making the system combined-cycle;
- When waste heat generated on site is not utilizable for any other purpose on-site;
- Where the project activity does not increase the lifetime of the existing gas turbine during the crediting period (i.e.

this methodology is applicable up to the end of the lifetime of existing gas turbine, if shorter than crediting period);
- described in ACM0002, of the electricity grid to which the proposed project is connected.

ACM0009: Consolidated methodology for industrial fuel switching from coal or petroleum fuel to natural gas, Version 03 (1,4)

This methodology is applicable to project activities that switch in one or several element processes*[1] of an industrial facility from coal or oil to natural gas. The fuel switching is undertaken in processes for heat generation that are located at and directly linked to an industrial process with a main output other than heat or that provide heat to a district heating system by means of heat-only boilers.

*1: An "element process" is defined as fuel combustion in a single equipment at one point of an industrial facility or of a district heating system, for the purpose of providing thermal energy (the fuel is not combusted for the purpose of electricity generation or used as oxidant in chemical reactions or otherwise used as feedstock). Examples of an element process are steam generation by a boiler and hot air generation by a furnace". Each element process should generate a single output (such as steam or hot air) by using mainly a single fuel (not plural energy sources). For each element process, energy efficiency is defined as the ratio between the useful energy. (the enthalpy of the steam/water/gas multiplied with the steam/water/gas quantity) and the supplied energy to the element process (the net calorific values of the fuel multiplied with the fuel quantity). This methodology covers fuel switch in several element processes, i.e., project participants may submit one CDM-PDD for fuel switch in several element processes within one industrial facility.

Furthermore, the following conditions apply:
- Prior to the implementation of the project activity, only coal or oil (but not natural gas) have been used in the element processes;
- Regulations/programs do not constrain the facility from using the fossil fuels being used prior to fuel switching;
- Regulations do not require the use of natural gas or any other fuel in the element processes;
- The project activity does not increase the capacity of thermal output or lifetime of the element processes during the crediting period (i.e. emission reductions are only accounted up to the end of the lifetime of the relevant element process), nor is there any thermal capacity expansion planned for the project facility during the crediting period;
- The proposed project activity does not result in integrated process change;

AM0009: Recovery and utilization of gas from oil wells that would otherwise be flared, Version 02 (10)

This methodology is applicable to projects recovering gas at oil wells under the following conditions:
- Gas at oil wells is recovered and transported in pipelines to a process plant where dry gas, LPG and condensate are produced;
- Energy required for transport and processing of the recovered gas is generated by using the recovered gas;
- The products (dry gas, LPG and condensate) are likely to substitute in the market only the same type of fuels or fuels with a higher carbon content per unit of energy;
- The substitution of fuels due to the project activity is unlikely to lead to an increase of fuel consumption in the respective market;
- In the absence of the project activity, the gas is mainly flared;
- Data (quantity and fraction of carbon) is accessible on the products of the gas processing plant and on the gas recovered from other oil exploration facilities in cases where these facilities supply recovered gas to the same gas processing plant.

AM0014: Natural gas-based package cogeneration, Version 02 (1, 4)

This methodology is applicable to natural gas-based cogeneration projects under the following conditions:
- The cogeneration system is a third party cogeneration systems, i.e. not own or operated by the consuming facility that receives the project heat and electricity or the cogeneration system is owned by the industrial user (henceforth referred to as self-owned) that consumes the project heat and electricity;
- The cogeneration system provides all or a part of the electricity and or heat demand of the consuming facility;
- No excess electricity is supplied to the power grid and no excess heat from the cogeneration system is provided to another user.

AM0017: Steam system efficiency improvements by replacing steam traps and returning condensate, Version 02 (3)

This methodology is applicable to steam efficiency improvement project activities with the following conditions:
- Steam efficiency is improved by replacement and/or repair of steam traps and the return (collection and reutilization) of condensate;
- Steam is generated in a boiler fired with fossil fuels;
- The regular maintenance of steam traps or the return of condensate is not common practice or required under regulations in the respective country;
- Data on the condition of steam traps and the return of condensate is accessible in at least five similar other plants.

AM0018: Methodology for steam optimization systems (3)

This methodology is applicable to steam optimization projects in production processes with homogeneous and relatively constant outputs with continuous monitoring of steam output.

AM0020: Methodology for water pumping efficiency improvements (3)
This methodology is applicable to project activities that: - Seek to reduce GHG emissions by explicitly reducing the amount of energy required to deliver a unit of water to end-users in municipal water utilities; - Improve energy efficiency in the overall water pumping, including reducing technical losses and leaks as well as the energy efficiency of the pumping scheme, which consume electricity from the electricity grid, where: + The efficiency (water and energy) of existing schemes is being improved; or + A new scheme is being developed to completely replace the old scheme which will no longer be used. This methodology will apply to the new scheme only up to the measured delivery capacity (annual amount of delivered water) of the old scheme; This methodology is NOT applicable to project activities cases where entirely new schemes are built to augment existing capacity. This will ensure that only emissions reductions up to the existing capacity of the system will be considered.
AM0023: Leak reduction from natural gas pipeline compressor or gate stations (3)
This methodology is applicable to project activities that reduce leaks in natural gas pipeline compressor stations and gate stations in natural gas long-distance transmission systems by establishing advanced leak detection and repair practices: - Where natural gas pipeline operators have no current systems in place to systematically identify and repair leaks; - Where leaks can be identified and accurately measured; - Where a monitoring system can be put in place to ensure leaks repaired remain repaired.
AM0024: Methodology for greenhouse gas reductions through waste heat recovery and utilization for power generation at cement plants (1, 4)
This methodology is applicable to project activities that use waste heat gas generated in clinker making process (i.e. in the cement kilns) to produce electricity. The methodology is applicable under the following conditions: 1) The electricity produced is used within the cement works where the proposed project activity is located and excess electricity is supplied to the grid; it is assumed that there is no electricity export to the grid in the baseline scenario (in case of existing captive power plant); 2) Electricity generated under the project activity displaces either grid electricity or from an identified specific generation source. Identified specific generation source could be either an existing captive power generation source or new generation source; 3) The grid or identified specific generation source option is clearly identifiable; 4) Waste heat is only to be used in the project activity; 5) In the baseline scenario, the recycling of waste heat is possible only within the boundary of the clinker making process (e.g. clinker production lines in baseline scenario could include some heat recovery systems to capture a portion of the waste heat from the cooler end of the clinker kiln and use this to heat up the incoming raw materials and fuel - so called Type 1 Waste Heat Utilization as described in explanatory note below). This methodology is **NOT applicable** to project activities, 1) Where the current use of waste heat or the identified alternative business as usual use of waste heat is located outside of the clinker making process (so called Type 2 Waste heat utilization as described in explanatory note found in page 2 of AM0024); 2) That affect process emissions from cement plants.
AM0027: Substitution of CO_2 from fossil or mineral origin by CO_2 from renewable sources in the production of inorganic compounds, Version 02 (5)
This methodology is applicable generally to industrial production/manufacturing processes of inorganic compounds where fossil or mineral sources of CO_2 are presently used as an input and where renewable sources of CO_2 are available as a substitute input in the project activity case. The methodology is applicable under the following conditions: - The residual CO_2 from the processing of biomass was already produced but was not used before the project activity, so that no diversion of CO_2 from other applications is due to the project activity. - The processing of biomass undergoes no substantial changes in the process with the project activity; - CO_2, from fossil or mineral sources, used for the production of inorganic compounds in the baseline is from a production process whose only useful output is CO_2. The CO_2 production process from fossil source does produce any energy by-product; - CO_2 from fossil or mineral sources that is used for the production of inorganic compounds prior to the project activity will not be emitted to the atmosphere with the project activity; - There are no substantial changes (e.g. product change) in the production process of inorganic compounds as a result of the project activity; - Production levels of the plant (tons of inorganic compound produced per year) may in general not increase with the project activity over historic maxima;

- No additional significant energy quantities are required to prepare the renewable CO_2 from biomass processing for use in the production of inorganic compounds (related CO_2 emissions are below 1% of total emission reduction);
- All Carbon in the produced inorganic compounds stems from the CO_2 supplied during the production process.

AM0032: Methodology for waste gas or waste heat based cogeneration system (1, 4)

The methodology is applicable under the following conditions:

- The project activity is cogeneration of steam and electricity utilizing waste gas or waste heat (henceforth referred to as waste gas) as a fuel source;
- The cogeneration plant is installed at the site where waste gas (WG) is produced;
- The waste gas used for cogeneration is surplus and not required to meet on-site energy requirement of the industrial unit where waste gas is produced. The energy generated at the cogeneration plant is primarily for export to user(s) (also referred to as recipient plant(s));
- On-site use of the energy generated by the cogeneration plant, if any, shall not be considered for claiming certified emissions reductions (CERs).

An agreement is signed by the owner's of the project cogeneration plant (henceforth referred to as generator) with the recipient plant(s) that the emission reductions would not be claimed by recipient plant(s) for using a zero-emission energy source.

AM0033: Use of non-carbonated calcium sources in the raw mix for cement processing (4)

This methodology is applicable to project activities in the cement industry, which is to switch a part of raw material used for clinker production to a non-carbonated calcium sources from limestone and clay that would otherwise continue to be used during the crediting period.

The methodology is applicable under the following conditions:

- CO_2 emissions reductions relate to CO_2 generated from decarbonisation of raw materials (typically $CaCO_3$ and $MgCO_3$) and are unrelated to the CO_2 emissions generated from fossil fuel burning
- Usual raw materials (limestone and clay) used as a raw material for clinker production are partially replaced by non-carbonated calcium sources, where non-carbonated raw materials availability in the region (defined as the area including at least the ten cement plants nearest to the plant of the project activity) or country is such that leakages in other uses of these non-carbonated raw materials will not occur
- Type and quality of produced clinker remain the same in both baseline and project cases
- GHG emissions intensity from energy use for clinker production cannot increase with the implementation of the project activity

AM0036: Fuel switch from fossil fuels to biomass residues in boilers for heat generation (1,4)

The methodology is applicable to project activities that switch from use of fossil fuels to biomass residues, in existing and, where applicable new, boilers. The methodology is applicable to project activities described in Table 1.

Table 1. Project activities eligible for use of this methodology

<Scenario 1> Retrofit of existing boilers.

The project activity is the retrofit of (an) existing boiler(s). The retrofit is made to the boiler(s) to enable (a) the use of biomass residues or (b) an increase in the use of biomass residues beyond historical levels, which would not be technically possible in any of the existing boilers without a retrofit or replacement of the boilers.

<Scenario 2> Replacement of existing boilers.

The project activity involves the replacement of (an) existing boiler(s) by new boiler(s) that fire(s) mainly or solely biomass residues (some fossil fuels may be co-fired). The replacement shall (a) enable the use of biomass residues or (b) enable an increase in the use of biomass residues beyond historical levels, which would not be technically possible in any of the existing boilers without a retrofit or replacement of the boilers.

<Scenario 3> Installation of new boilers.

The project activity is to increase of the heat generation capacity by installation of new boilers(s) that fire(s) mainly or solely biomass residues (some fossil fuels may be co-fired). The use of biomass residues or an increase in the use of biomass residues beyond historical levels would not be technically possible without a retrofit or replacement of the existing boiler(s) or the installation of a new boiler. The procedure to determine the most plausible baseline scenario results in that the same fossil fuel type(s), as used in the existing boiler(s), would be used in the new boiler(s) in the absence of the CDM project activity. The use of biomass residues in the new boiler(s) involves a significant additional capital investment in either a new dedicated biomass supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes) or in the boiler (i.e. enabling the use of biomass residues instead of fossil fuels).

<Scenario 4> Installation of new boilers and retrofit and/or replacement of existing boilers.

The project activity involves :

(a) increase the heat generation capacity by installation of new boiler(s) that fire(s) mainly or solely biomass residues (some fossil fuels may be co-fired); and

(b) the retrofit of (an) existing boiler(s) and/or the replacement of (an) existing boiler(s) by new boiler(s) that fire(s) mainly or solely biomass residues (some fossil fuels may be cofired).

The use of biomass residues or an increase in the use of biomass residues beyond historical levels would not be technically possible without a retrofit or replacement of the existing boiler(s) or the installation of a new boiler. The

procedure to determine the most plausible baseline scenario results in that the same fossil fuel type(s) as used in the existing boiler(s) would be used in the new boiler(s) in the absence of the CDM project activity. The use of biomass residues in the new boiler(s) involves a significant additional capital investment in either a new dedicated biomass supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes) or in the boiler (i.e. enabling the use of biomass residues instead of fossil fuels).

The project activity may be based on the operation of (a) heat generation boiler(s):

- In an agro-industrial plant generating the biomass residues, which is used in the activity; or
- In an independent plant where the biomass residues are procured from the nearby area or a market.

The methodology is applicable under the following conditions:

- The heat generated in the boiler(s) is
  + Not used for power generation; or
  + If power is generated with heat from the boilers, it is not increased as a result of the project activity, i.e,
    (a) site, the power generation capacity installed remains unchanged due to the implementation of the project activity and this power generation capacity is maintained at the pre-project level throughout the crediting perio; and
    (b) the annual power generation during the crediting period is not more than 10% larger than the highest annual power generation in the most recent three years prior to the implementation of the project activity.
- The use of biomass residues or increasing the use of biomass residues beyond historical levels is technically not possible at the project site without a significant capital investment in
  + Either the retrofit or replacements of existing boilers or the installation of new boilers;
  + Or in a new dedicated biomass supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes).
- Existing boilers at the project site have used no biomass or have used only biomass residues (but no other type of biomass) for heat generation during the most recent three years*[1] prior to the implementation of the project activity.

  *1: If the three most recent historical years prior to the implementation of the project activity are not representative for the situation at the project site (e.g. a drought in one year, a boiler or plant not operating during a certain year for technical reasons, etc), project participants may alternatively select the five most recent historical years from which one year may be excluded if deviating significantly from other years. The selection by project participants should be documented in the CDM-PDD and be applied to all relevant provisions and equations throughout this methodology in a consistent manner, including the applicability condition.
- No biomass types other than biomass residues, as defined above, are used in the boiler(s) during the crediting period (some fossil fuels may be co-fired);
- For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;
- The biomass residues used at the project site, site where the project activity is implemented, should not be stored for more than one year;
- No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology.
- The biomass residues are directly generated at the project site or transported to the project site by trucks.
- In case of project activities that involve the replacement or retrofit of existing boiler(s), all boiler(s) existing at the project site prior to the implementation of the project activity should be able to operate until the end of the crediting period without any retrofitting or replacement, i.e. the remaining technical lifetime of each existing boiler should at the start of the crediting period be larger than the duration of the crediting period (7 or 10 years as applicable). For the purpose of demonstrating this applicability condition, project participants should determine and document the typical average technical lifetime of boilers in the country and sector in a conservative manner, taking into account common practices in the sector and country. This may be done based on industry surveys, statistics, technical literature, historical replacement records of boilers in the company, etc. The age of the existing boiler(s) and the average technical lifetime of boilers in the country and sector should be documented in the CDM-PDD.

Furthermore, this methodology is only applicable if the most plausible baseline scenario(s):

- For heat generation is either case H2 or case H5; and
- For the use of biomass residues is case B1, B2, B3, B4 and/or B5. If case B5 is the most plausible scenario, the methodology is only applicable if:
  a) The plant where the biomass residues would be used as feedstock in the absence of the project activity can be clearly identified throughout the crediting periods; and
  b) The fuels used as substitutes for the biomass residues at that plant can be monitored by project participants.

The applicability conditions outlined in the latest available version of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site", in addition to the above listed applicability conditions, apply if:

- CH4 emissions, from the treatment of biomass residues, in the baseline are included; and
- Where case B2 is identified as the most plausible baseline scenario for the use of biomass residues.

AM0037: Flare reduction and gas utilization at oil and gas processing facilities (5,10)

The methodology is applicable to project activities that recover tail gas from oil and natural gas processing facilities that was previously flared and utilize this tail gas for productive uses (e.g., as a fuel or a feedstock).
The following conditions apply to the methodology:

- Tail gas from an oil or natural gas processing facility, used by the project activity, was flared (not vented for the last 3 years, prior to the start of the project, or as long as the processing facility has been in operation.
- Previously-flared tail gas from an oil or natural gas processing plant is used to produce useful energy or a useful product (e.g. methanol, ethylene, or ammonia). The surplus tail gas substitutes the same type of fuels/feedstock or fuel/feedstock with a higher CO_2 equivalent emissions impact.
- If the tail gas is used as a feedstock in a new facility, the production of the useful products (e.g. methanol, ethylene, etc.) by the project activity does not lead to displacement of production in a new plant that would be built in the absence of the project activity in an Annex I country; and would emit more than 1% of the emissions due to flaring of the tail gas in the baseline situation. The project participants can use market studies of the useful product, interviews with appropriate experts, analysis from research institutes with expertise the market for that useful product, etc. to demonstrate that such a displacement of production in Annex I country is highly unlikely to occur.
- The use of the tail gas by the project activity will not lead to an increase in fuel consumption outside of the project boundary.
- Energy requirements for the project activity are primarily met using the previously-flared tail gas. If additional fossil fuel is required for the project activity, these emissions should be counted as project emissions.
- Accurate data on the quantity and carbon content on the tail gas are available.

AM0038: Methodology for improved electrical energy efficiency of an existing submerged electric arc furnace used for the production of SiMn (9)

This methodology is applicable if the following conditions are met:

- Submerged electrical arc furnaces is used for production of silicomanganese (SiMn) both in the project case and baseline;
- The electricity consumed, both in the project case and the baseline, by the submerged electric arc furnace is sourced from the grid and not by onsite generation.
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;
- The quality of the raw material and SiMn produced is not affected by the project activity and remains unchanged;
- The local regulations/programs do not cap the level of grid electricity that can be procured by the SiMn production facility where the project activity is implemented;
- Data for at least three years preceding the implementing the project activity is available to estimate the baseline emission.
- Emission reduction credits shall be claimed only until the end of the lifetime of the equipment;
- The project activity does not result in increase of in production capacity of the SiMn production facility, where the project is implemented, during the crediting period.

The following approaches should be taken into account to estimate the remaining lifetime of the existing equipment or its parts:

(a) The typical average technical lifetime of the equipment, taking into account common practices in the sector, e.g., based on industry surveys, statistics, technical literature, etc.
(b) The practices regarding replacement schedules, e.g. based on historical replacement records for similar equipment.

The lifetime of the equipment will be documented and validated by the DOE. The remaining lifetime of the existing equipment should be chosen in conservative manner, i.e., the smallest value of remaining lifetime should be chosen in cases where the life time estimated as a time range rather than single value.
If the project activity is implemented in a number of electric arc furnaces, which produce SiMn, as part of a program, the methodology is applicable to the program as a whole. However all of the requirements (baseline determination, additionality, etc.) shall be applied to and should be fulfilled by each individual electric arc furnace covered under the program.

AM0040: Methodology for project activities using alternative raw materials that contain carbonates in clinker manufacturing in cement kilns (4)

This methodology is applicable to cement industry projects that reduce CO_2 emissions in cement kilns by using alternative raw materials in clinker manufacturing. The alternative raw materials for clinker manufacturing (AMC) are defined as any mineral or synthetic substances or compounds that are obtained from mining, transformation or as by-products of other industrial processes that chemically react with commonly used raw materials for clinker production. These alternative raw materials could include, among others: waste ash from fuel combustion in thermal power plants, blast furnace slag, gypsum, anhydrite, and fluorite etc. that are not used in normal production conditions. The use of alternative raw materials in clinker manufacturing may also result in the reduction of CO_2 emissions due to the reduction in consumption of raw materials and/or consumption of energy (fuels and electricity).
This methodology is applicable under the following conditions:

- Use of alternative raw materials partially substitutes calcium and/or magnesium carbonate contents in raw material for clinker manufacturing.
- Use of alternative materials shall increase neither the capacity of clinker production nor the lifetime of equipment.
- Alternative raw materials have never been used in the clinker manufacturing facility prior to the implementation of the project activity.
- The quantity of alternative materials available shall be at least 1.5 times the quantity required for meeting the demand of all existing users consuming the same alternative raw materials in the project area, i.e. the total quantity required for the project as well as other users of the alternative raw materials. Project area in this context is defined as the area within a radius of 200km around the project activity.
- There is sufficient historical information about the clinker manufacturing facility, the raw materials used, and energy performance of the kiln.

This methodology is **not applicable** for the following activities:

- Energy efficiency initiatives for improvements in process equipment (up-grade towers, grinding separators, burners, expert control systems, etc.).
- Fuel switching.

NOTE: The quantity of clinker used for manufacturing new varieties of cement following project implementation is excluded from calculation of emissions, since these new varieties do not belong to the common-practice cement category.

(iv) Projects involving other GHGs (HFC, N_2O and PFC)

AM0001: Incineration of HFC 23 waste streams, Version 04 (11)

This methodology is applicable to HFC 23 (CHF_3) waste streams from an existing HCFC22 production facility where the project activity occurs,

1. with at least three (3) years of operating history between beginning of the year 2000 and the end of the year 2004; and
2. where no regulation requires the destruction of the total amount of HFC23 waste.

AM0021: Methodology for decomposition of N_2O from existing adipic acid production plants (5)

This methodology is applicable to projects which decomposes N_2O from adipic acid production plants under the following conditions:

- Either catalytic or thermal decomposition of the N_2O by-product of adipic acid production at existing production plants.
- The methodology is spatially generic, being applicable across regions where the data (both related to baseline and project activity as well) exist to undertake the assessments.
- The methodology is applicable only for installed capacity (measured in tonnes of adipic acid per year) that exists by the end of the year 2004.

AM0028: Catalytic N_2O destruction in the tail gas of Nitric Acid or Caprolactam Production Plants, Version 02 (5)

The proposed methodology is applicable to project activities that destroy N_2O emissions either by catalytic decomposition or catalytic reduction of N_2O in the tail gas of nitric acid or caprolactam production*[1] plants (*i.e.* tertiary destruction), where the following conditions apply:

*1: Caprolactam Production Plants including the ammonia oxidation reactor (AOR) where N_2O is generated.

- The applicability is limited to the existing production capacity measured in tonnes of nitric acid or caprolactam. Definition of "existing" production capacity is applied for the process with the existing ammonia oxidization reactor where N_2O is generated and not for the process with new ammonia oxidizer. Existing production "capacity" is defined as the designed capacity, measured in tons of nitric acid or caprolactam per year, installed no later than 31 December 2005.
- Existing caprolactam plants are limited to those employing the Raschig process not using any external sources of nitrogen compounds other than feed ammonia.
- The project activity will not result in shut down of an existing N_2O destruction or abatement facility at the nitric acid or caprolactam production plant;
- The project activity shall not affect the nitric acid or caprolactam production level;
- The project activity will not cause an increase in NO_X emissions;
- In case a $DeNO_X$ unit is already installed prior to the start of the project activity, the installed $DeNO_X$ is a Selective Catalytic Reduction (SCR) $DeNO_X$ unit;
- The N_2O concentration in the flow at the inlet and the outlet of the catalytic N_2O destruction facility is measurable.

AM0030: PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities (9)

This methodology is applicable to project activities:

- Primarily aimed at the avoidance of PFC emissions*[1] in Aluminium smelting facilities that use center work pre-bake cell technology with bar brake (CWPB) or point feeder systems (PFPB);

*1: In contrast to activities primarily aiming at increasing aluminium production, with emission avoidance as a sideeffect.

- At Aluminium smelting facilities that started operations before 31 December 2002;
- Where at least three years of historical data are available regarding current efficiency, anode effect and Aluminium production of the industrial facility from 31 December 2002 onwards or, in case of project activities with a starting date before 31 December 2005, from 3 years prior to the implementation of the project activity onwards, until the starting date of the project activity.
- At facilities where the existing number of potlines and pots within the system boundary is not increased during the crediting period. The methodology is only applicable up to the end of the lifetime of existing potlines if this is shorter than the crediting period.
- Where it is demonstrated that, due to historical improvements carried out, the facility achieved an "operational stability associated to a PFC emissions level" that allows increasing the Aluminium production by simply increasing the electric current in the pots". This can be demonstrated for example by providing results of pilot tests carried out by the company.

AM0034: Catalytic reduction of N_2O inside the ammonia burner of nitric acid plants (5)

This methodology is applicable to project activities that install a secondary N_2O abatement catalyst inside the ammonia burner of a nitric acid plant, underneath the precious metal gauze pack. The methodology is applicable under the following conditions apply:

- The applicability is limited to existing nitric acid production facilities installed no later than 31 December 2005.
- The project activity will not result in the shut down of any existing N_2O destruction or abatement facility or equipment in the plant;
- The project activity shall not affect the level of nitric acid production
- There are currently no regulatory requirements or incentives to reduce levels of N_2O emissions from nitric acid plants in the host country.
- No N_2O abatement technology is currently installed in the plant.
- The project activity will not increase NO_X emissions.
- NO_X abatement catalyst installed, if any, prior to the start of the project activity is not a Non- Selective Catalytic Reduction (NSCR) DeNOX unit.
- Operation of the secondary N_2O abatement catalyst installed under the project activity does not lead to any process emissions of greenhouse gases, directly or indirectly.
- Continuous real-time measurements of N_2O concentration and total gas volume flow can be carried out in the stack:
  + Prior to the installation of the secondary catalyst for one campaign, and
  + After the installation of the secondary catalyst throughout the chosen crediting period of the project activity

AM0035: SF_6 Emission Reductions in Electrical Grids (1,11)

The methodology is applicable to project activities:

- To recycle SF_6 and/or reduce SF_6 leaks implemented at an electric utility;
- Implemented either in the entire electrical grid or a verifiable distinct geographic portion of an electrical grid of the electric utility;
- Where documented proof is available to confirm that reduction in emissions of SF_6 from replaced or repaired equipment is not claimed by any other CDM project. The DOE shall verify the documentation at validation as well as at verification.

(v) Projects involving transportation

AM0031: Baseline Methodology for Bus Rapid Transit Projects (7)

The methodology is applicable to project activities that reduce emissions through the construction and operation of a Bus Rapid Transit (BRT) system for urban road based transport. The methodology is also applicable for extensions or expansions of existing BRT systems (adding new routes and lines).

The following applicability conditions apply:

- The project has a clear plan to reduce existing public transport capacities either through scrapping, permit restrictions, economic instruments or other means and replacing them by a BRT system.
- Local regulations do not constrain the establishment or expansion of a BRT system
- The fuel(s) used in the baseline and/or project case are unblended*[1] gasoline, diesel, LNG or CNG.

  *1: Less than 3 % fuel additive is permitted

  Projects using biofuels either in the baseline or project case are not eligible to use this methodology*[2].

  *2: Project participants wishing to consider biofuels may propose a revision to this methodology
- The BRT system as well as the baseline public transport system and other public transport options are road-based (the methodology excludes rail, air and water-based systems from analysis).
- The BRT system partially or fully replaces a traditional public transport system in a given city. The methodology cannot be used for BRT systems in areas where currently no public transport is available.
- The methodology is applicable if the analysis of possible baseline scenario alternatives leads tothe result that a continuation of the current public transport system is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases (GHG) that would occur in the absence of the proposed project activity

(i.e. the baseline scenario).

Source: approved methodologies
(available on CDM web site: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.htm)

Appendix 2 Applicability of approved A/R methodologies

ARAM0001: Reforestation of degraded land, Version 02

This methodology is applicable to project activities with the following conditions:

- The project activity does not lead to a shift of pre-project activities outside the project boundary, i.e. the land under the proposed A/R CDM project activity can continue to provide at least the same amount of goods and services as in the absence of the project activity;
- Lands to be reforested are severely degraded with the vegetation indicators (tree crown cover and height) below thresholds for defining forests, as communicated by the DNA consistent with decision 11/CP.7 and 19/CP.9, and the lands are still degrading;
- Environmental conditions and human-caused degradation do not permit the encroachment of natural forest vegetation;
- Lands will be reforested by direct planting and/or seeding;
- Site preparation does not cause significant longer term net emissions from soil carbon;
- Plantation may be harvested with either short or long rotation and will be regenerated either by direct planting or natural sprouting;
- Carbon stocks in soil organic matter, litter and deadwood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario;
- Grazing will not occur within the project boundary in the project case;
- The application of the procedure for determining the baseline scenario in section II.4 leads to the conclusion that the baseline approach 22(a) (existing or historical changes in carbon stocks in the carbon pools with the project boundary) is the most appropriate choice for determination of the baseline scenario and that the land would remain degraded in the absence of the project activity.

ARAM0002: Restoration of degraded lands through afforestation/reforestation

This methodology is applicable to project activities with the following conditions:

- The project activity does not lead to a shift of pre-project activities outside the project boundary, i.e. the land under the proposed A/R CDM project activity can continue to provide at least the same amount of goods and services as in the absence of the project activity;
- Lands to be reforested are severely degraded (due to such agents as soil erosion, land slides, or other physical constraints as well as anthropogenic actions) and the lands are still degrading;
- Environmental conditions or anthropogenic pressures do not permit significant encroachment of natural tree vegetation;
- Grazing will not occur within the project boundary in the project case;
- The application of the procedure for determining the baseline scenario in section II.4 leads to the conclusion that the baseline approach 22(a) (existing or historical changes in carbon stocks in the carbon pools with the project boundary) is the most appropriate choice for determination of the baseline scenario and that the land would remain degraded in the absence of the project activity.

ARAM0003: Afforestation and reforestation of degraded land through tree planting, assisted natural regeneration and control of animal grazing, Version 02

This methodology is applicable to the following project activities:

- Afforestation or reforestation of degraded land, which is subject to further degradation or remains in a low carbon steady state, through assisted natural regeneration, tree planting, or control of pre-project grazing and fuelwood collection activities (including on-site charcoal production).

The conditions under which the methodology is applicable are:

- The project activity can lead to a shift of pre-project activities outside the project boundary, e.g. a displacement of grazing and fuelwood collection activities, including charcoal production;
- Lands to be afforested or reforested are severely degraded and the lands are still degrading or remain in a low carbon steady state;
- Environmental conditions or anthropogenic pressures do not permit the encroachment of natural tree vegetation that leads to the establishment of forests according to the threshold values of the national definition of forest for CDM purposes;

- Lands will be afforested or reforested through promotion of natural regeneration and or direct planting or seeding; - Site preparation does not cause significant longer term net decreases of soil carbon stocks or increases of non-CO_2 emissions from soil; - Carbon stocks in soil organic carbon, litter and dead wood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario; - Flooding irrigation is not permitted; - Soil drainage and disturbance are insignificant, so that non CO_2-greenhouse gas emissions from this type of activities can be neglected; - The amount of nitrogen-fixing species (NFS) used in the AR CDM project activity is not significant, so that greenhouse gas emissions from denitrification can be neglected in the estimation of actual net greenhouse gas removals by sinks; - The AR CDM project activity is implemented on land where there are no other on-going or planned AR activities.
ARAM0004: Reforestation or afforestation of land currently under agricultural use
This methodology is applicable to the following project activities: - Afforestation or reforestation of degraded land, which is subject to further degradation or remains in a low carbon steady state, through assisted natural regeneration, tree planting, or control of pre-project grazing and fuel-wood collection activities (including in-site charcoal production). - The project activity can lead to a shift of pre-project activities outside the project boundary, e.g. a displacement of agriculture, grazing and/or fuel-wood collection activities, including charcoal production; The conditions under which the methodology is applicable are: - Lands to be afforested or reforested are degraded and the lands are still degrading or remain in a low carbon steady state. - Site preparation does not cause significant longer term net decreases of soil carbon stocks or increases of non-CO_2 emissions from soil. - Carbon stocks in soil organic carbon, litter and dead wood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario. - Flooding irrigation is not permitted; - Soil drainage and disturbance are insignificant, so that non CO_2-greenhouse gas emissions from this these types of activities can be neglected; - The amount of nitrogen-fixing species (NFS) used in the AR CDM project activity is not significant, so that greenhouse gas emissions from denitrification can be neglected in the estimation of actual net greenhouse gas removals by sinks. - The AR CDM project activity is implemented on land where there are no other on-going or planned AR activities (no afforestation/reforestation in the baseline).

Source: approved A/R methodologies
(available on CDM web site: http://cdm.unfccc.int/methodologies/ARmethodologies)

Appendix 3: Application of baseline methodology: ACM0001 version 04

ACM0001 "Consolidated baseline methodology for landfill gas project activities" (version 04) is widely applied for landfill gas capture and utilization projects. Here, it is illustrated how ACM0001 is being applied in the PDD, based on the PDDs of some registered CDM project activities[23].

Applicability

This methodology is applicable to landfill gas capture project activities where the baseline scenario is the partial or total atmospheric release of the gas.

The project activities include situations such as:

(a) The captured gas is flared; or

(b) The captured gas is used to produce energy (e.g. electricity/thermal energy), but no emission reductions are claimed for displacing or avoiding energy from other sources; or

(c) The captured gas is used to produce energy (e.g. electricity/thermal energy), and emission reductions are claimed for displacing or avoiding energy generation from other sources. In this case a baseline methodology for electricity and/or thermal energy displaced shall be provided or an approved one used, including the ACM0002 "Consolidated Methodology for Grid-Connected Power Generation from Renewable". If capacity of electricity generated is less than 15MW, and/or thermal energy displaced is less than 54 TJ (15GWh), small-scale methodologies can be used.

For the purpose of illustration, the following four registered CDM project activities have been selected as examples of how ACM0001 is applied. The following summarizes the characteristics of those projects.

1. Meizhou Landfill Gas Recovery Utilization as Energy (Document Version 05, 2005/11/01)

Project activity	*Landfill gas collection and utilization activities of the eight landfills in the Meizhou City, Guangdong province, the People's Republic of China.*
Landfill status	*Total Municipal Solid Waste collection: 1,160 t/d (2004 average). 9% Increase per annum.*
Energy production	*Electricity generation for export to the grid or landfill local site use. Emission reductions due to displaced grid electricity will not be claimed for the first seven years.*

2. Landfill Gas Extraction and Utilization at the Matuail landfill site Dhaka, Bangladesh

Project activity	*Landfill gas extraction and utilization with electricity generation at the Matuail landfill site near Dhaka, the Peoples Republic of Bangladesh*
Landfill status	*Total waste in t/y: 429,900(1994) – 635,500 (2005) – 431,100 (2008 onwards)*
Energy production	*Electricity generation for export to the grid.*

3. Bandeirantes Landfill Gas to Energy Project (BLFGE) (Version 2B, dated December 04, 2005)

Project activity	*Landfill gas extraction and utilization with electricity generation at the Bandeirantes landfill, near Sao Paulo, Brazil.*
Landfill status	*Older parts have already been closed and newer parts are still accepting wastes. Waste disposal in the newer parts: 1.8-1.9 million tonnes/years (1996-2006)*
Energy production	*Electricity generation for export to the grid: 22MW installed capacity*

4. Hiriya Landfill Project (Version 3, 11 November 2005)

Project activity	*Landfill gas collection and flaring at the Hiriya landfill, Dan Region, Israel.*
Landfill status	*Closed in 1998.*
Energy production	*Collected gas may be used for burning in boilers, but no CERs are claimed.*

Note) Above information is based on the publicly available CDM-PDDs of the registered projects. The project activities have been selected considering regional distribution.

[23] The registered CDM project activities may be applying earlier versions of ACM0001.

Appendix 3 Application of baseline methodology: ACM0001 version 04

Baseline

The baseline is the atmospheric release of the gas. The baseline methodology considers that some of the methane generated by the landfill may be captured and destroyed to comply with regulations or contractual requirements, or to address safety and odour concerns.

The baseline is usually described in the PDDs as the continuation of the current practice, often called the business as usual (BAU) scenario. This corresponds to a situation where landfill gas is neither collected, flared nor utilized, except for partial collection and flaring.

Examples of baseline description:

- The landfill operator could continue the current business as usual practice of not collecting and utilizing or flaring landfill gas from his waste operations. Uncontrolled LFG emissions are expected occur from the landfills until the organic component of the MSW is completely decomposed anaerobically. This is expected to continue for about 30 years after the site is closed. In this case, no power would be generated at the sites. (BAU scenario)
- Continuation of the current practice (landfill gas recovery does not take place and no electricity generation will occur)
- The baseline scenario is the atmospheric release of the methane generated, with some gas being destroyed to comply with regulations or contractual requirements. In fact, prior to GLFGE operation, some landfill gas was burned inefficiently at some well's heads. This amount has been estimated to be around 20% of the gas captured by the passive venting system in place.

Additionality

The additionality of the project activity shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM Executive Board, which is available on the UNFCCC CDM web site.

(Step 0 is not explained here as it only pertains to project activities with crediting period starting prior to the registration.)

Step 1 Identification of alternatives to the project activity consistent with current laws and regulations

In Sub-step 1a, project participants must define realistic and credible alternatives to the project activity, which are available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity.

Typically, the following scenarios are presented for project activities applying ACM0001.

- Continuation of the current practice (BAU scenario)
- The project activity undertaken not as a CDM project activity (project scenario)

Other possible alternatives would include, for example,

- Different use of landfill gas on-site
- Different use of landfill gas off-site
- A modified amount of landfill gas is extracted

From list of alternatives, all of the PDDs taken as examples narrow down the list of plausible alternatives to the BAU and project scenarios.

Step 2 Investment Analysis and Step 3 Barrier Analysis

According to the additionality tool, project participants can apply either Step 2 Investment Analysis or Step 3 Barrier Analysis. If they wish, project participants can choose to apply both steps.

Step 2 is applied in all four example cases, as this type of projects usually brings considerable financial benefits. In one case, the simple cost analysis is chosen as the appropriate analysis method in Step 2a, whereas the other three cases opt for the benchmark analysis. The simple cost analysis can be applied when the only financial benefit of the project activity is the CER revenue. In other words, project activities that only collect and flare landfill gas can apply the simple costs analysis method. Project activities that involve electricity generation or sale of produced landfill gas should apply either the benchmark analysis or the investment comparison analysis. In the three cases that apply the benchmark

analysis, government bond rates or interest rates provided by local banks are used as the benchmark value.

Two of the example PDDs apply Step 3 as well, considering technical barriers, mechanism barriers, policy barriers and organization and implementation barriers. Availability of securing necessary financial resources is also listed as one of the barriers.

Step 4 Common practice analysis

Step 4 requires project participants to identify and discuss the existing common practice through (1) providing an analysis of any other activities implemented previously or currently underway that are similar to the proposed project activity, and (2) if similar activities are identified, demonstrating why the existence of these activities does not contradict the claim that the proposed project activity is financially unattractive or subject to barriers.

In all four cases, the PDDs simply make a statement that there are no or limited occurrences of similar activities in the host country. Only one PDD provides a list of landfills in the host country with an indication if those landfills have gas collection system in place or not.

Step 5 Impact of CDM registration

In Step 5, project participants should explain how the approval and registration of the project activity as a CDM activity will alleviate the economic and financial hurdles or other identified barriers and thus enable the project activity to be undertaken. All of the example PDDs state that CER revenues alleviate, in different degrees, the financial barrier that project participants argued to exist in Step 2. In some cases, additional benefits, such as technology transfer, are claimed.

Emission Reduction

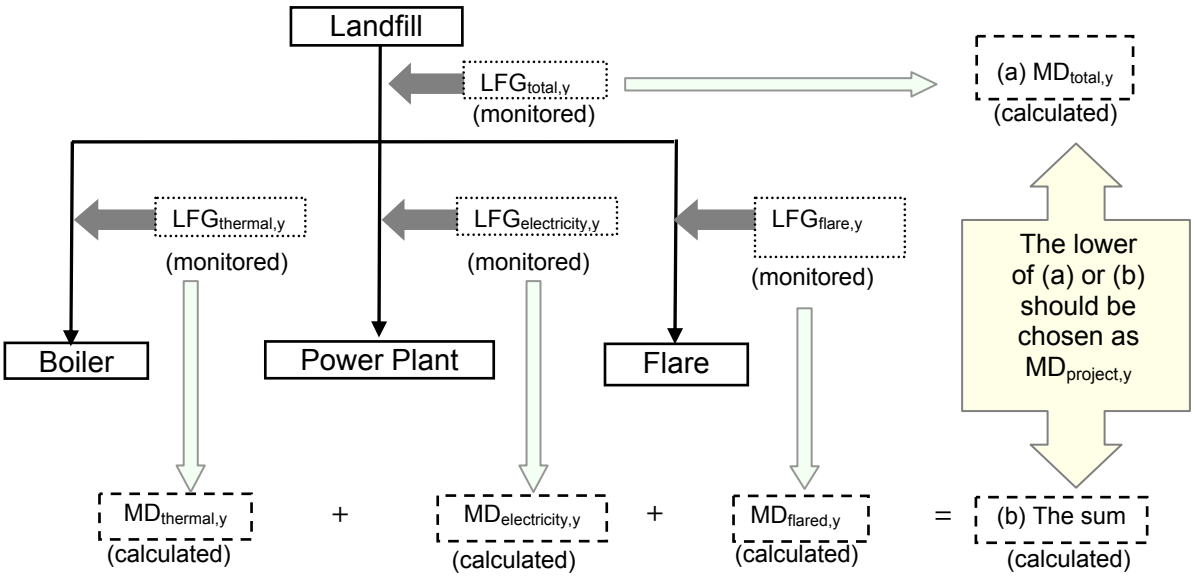
The greenhouse gas emission reductions achieved by the project activity during a given year "y" (ERy) are estimated as follows:

$$ER_y = (MD_{project,y} - MD_{reg,y}) \times GWP_{CH4} + EL_y \times CEF_{electricity,y} - ET_y \times CEF_{thermal,y}$$

(1) (2) (3) (4) (5) (6) (7)

(1) $MD_{project,y}$ the amount of methane that would have been destroyed/combusted during the year (Unit: tCH_4)

The following diagram shows how $MD_{project,y}$ is to be determined ex post by metering the actual quantity of methane captured and destroyed once the project activity is operational.



Here, $MD_{total,y}$, $MD_{flared,y}$, $MD_{electricity,y}$ and $MD_{thermal,y}$ are calculated based on monitored flow of landfill gas at different points, i.e. $LFG_{total,y}$, $LFG_{flare,y}$, $LFG_{electricirty,y}$ and $LFG_{thermal,y}$, using the following formula.

$MD_{total,y}=LFG_{total,y} \times W_{CH4,y} \times D_{CH4}$

$MD_{electricity,y}= LFG_{electricirty,y} \times w_{CH4,y} \times D_{CH4}$

$MD_{thermal,y}= LFG_{thermal,y} \times w_{CH4,y} \times D_{CH4}$

$MD_{flared,y} = LFG_{flare,y} \times w_{CH4,y} \times D_{CH4} \times FE$

$w_{CH4,y}$: Average methane fraction of the landfill gas as measured during the year(in m^3CH_4 / m^3LFG)

D_{CH4}: Methane density (tCH_4/m^3CH_4)

$MD_{project,y}$ should be chosen as the lower value of $MD_{total,y}$ or the sum of $MD_{flared,y}$, $MD_{electricity,y}$, and $MD_{thermal,y}$. When the sum of $MD_{flared,y}$, $MD_{electricity,y}$, and $MD_{thermal,y}$ is lower, then the hours where the energy plant and the boiler are working should be monitored and no emission reduction could be claimed for methane destruction in the energy plant or the boiler when they are not working.

Calculation of $MD_{flared,y}$ using flare efficiency (FE)

The flare efficiency shall be calculated as product of (i) fraction of time the gas is combusted in the flare; and (ii) the efficiency of the flaring process. Efficiency of the flaring process is defined as fraction of methane completely oxidized by the flaring process.

$MD_{flared,y} = LFG_{flare,y} \times w_{CH4,y} \times D_{CH4} \times FE$

If an enclosed flare is used, the project participants shall measure and quantify the efficiency of the flare (% of methane completely oxidized by combustion in the flare) on a yearly basis, with the first measurement to be made at the time of installation. The measured value of the efficiency of the flare shall be applicable for the period up to the next measurement. In case the yearly measurement of efficiency of the flare is not performed, the efficiency of the flare shall be a default value of 90%. If the last measured value of the efficiency of the flare is lower than 90%, then the last lower measured value shall be used.

For open flares, if the efficiency of the flare is not measured, a conservative destruction efficiency factor of 50% should be used.

The flare efficiency (FE) shall be measured as the fraction of time in which the gas is combusted in the flare multiplied by the efficiency of the flaring process. For this purpose, the methane content of the flare emissions should be analysed at least quarterly, and where necessary more frequently, in order to determine the fraction of methane destroyed within the flare.

In the monitoring methodology, FE is a compound of the following two monitoring items:

Data variable	*Recording frequency*	*Comment*
(1) Flare / combustion efficiency, determined by the operation hours	*Continuously*	*1) The flare operation shall be continuously monitored by continuous measurement of operation time of flare using a run time meter connected to a flame detector or a flame continuous temperature controller, irrespective of whether the flare efficiency is monitored.*
(2) Methane content in the exhaust gas	*Open flares shall be monitored quarterly, monthly if unstable. Enclosed flares shall be monitored yearly, with the first measurement to be made at the time of installation.*	*2) Periodic measurement of methane content of flare exhaust gas.*
		3) The enclosed flares shall be operated and maintained as per the specifications prescribed by the manufacturer.

(2) $MD_{reg,y}$ *The amount of methane that would have been destroyed/combusted during the year in the absence of the project. (Unit: tCH_4)*

In the case where the $MD_{reg,y}$ *is given/defined as a quantity that quantity will be used.*
In cases where regulatory or contractual requirements do not specify MDreg,y *an "Adjustment Factor" (AF) shall be used and justified, taking into account the project context.*

$MD_{reg,y} = MD_{project,y} X \quad AF$

The following examples provide guidance on how to estimate AF:

- *In cases where a specific system for collection and destruction of methane is mandated by regulatory or contractual requirements, the ratio of (1) the destruction efficiency of the system mandated by regulatory or contractual requirements to (2) the destruction efficiency of the system used in the project activity shall be used.*
- *In cases where a specific percentage of the "generated" amount of methane to be collected and destroyed is specified in the contract or mandated by regulations, this percentage divided by an assumed efficiency for the collection and destruction system used in the project activity shall be used.*

Following are some examples of application of Adjustment Factor (AF):

Case	*AF*	*Justification*
1.	*0%*	*Meizhou landfills do not have any contractual requirements to do the landfill gas collection. All the eight landfill sites in this Project emit all gas produced in the waste dumps to the atmosphere.* *An AF of 0% will be used to account for any self burning that may occur at Meizhou, or at similar landfills in China that are not CDM projects. In the monitoring plan, it is stipulated if the situation changes for similar landfills, the AF will be increased to take the changed situation into consideration.*
2.	*0%*	*1: In the Mauail landfill situation currently no measures are in place to capture or destroy methane produced.* *2: In Bangladesh no policies or regulations or contractual requirements what so ever are in place that oblige landfill operators to capture or destroy methane. AF will be evaluated at the beginning of each crediting period.*
3.	*20%*	*Prior to BLFGE operation, some landfill gas was burned inefficiently at some well's heads. This amount has been estimated to be around 20% of the gas captured by the passive venting system in place.* *Considering there is no regulatory or contractual requirement determining MDreg, an EAF of 20% is used in BLFGE's case.*
4.	*0%*	*This value is justified based on local regulations, which do not require flaring of any landfill gas in closed landfills. Although there is a recommendation to keep methane concentration in the surface of the landfill below 5%, this is not mandatory and does not require flaring (i.e. solutions such as venting could be adopted).*

(3) GWP_{CH4} *Global Warming Potential value for methane for the first commitment period: 21 (Unit: t-*CO_2*e/t-*CH_4*)*

(4) EL_y *Net quantity of electricity exported during year y. (Unit: MWh)*

$EL_y = EL_{EX,LFG} - EL_{IMP}$

$EL_{EX,LFG}$ *: Net quantity of electricity exported during year y, produced using landfill gas, in MWh.*

EL_{IMP} *: Net incremental electricity imported, defined as difference of project imports and any imports of electricity in the baseline, to meet the project requirements, in MWh*

(5)$CEF_{electricity,y}$ CO_2 *emissions intensity of the electricity displaced. This can estimated using either ACM0002 or AMSI.D, if the capacity is within the small scale threshold values, when grid electricity is used or displaced. (Unit: t-*CO_2*e/MWh)*

(6) ET_y *Incremental quantity of fossil fuel, defined as difference of fossil fuel used in the baseline and fossil use during project, for energy requirement on-site under project activity during year y. (Unit: TJ)*

(7) $CEF_{thermal,y}$ *CO_2 emissions intensity of the fuel used to generate thermal/mechanical energy. (Unit: t-CO_2e/TJ)*

Methods for the *ex ante* estimation of $MD_{project,y}$

Project proponents should provide an ex ante estimate of emissions reductions, by projecting the future GHG emissions of the landfill in the CDM-PDD. ACM0001 does not specify how to estimate this. A method used to estimate the yearly methane generation potential in the landfill in the simplified methodology for small-scale landfill methane recovery projects (AMS III.G. Version 03) is introduced here as an example. The quantity of methane projected to be formed during a given year is estimated using a fist order decay model based on the discrete time estimate method proposed in the IPCC Guidelines[24]. All of the example PDDs adopt the first order decay model for *ex ante* estimation of methane generation potential. In addition, the EB has approved a methodological tool to calculate baseline emissions of methane from waste that would in the absence of the project activity be disposed at solid waste disposal sites called the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" [EB26, Annex 14]. Although this tool is developed for methane avoidance project activities, project proponents of LFG capture project activities may make use of this tool for the ex ante estimation of emission reductions by such project activities.

$$MB_y = (16/12) \times F \times DOC_f \times MCF \times [{}_y\textstyle\sum_{x=1}][{}_D\textstyle\sum_{j=A}] A_{j,x} \times DOC_j \times (1-e^{-kj}) \times e^{-kj\,(y-x)}$$

where:

F	Fraction of methane in the landfill gas (default 0.5)
DOC_j	Per cent of degradable organic carbon (by weight) in the waste type j
DOC_f	Fraction of DOC dissimilated to landfill gas (IPCC default 0.77)
MCF	Methane Correction Factor (fraction, IPCC default 1.0)
$A_{j,x}$	Amount of organic waste type j landfilled in the year x (tones/year)
k_j	Decay rate for the waste stream type j
j	Waste type distinguished into the waste categories (from A to D), as illustrated in the table below
x	Year since the landfill started receiving wastes: x runs from the first year of landfill operation (x=1) to the year for which emissions are calculated (x=y)
y	Year for which LFG emissions are calculated

Table III.G.1. Waste stream decay rate (k_j) and associated IPCC default values for DOC_j

Waste stream A to E	***Per cent DOC_j (by weight)***	***Decay-rate (k_j)***
A. Paper and textiles	*40*	*0.023*
B. Garden and park waste and other (non-food) putrescibles	*17*	*0.023*
C. Food waste	*15*	*0.231*
D. Wood and straw waste [*1)]	*30*	*0.023*
E. Inert material	*0*	*0*

[*1)] Excluding lignin-C

The amount of organic waste type "j" landfilled in each year "x" (Aj,x) should be known. Alternatively, it can be considered as constant through the years. If the pre-existing amount and composition of the waste in the landfill are unknown, they can be estimated by comparison with other landfills with similar conditions at regional or national levels, using parameters related to the attended population. For projects in which the landfill will be operated during the crediting period, the waste amount and composition shall be monitored.

Project Boundary

The spatial extent of the project boundary is defined in ACM0001 as the site of the project activity where the gas is captured and destroyed/used.

[24] *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (IPCC, 2000)

The following GHG sources are to be accounted as project emissions:

- Possible CO_2 emissions resulting from combustion of other fuels than the methane recovered. Such emissions may include:
  - fuel combustion due to pumping and collection of landfill gas
  - fuel combustion for transport of generated heat to the consumer locations.
- Electricity required for the operation of the project activity, including transport of heat, should be accounted and monitored. Where the project activity involves electricity generation, only the net quantity of electricity fed into the grid should be used to account for emission reductions due to displacement of electricity in other power plants. Where the project activity does not involve electricity generation, project participants should account for CO_2 emissions by multiplying the quantity of electricity required with the CO_2 emissions intensity of the electricity displaced ($CEF_{electricity,y}$)

Appendix 4: Application of baseline methodology: ACM0002 version 06

This part explains the application of ACM 0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (version 06), focusing on the baseline emission factor calculation. Using two hypothetical cases as examples, the calculation of build margin (BM) and the operating margin (OM) emission factors are illustrated.

The project activity is grid-connected electricity generation from renewable energy sources. This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site. The geographic and system boundaries for the relevant electricity grid should be clearly identified and information on the characteristics of the grid should be available.

For project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following: Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described below. For project activities that modify or retrofit an existing electricity generation facility, a different baseline scenario applies, and the CM emission factor applies to project electricity generation above baseline levels.

According to ACM0002, the baseline emission factor is calculated as a combined margin (CM), consisting of the combination of build margin (BM) and operating margin (OM) emission factors. OM emission factor is to be calculated according to one of the following methods: (a) Simple OM, (b) Simple Adjusted OM, (c) Dispatch Data Analysis OM, or (d) Average OM. Calculations for this combined margin must be based on data that is from an official source and made publicly available. Dispatch data analysis should be the first methodological choice as illustrated in flow diagram of OM application, Figure A-1.

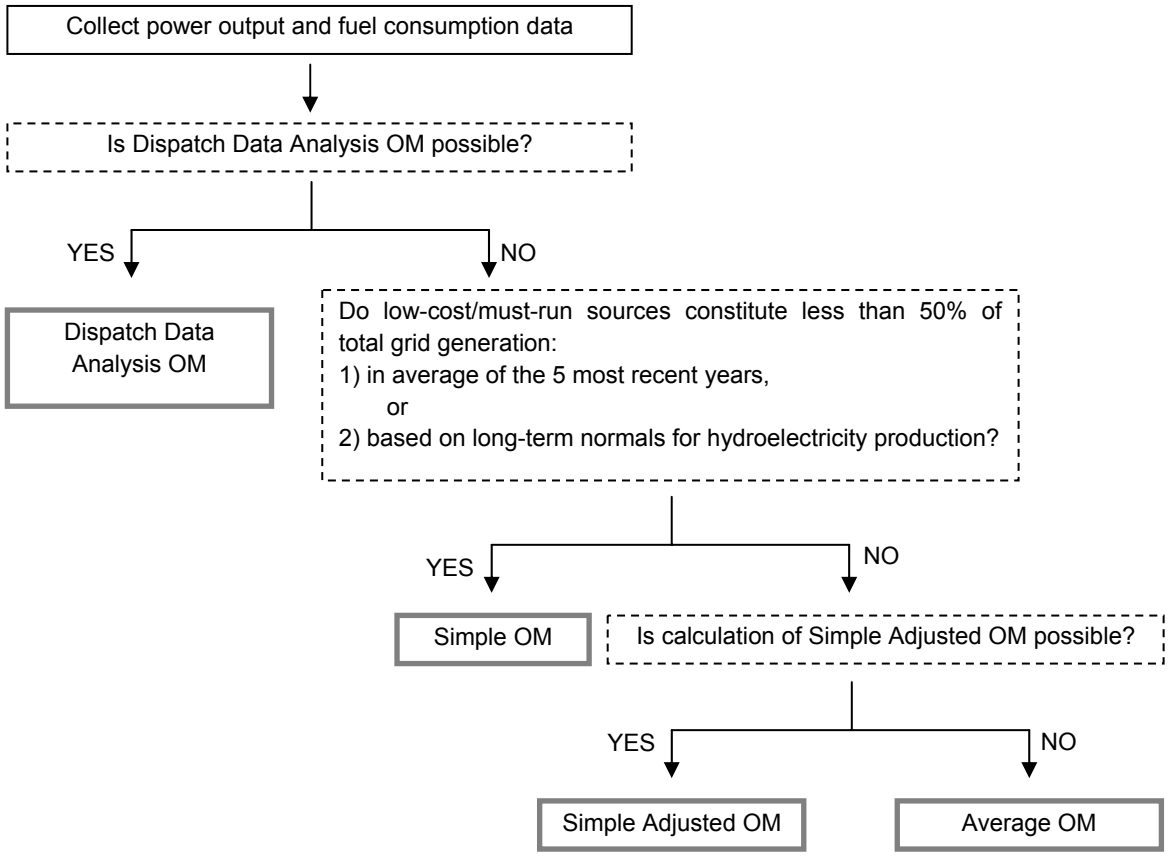


Figure A-1 Flow diagram of OM application

Dispatch Data Analysis OM

The Dispatch Data OM emission factor is the ratio of the generation of the project (in MWh) in a year to the emissions (t-CO_2) associated with the operating margin. The emission factor is calculated as the summation of the products of the hourly generation of the project (in MWh) and the hourly generation-weighted average emissions per electricity unit (t-CO_2/MWh) of the set of power plants in the top 10% of grid system dispatch order during each hour.

$$EM_{OM,DispatchData,y} = E_{OM,y}/EG_y \leftarrow EF_{OM,y} = \sum_h EG_h \text{ X } EF_{DD,h} \leftarrow EF_{DD,h} = \sum_{i,n} F_{i,n,h} \text{ X } COEF_{i,n}/\sum_n GEN_{n,h}$$

The set of plants consists of those plants at the top of the stack (i.e., having the least merit), whose combined generation comprises 10% of total generation from all plants during that hour (including imports to the extent they are dispatched).

Baseline Emission Factor Calculation: Example 1

Suppose a renewable energy-based electricity generation project activity that feeds into a small grid system with 11 power plants currently in operation. Calculation of Operating Margin emission factor and Building Margin is done from the power generation and fuel consumption data as shown in Table A-1. Additional fuel data is presented in. PDD is drafted based on the data up to the year 2004. The project activity starts in the year 2005. Note that the grid system shown here is not based on a real case.

Table A-1 Fuel consumption and power output data for power plants supplying electricity to the grid

Starting year of operation	*Plant No.*	*Type*	*Power output (GWh/y)*					*5 yrs total output 2000-2004 (GWh)*	*3 yrs total output 2002-2004 (GWh)*	*Fuel Consumption (10^3ton)*			*total fuel consumption 2000-2004 (10^3ton)*	*average Co_2 EF 2002-2004 (t-CO_2/MWh)*
			2000	*2001*	*2002*	*2003*	*2004*			*2002*	*2003*	*2004*		
Before 2000	*1*	*Hydro*	*1,100*	*1,000*	*1,000*	*1,100*	*1,100*	*5,300*	*3,200*	*-*	*-*	*-*	*0*	*-*
	2	*Thermal (coal)*	*500*	*400*	*400*	*-*	*-*	*1,300*	*400*	*188*	*-*	*-*	*188*	*1.22*
	3	*Thermal (crude oil)*	*600*	*500*	*500*	*400*	*400*	*2,400*	*1,300*	*126*	*103*	*105*	*334*	*0.79*
	4	*Thermal (coal)*	*300*	*400*	*400*	*400*	*300*	*1,800*	*1,100*	*160*	*162*	*123*	*445*	*1.05*
	5	*Thermal (LNG single cycle)*	*600*	*600*	*600*	*500*	*500*	*2,800*	*1,600*	*131*	*111*	*113*	*354*	*0.65*
	6	*Thermal (crude oil)*	*1,000*	*900*	*700*	*500*	*600*	*3,700*	*1,800*	*166*	*120*	*146*	*433*	*0.74*
	7	*Thermal (LNG single cycle)*	*600*	*600*	*600*	*400*	*400*	*2,600*	*1,400*	*127*	*86*	*88*	*300*	*0.63*
	8	*Thermal (LNG combined cycle)*	*900*	*900*	*900*	*700*	*600*	*4,000*	*2,200*	*133*	*105*	*92*	*329*	*0.44*
2001	*9*	*Hydro*	*-*	*300*	*500*	*600*	*600*	*2,000*	*1,700*	*-*	*-*	*-*	*0*	*-*
2002	*10*	*Thermal (crude oil)*	*-*	*-*	*200*	*500*	*600*	*1,300*	*1,300*	*46*	*117*	*141*	*304*	*0.72*
2001	*11*	*Thermal (LNG combined cycle)*	*-*	*-*	*300*	*600*	*600*	*1,500*	*1,500*	*43*	*88*	*89*	*219*	*0.43*
2002	*12*	*Hydro*	*-*	*-*	*400*	*600*	*600*	*1,600*	*1,600*	*-*	*-*	*-*	*0*	*-*
2003	*13*	*Thermal (LNG combined cycle)*	*-*	*-*	*-*	*400*	*500*	*900*	*900*	*-*	*55*	*71*	*126*	*0.41*
2005 (expected)	*14*	*Thermal (LNG combined cycle)*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Total			*5,600*	*5,600*	*6,500*	*6,700*	*6,800*	*31,200*	*20,000*	*-*	*-*	*-*	*-*	*-*

Note) It is assumed that natural gas-fired power plants are fuelled with LNG for simplification.

Table A-2 Fuel types

	Carbon Emission Factor (ton-C/TJ)	*Oxidation Factor*	*Net Calorific Value ($TJ/10^3$ ton)*
Crude oil	*21.10*	*0.990*	*40.19*
Coal	*25.80*	*0.980*	*28.00*
LNG	*17.20*	*0.995*	*46.85*

Source: *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (Volume 3)*

It may be mentioned here that where available, local values of net calorific value (energy content) and CO_2 emission factor should be used. If no such values are available, country-specific values given in the IPCC Good Practice Guidance are preferable to IPCC world-wide default values.

Calculation of Operating Margin (OM) Emission Factor

If Dispatched Data Analysis is not chosen as the first methodological choice, e.g. due to data limitation, other OM methods can be used.

Although crude oil, natural gas and coal[25] are used as power generating sources serving the grid system in example, hydro is the low operating cost and must run resource. In this case, the Simple OM Method could be applied since hydro constitutes 29% of total grid generation in average of the 5 most recent years (2000-2004).

Simple OM Method

As per ACM0002, the OM emission factor can be calculated using either of the two following data vintages: 1) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission (ex-ante), or 2) the year in which project generation occurs, if data are updated based on ex-post monitoring (ex-post). The choice between ex-ante and ex-post vintage should be specified in the PDD, and cannot be changed during the crediting period.

In this example, Simple OM is calculated from ex-ante data vintage, i.e. the full generation-weighted average for the most recent 3 years (2002-2004). Therefore, it is the generation-weighted average emissions per electricity unit (t-CO_2/MWh) of all generating sources (coal, crude oil and natural gas) serving the system, excluding the low-operating cost and must-run power plants and computed as below:

$$EF_{OM,y} = \sum_{i,j} F_{i,j,y} \text{ X } COEF_{i,j} / \sum_j GEN_{j,y}$$

As shown in Table A-3, the Simple OM emission factors for the years 2002-2004 are $EF_{OM,Simple,2002}$=0.70, $EF_{OM,Simple,2003}$=0.63 and $EF_{OM,Simple,2004}$=0.63 (t-CO_2/MWh), whereas the 3-year average is $EF_{OM,Simple,2002\text{-}2004}$=0.65 (t-$CO_2$/MWh).

[25] If coal is obviously used as must-run, it should also be included in the list of low operating cost and must run resources, i.e. excluded from the set of plants for OM calculation.

Table A-3 Simple OM calculation data

Year	*Fuel Type*	*Plant No.*	*Power Generation (GWh)*	*Fuel Consumption (10^3 ton)*	*CO_2 Emission Factor (t-CO_2/MWh)*	
					Fuel Type	*Simple OM*
2002	*Coal*	*2,4*	*800*	*348*	*1.13*	*0.70*
	Crude Oil	*3,6,10*	*1400*	*338*	*0.74*	
	LNG	*5,7,8,11*	*2400*	*433*	*0.53*	
2003	*Coal*	*4*	*400*	*162*	*1.05*	*0.63*
	Crude Oil	*3,6,10*	*1400*	*340*	*0.75*	
	LNG	*5,7,8,11,13*	*2600*	*444*	*0.50*	
2004	*Coal*	*4*	*300*	*123*	*1.07*	*0.63*
	Crude Oil	*3,6,10*	*1600*	*392*	*0.75*	
	LNG	*5,7,8,11,13*	*2600*	*452*	*0.51*	

Calculation of Build Margin (BM) Emission Factor

Calculation of the Build Margin emission factor is based on the information available on either 1) the five power plants that have been built most recently, or 2) the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently; whichever is larger in terms of annual generation.

$$EF_{BM,y} = \sum_{i,m} F_{i,m,y} \text{ X } COEF_{i,m} / \sum_{m} GEN_{m,y}$$

Project participants should choose from the following two options when calculating the Build Margin (BM) emission factor:

- (Option 1) Ex-ante baseline emission factor calculation based on the most recent information available on plants already built for sample group m at the time PDD submission
- (Option 2) For the first crediting period, the Build Margin emission factor must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. However, for the subsequent crediting periods, BM emission factor should be calculated ex-ante, as described in option 1.

In case of Option 1, the BM emission factor will be fixed with the value for the year 2004. As per Table A-4, the five most recently built power plants are plants Nos. 9 – 13 comprising more than 20% of the system generation. Therefore, these five plants comprise the sample group "*m*" for the calculation of the BM emission factor. Considering the power generation of the sample group "*m*", the BM emission factor for the same year is $EF_{BM,2004}$=0.31 (t-CO_2/MWh).

In case of Option 2, the BM emission factor must be updated annually ex-post. As per Table A-4, an LNG combined cycle power plant starts its operation in the middle of year 2005. For project activity that starts in the year 2005, the sample group to calculate the BM emission factor at the end of the first year of project activity, i.e. the end of the year 2005, will include Plant Nos. 10 – 14. Compared to the sample group used in Option 1 that consists of plants Nos. 9 – 13, a hydro power plant (No. 9) is excluded and an LNG combined cycle power plant (No. 14) is added. This will result in a higher value of the BM emission factor compared to Option 1.

Therefore, for the ex-post option BM emission factor in the year 2005 in which actual project generation and associated emissions reductions occurred is $EF_{BM,2005}$=0.39 (t-CO_2/MWh).

Table A-4 Example of BM sampling group

Starting year of operation	*Plant No.*	*Type*	*Power output (GWh/y)*				*Fuel Consumption (10^3ton)*	*Co_2 Emission Factor (t-CO_2/MWh)*
			2002	*2003*	*2004*	*2005*	*2005*	*2005*
Before 2000	*1*	*Hydro*	*1,000*	*1,100*	*1,100*	*1,000*	*0*	*0.00*
	2	*Thermal (coal)*	*400*	*-*	*-*	*-*	*0*	*1.22*
	3	*Thermal (crude oil)*	*500*	*400*	*400*	*300*	*78*	*0.80*
	4	*Thermal (coal)*	*400*	*400*	*300*	*300*	*124*	*1.07*
	5	*Thermal (LNG single cycle)*	*600*	*500*	*500*	*500*	*112*	*0.66*
	6	*Thermal (crude oil)*	*700*	*500*	*600*	*600*	*146*	*0.75*
	7	*Thermal (LNG single cycle)*	*600*	*400*	*400*	*400*	*86*	*0.63*
	8	*Thermal (LNG combined cycle)*	*900*	*700*	*600*	*600*	*92*	*0.45*
2001	*9*	*Hydro*	*500*	*600*	*600*	*500*	*0*	*0.00*
2002	*10*	*Thermal (crude oil)*	*200*	*500*	*600*	*600*	*141*	*0.72*
2001	*11*	*Thermal (LNG combined cycle)*	*300*	*600*	*600*	*600*	*88*	*0.43*
2002	*12*	*Hydro*	*400*	*600*	*600*	*600*	*0*	*0.00*
2003	*13*	*Thermal (LNG combined cycle)*	*-*	*400*	*500*	*500*	*71*	*0.42*
2005	*14*	*Thermal (LNG combined cycle)*	*-*	*-*		*300*	*41*	*0.40*
Total			*6,500*	*6,700*	*6,800*	*6,800*	*-*	*-*

Sample group at the time of PDD preparation
⇒ Ex-ante baseline emission factor 0.31 (t-CO_2/MWh)

Sample group after project implementation
⇒ Ex-post baseline emission factor 0.39 (t-CO_2/MWh)

Baseline Emission Factor Calculation: Example 2

Suppose a renewable energy-based electricity generation project activity that feeds into a large grid system with more than 150 power plants currently in operation. Calculation of Operating margin emission factor and Building Margin is done from the power generation and fuel consumption data by applying Simple Adjusted OM Method as shown in Table A-5 and Table A-6.

PDD is drafted based on the data up to the year 2004. The project activity starts in the year 2005.

Note that the grid system shown here is not based on a real case.

Calculation of Operating Margin (OM) Emission Factor

If Dispatched Data Analysis is not chosen as the first methodological choice, other OM methods can be used under particular circumstances.

In this case, since hydro, wind and low cost biomass which are considered to be low operating cost and must run resources constitute 78% of total grid generation in average of the five most recent years, Simple OM method could not be applied. Hence, Simple Adjusted OM method is chosen for the OM emission factor calculation.

Table A-5 Power source composition and power output vs. fuel consumption of the power plants supplying electricity to grid

Type	*Power output (GWh/y)*					*5 yrs of power output*	*3 yrs of power output*	*Fuel Consumption (10^3ton)*			*3 yrs of fuel consumption*	*3 yrs average of Co_2 Emission Factor*
	2000	*2001*	*2002*	*2003*	*2004*	*2000-2004 (GWh)*	*2002-2004 (GWh)*	*2002*	*2003*	*2004*	*2000-2004 (10^3ton)*	*2002-2004 (t-CO_2/MWh)*
Hydro	*31,000*	*32,000*	*32,000*	*28,000*	*31,500*	*154,500*	*91,500*	-	-	-	-	*0.00*
Thermal (coal)	*2,000*	*2,300*	*2,200*	*3,400*	*2,600*	*12,500*	*8,200*	*526*	*828*	*643*	*1,998*	*0.75*
Thermal (Diesell)	*1,600*	*1,500*	*1,400*	*2,000*	*1,400*	*7,900*	*4,800*	*134*	*206*	*154*	*493*	*0.70*
Thermal (LNG single cycle)	*25,000*	*2,400*	*2,500*	*3,200*	*2,200*	*12,800*	*7,900*	*500*	*653*	*459*	*1,612*	*0.60*
Thermal (LNG combined cycle)	*400*	*2,000*	*2,5000*	*3,000*	*2,300*	*11,700*	*7,800*	*330*	*408*	*323*	*1,061*	*0.40*
Wind	*400*	*300*	*300*	*400*	*400*	*1,800*	*1,100*	-	-	-	*0*	*0.00*
Low cost biomass	*300*	*300*	*300*	*300*	*300*	*1,400*	*900*	-	-	-	*0*	-
Power import from the nearby domestic grid	*300*	*350*	*500*	*600*	*300*	*2,050*	*1,400*	*81*	*97*	*49*	*227*	*0.50*
Power import from the foreign grid	*250*	*300*	*800*	*1,500*	*300*	*3,150*	*2,600*	-	-	-	*0*	*0.00*
Total Power Generation	*40,150-*	*40,500*	*40,900*	*40,000*	*40,400*	*201,200*	*121,300*	-	-	-	*5,165*	-

This grid is mainly supplied by hydro electric generating plants. In the year 2003, the rate of hydroelectric power generation was decreased due to less amount of rainfall, while the thermal power generation was increased instead.

Since the amount of domestically imported power is less than 20 % of power generation of this grid, the emission factor of nearby grid should be calculated with Average OM according to ACM0002. Here, the assumption is 0.5 t-CO_2 /MWh.

When power is supplied from grids located outside of country, ⇒ 0 t-CO_2 /MWh.

Simple Adjusted OM

Simple adjusted OM emission factor is calculated as follows:

(1) Determine the number of hours per year for which low-cost/must-run sources are on the margin, X_y.

(2) The number of hours per year for which low-cost/must-run sources are on the margin÷8760, which corresponds to λ_y.

For the year 2002, X_{2002}=3430 (hours) andλ_{2002}=39 (%) are determined as shown in Figure A-2.

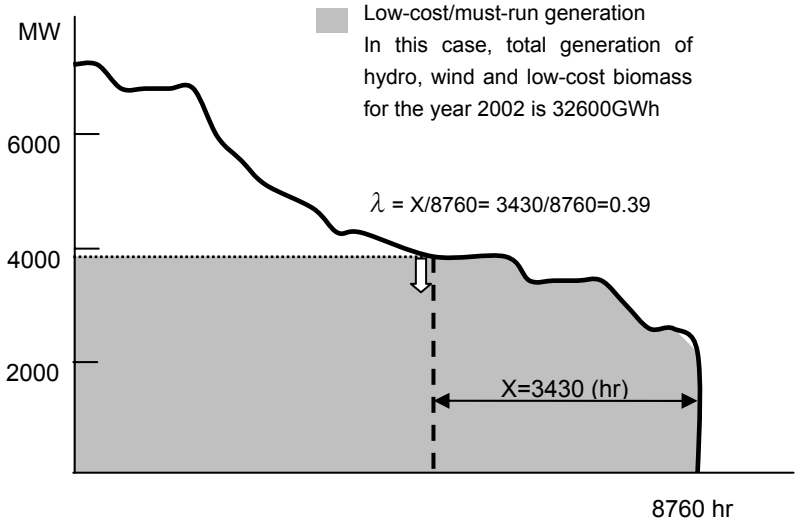


Figure A-2 Calculation for Simple Adjusted OM Method

Since low-cost/must-run sources include hydro, wind and low cost biomass, carbon emission factor of these sources is 0 t-CO_2/MWh. In this case, resources other than low operating cost and must run resources are thermal (crude oil, diesel and LNG) or power import from a connected domestic grid or import from overseas grid. Therefore, for the resources other than low-cost/must-run sources, the weighted average carbon emission factor is 0.57 t-CO_2/MWh.

$$EF_{OM,Simple\ Adjusted,2004} = 0.57 \times (1-\lambda_{2002}) + 0 \times \lambda_{2002} = 0.35\ (t\text{-}CO_2/MWh)$$

To determine the 3-year average Simple Adjusted OM emission factor, values of X_y and λ_y are calculated for the years 2003 and 2004, as shown in Table A-6. The 3-year average emission factor is:

$$EF_{OM,Simple\ Adjusted,2002\text{-}2004} = 0.39\ t\text{-}CO_2/MWh$$

Table A-6 Simple adjusted OM emission factor

	2002	*2003*	*2004*	*3-year average*
X_y (hour)	*3,430*	*1,960*	*3,500*	*-*
λ_y	*0.39*	*0.22*	*0.40*	*-*
Carbon emission factor of low-cost/must-run sources (t-CO_2/MWh)	*0.00*	*0.00*	*0.00*	*-*
Carbon emission factor of sources other than low-cost/must-run sources (t-CO_2/MWh)	*0.57*	*0.60*	*0.61*	*-*
Simple adjusted OM emission factor (t-CO_2/MWh)	*0.35*	*0.47*	*0.37*	*0.39*

Average Emission Rate Method

In case of Simple Adjusted OM Method cannot be used due to data unavailability, Average Emission Rate OM Method can be applied. This is calculated as the average emission rate of all power plants, using the following equation, but including low-operating cost and must-run power plants.

$$EF_{OM,y} = \sum_{i,j} F_{i,j,y} \times COEF_{i,j} / \sum_j GEN_{j,y}$$

For Average OM, generation from the hydro power plant and overseas power import (Emission factor is 0 t-CO_2/MWh) are included in the calculation. The value of the Average OM emission factor, as shown in Table A-7, is $EF_{OM,average,2002\text{-}2004}$ = 0.15 (t-CO_2/MWh). This value is smaller compared to the above-calculated Simple adjusted OM emission factor.

Table A-7 Average OM emission factor

	2002	*2003*	*2004*	*3 years average*
Average OM emission factor (t-CO_2/MWh)	*0.13*	*0.18*	*0.14*	*0.15*

Calculation of Build Margin (BM) Emission Factor

In this case, a large grid system is considered. Therefore, the electricity generation of the five most recently built power plants is less than 20% of the system generation. Hence, the sample group is the set of plants comprising 20% of system generation (8080 GWh up to 2004). As per Table A-8, selecting sample group as above and calculating from power generation and corresponding CO_2 emission factor (calculated from fuel consumption), $EF_{BM,2004}$ = 0.29 t-CO_2/MWh.

Here, it is assumed that Option 1 is chosen, and the BM emission factor is calculated ex-ante.

Table A-8 Power source composition of sample group

Power source composition	*Amount of electricity produced in 2004 (GWh/y)*	*Amount of fuel used in 2004 (10^3 ton)*	*CO_2 emission factor in 2004 (t-CO_2/MWh)*
Hydro	*3,000*		
Thermal (Crude oil)	*1,500*	*0*	*0.76*
Thermal (Diesel)	*0*	*643*	*0.75*
Thermal (LNG Single Cycle)	*0*	*154*	*0.61*
Thermal (LNG Combined Cycle)	*3,000*	*459*	*0.41*
Wind	*400*	*323*	
Low cost biomass	*180*	*0*	
Total	*8,080*		*0.29*

Selecting OM and BM weights - Use of 50:50 defaults is not always required.

When calculating the baseline emission factor using ACM0002, project participants must apply the following formula to combine the OM and BM emission factors.

$$EFy = w_{OM} \text{ X } EF_{OM,y} + w_{BM} \text{ X } E_{FBM,y}$$

The weights wOM and wBM are set at 50% by default, except for wind and solar projects, for which the default weights are wOM =0.75 and wBM =0.25, owing to their intermittent and non-dispatchable nature. Alternative weights may be used as long as wOM + wBM =1, following to the guidance provided in ACM0002. Project participants should justify their choice of alternative weights, which will be assessed by the EB.

"Guidance on selecting alternative weights" included in ACM0002 provide a number of project-specific and context-specific factors for developing alternative operating and build margin weights to the above defaults. Project participants are suggested to propose specific quantification methods with justifications that are consistent with the guidance provided below. Given that it is unlikely that a project will impact either the OM or BM exclusively during the first crediting period, it is suggested that neither weight exceeds 0.75 during the first crediting period.

Factor	***Summary: Impact on weights***	***Further Explanation***
Project size *(absolute or relative to the grid size of the system or the size of other system capacity additions)*	*No change in weight on the basis of absolute or relative size alone*	*Alternative weights on the basis of absolute or relative project size* alone *do not appear to be justified. See paper prepared by Mr. Bruce Biewald for further discussion and explanation.(*)*
Timing of project output	*Possible to increase OM weight for highly off-peak projects; increase BM for highly on-peak projects.*	*Projects with output mainly during off-peak can have a greater OM weight (e.g. solar PV projects in evening peak regions, seasonal biomass generation during off-peak seasons), whereas projects with disproportionately high output during onpeak periods (e.g. air conditioning efficiency projects in some grids) can have greater BM weight.*
Predictability of project output	*Possible to increase OM for intermittent resources in some contexts.*	*Projects with output of an intermittent nature (e.g. wind or solar projects) may have limited capacity value, depending on the nature of the (wind/solar) resource and the grid in question, and to the extent that a project's capacity value is lower than that of a typical grid resource its BM weight can be reduced. Potential adjustments to the OM/BM margin should take into account available methods (in technical literature) for estimating capacity*

		value.
Suppressed demand	*Possible to increase BM weight for the 1st crediting period.*	*Under conditions of suppressed demand that are expected to persist through over half of the first crediting period across a significant number of hours per year, available power plants are likely to be operated fully regardless of the CDM project, and thus the OM weight can be reduced*
*For **system management** (nature of local electricity markets, planning, and actors) and other considerations no guidance is available at present.*		

(*) Please refer to <http://cdm.unfccc.int/Panels/meth/Meth17_repan12_BiewaldPaperOMBMMargins.pdf>.