CLEAN DEVELOPMENT MECHANISM

CDM-MP70-A19

Concept Note

Cost-effective and context-appropriate approaches for monitoring, reporting and verification (Jointly by MP and SSC WG)

Version 01.0

United Nations
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Climate Change

TABLE OF CONTENTS **Page**

1. Procedural background

1. The Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) in its decision 6.CMP.11, paragraph 15 requested the CDM Executive Board (Board) to develop more cost-effective and context-appropriate approaches for monitoring, reporting and verification (MRV), with a focus on project activities involving households and communities, addressing, inter alia:

    (a) Procedures to manage data gaps;

    (b) Regionally appropriate calibration requirements;

    (c) The use of sectoral and nationally collected data where appropriate.

2. Purpose

2. The purpose of this note is to analyse the feasibility of and options for developing more effective and context-appropriate approaches for monitoring, reporting and verification, with a focus on project activities involving households and communities.

3. Key issues and proposed solutions

3. Table 1 of Appendix 1 provides a list of CDM methodologies relevant to households and communities. These include project activities for electrification, energy efficiency and clean thermal energy. Technologies used under these project activities include photovoltaic installations such as solar home systems, solar lanterns, household scale biogas digesters, solar water heaters, improved cook stoves and water purification devices. These types of project activities are particularly challenged to meet the MRV requirements of the CDM in low-income countries for the following main reasons:

    (a) The dispersed nature of these projects, which often cover large geographic distances, poses significant demands on data collection and management;

    (b) Usually, different parties are involved in the design, implementation and operation of the projects, which increases the monitoring coordination efforts;

    (c) The MRV enabling environment regarding data availability, national regulations on which to build, and laboratories that can carry out analysis, may be weak.

4. Only 2 per cent of registered CDM project activities (PAs) and almost 30 per cent of the programme of activities (PoAs) apply the methodologies referred to in the above paragraph. The implementation rate for PAs and PoAs, i.e. the number of PAs/PoAs receiving at least one issuance over the total number registered, is around 34 per cent and 18 per cent, respectively. In comparison, the average issuance rates for the PAs and PoAs are 57 per cent and 77 per cent, respectively, when all CDM projects are considered. (Details are provided in Table 2 of Appendix 1.)

5. As part of the analysis, requests for post-registration changes submitted by projects registered under the above-mentioned methodologies were reviewed.

6. A study[1] conducted by the Carbon Initiative for Development[2] covered an extensive review of MRV of CDM, comprising a literature review and interviews with relevant experts and over 40 stakeholders from a wide range of perspectives – project developers, designated operational entities (DOEs), consultants, government representatives and carbon buyers. The study also reviewed stakeholder responses to the recent call for inputs on CDM simplification and streamlining made by the Board. The study also assessed and compared MRV processes of other mechanisms and protocols.[3] Recommendations of the study are also considered in this analysis.

3.1. Procedures to manage data gaps

7. For a number of reasons, a project proponent may temporarily not be able to monitor wholly or partially the registered PA or component project activity (CPA). For such cases, the Project Standard (PS) requires applying conservative assumptions or discount factors to the calculations to the extent necessary to ensure that greenhouse gas emission reductions will not be over-estimated as a result of the deviation (paragraphs 272 to 274, PS). This kind of temporary deviation from the monitoring plan requires the approval of the Board. There are, however, cases where prior approval is not required. Namely, if project participants report parameters related to baseline emissions as zero and/or report parameters related to project emissions assuming that the source operated at maximum capacity (paragraphs 2 to 3 of Appendix 1, PS). Although in some cases actual emission reductions can be determined by applying data from supplementary sources, project participants often choose the option that does not require prior approval, i.e. to waive emission reductions for the gap periods, due to the time required for the prior approval process.

8. Some methodologies relevant for the project activities involving households and communities require sampling surveys for the monitoring. Delays in undertaking surveys as per the specified sampling frequencies may lead to data gaps as well.

9. Additional guidance may be useful in cases of delays in sampling, meter failures or data loss. This is especially relevant for least-developed countries (LDCs), where implementation of registered survey and data collection methods may be temporarily affected for many reasons, including security issues within country. In addition, monitoring equipment and information technology systems may not work as reliably as expected due to power shortages or other incidents that are out of the control of the project participants.

10. A possible solution is to include an option in the procedures to enable the project proponent to provide a data handling protocol (DHP) as an appendix to the CDM-PDD or the monitoring plan. The DHP could also be submitted as part of the revised monitoring plan of the registered projects. The DHP should contain a decision tree leading to the choice of a predefined method for dealing with data gaps in a conservative but pragmatic manner. If a data gap occurs, the project developer would assess the supplementary data

[1] World Bank (2015): Increasing credit issuance by improving the monitoring, reporting and verification procedures and issuance rules of the CDM.

[2] An initiative of the World Bank (http://www.ci-dev.org/).

[3] Joint Implementation; the Gold Standard; the Verified Carbon Standard; offset protocols of the California Climate Action Reserve and the Japanese Joint Crediting Mechanism; as well as cap-and-trade schemes such as the Chinese trading systems and the European Emission Trading Scheme.

available. If the supplementary data are comparable to the original data in terms of accuracy, data can be used without correction. If this is not the case, the loss in accuracy should be compensated by adjusting emisison reduction estimates. The adjustment factor shall be proposed in the DHP. Such an approach could significantly shorten the process, as prior approval of proposed methods to fill data gaps would no longer be necessary.

11. For cases where the sampling survey is delayed by no more than six months from the date it was due, the following options are proposed:

    (a) An alternative less-preferred data collection method indicated as second or third order of preference in Table 2 Survey and data collection methods and preference for use in "Guideline: Sampling and surveys for CDM project activities and programmes of activities" (sampling guidelines) may be used for the period of delay i.e. 6 months. As the alternative data collection method is less preferred as per the sampling guidelines, a conservative adjustment should be applied to the emission reductions calculation. The adjustment factor shall be proposed in the DHP; or

    (b) If the original data collection method indicated in the monitoring plan was applied within 6 months from the date when it was due[4], the penalty of ten per cent is applied to the emission reduction estimates for the monitoring period to which the survey results apply.

12. The example outline of the DHP is attached to this note in Appendix 2. It is proposed that the outline be included in the PS.

3.1.1. Regionally appropriate calibration requirements

13. Calibration requirements outlined in the CDM methodologies may not have covered all situations. Where the methodology does not provide the calibration requirements, the PS (paragraph 65(f)) requires project participants to ensure that the equipment is calibrated either in accordance with the local/national standards or as per the manufacturer's specifications. If local/national standards or the manufacturer's specifications are not available, international standards may be used. Where national standards are not available, it has been reported that DOEs often request compliance with an international standard, which could even be a European standard. Such a level of conformity is often expensive and time-consuming.

14. In regions that lack technical capacity and/or the availability of accredited laboratories to perform calibration services for certain equipment,[5] the calibration of equipment is either

[4] For example the sampling survey was due within a period of 2 years from the previous survey; however it was conducted after 2 years period elapsed but within a period of 2.5 years.

[5] During interviews conducted for the Carbon Initiative for Development study, stakeholders reported that for some project types, such as landfill in Africa, external experts are needed, since the DOE requires European standards for monitoring. Often these experts and the services for calibration and maintenance as per manufacturer's specifications are not available locally to the project proponent, especially in LDCs. This results in high costs regarding expert day-rates and travel (depending on the location it can be USD 2,000 for travel and USD 1,000 per man day), or shipment of equipment to be calibrated in Europe. It was reported that sometimes requirements in the CDM are even higher than that for European companies covered by the European Emission Trading Scheme (especially calibration frequency).

delayed or not done at all, resulting in significant negative impacts on emission reductions that may be claimed by the project.

15. When calibration is delayed or the calibration frequency is to be changed, which is often encountered in many projects hosted in LDCs as described above, a prior approval of the changes to the monitoring plan by the Board is required.

16. It is proposed, to clarify through a revision of the PS, the preference and sources of the calibration standards including guidance for cases where calibration has been delayed (the proposed revised text is outlined in Appendix 3).

3.1.2. The use of sectoral and nationally collected data where appropriate

17. Currently, coordinating/managing entities (CMEs) may use national or regional statistical data to determine the baseline or other parameters required for emission reduction estimates. Examples include fraction of non-renewable biomass (fNRB) values and data on fuel characteristics.

18. There are monitoring parameters that are likely to be similar across multiple programmes being implemented in the same region under or outside the CDM. However, current procedures do not allow surveys that span boundaries of multiple CDM PoAs or include parameters from non-CDM programmes.

19. As long as the sampling and surveys are undertaken to fully meet the requirements of the Standard "Sampling and surveys for CDM project activities and programme of activities" (e.g. see sections 4 and 5), it should not matter whether the sampling surveys are undertaken exclusively within the boundary of CDM project or PoA or go beyond the boundary. It is proposed that the Standard "Sampling and surveys for CDM project activities and programmes of activities", be revised, as outlined in Appendix 4, to address this issue.

3.1.3. Other Improvements to monitoring requirements

20. There is further potential to improve monitoring requirements and expand the use of default values.

21. It is proposed that the methodologies listed in Table 1 of Appendix 1 be explored to identify further opportunities for improving monitoring requirements and the use of default factors, including the approaches below which have been piloted in certain methodologies:

    (a) **Technology-performance default values, e.g. default lifetime emission reductions or shorter technology-specific periods to claim emission reductions with reduced monitoring.** This could be an attractive option for household-scale appliances with short operational lifetimes such as lamps or stoves. Project developers often face difficulties in monitoring the performance of distributed appliances, particularly where data management is a challenge or project developers do not normally track customer data (e.g. appliances are sold via retailers). Project developers could opt for a conservative lifetime emission reduction appropriate for the technology that considers the average lifetime of a product and on-going usage rates, instead of monitoring throughout the crediting period. This would need to be linked to certain conditions, including that the use rates and performance of the appliance do not vary significantly and unpredictably across households, regions and time;

(b) **Default values to replace superfluous monitoring requirements**. There are occasions where monitoring requirements may be significant but their impact on the emission reductions is negligible. It is proposed that on these occasions, the requirements could be removed, based on the monitoring reports analysis. In addition, some methodologies include monitoring criteria that are very cumbersome and could be replaced by the conservative default values.

(c) **Using other data sources**. Where the meter's records could be cross-checked by invoices, the current requirements for data sources could be replaced by information provided in invoices.

(d) **Using a proxy CPA**. A registered CPA with better conditions for monitoring, i.e. access to data, could be used as a model in certain cases. The results of the monitoring campaigns for the proxy CPA could be used by other CPAs registered under the same PoA with certain discount factors.

22. The analysis will take into account the monitoring reports and post-registration change requests and is proposed to be undertaken on an ongoing basis. Concrete recommendations will be made in the context of specific methodologies or technologies.

4. Impacts

23. The cost-effective and context-appropriate approaches for monitoring, reporting and verification will reduce transaction costs associated with monitoring, improve the attractiveness of the CDM, and facilitate project development.

5. Proposed work and timelines

24. The proposed work plan is as follows:

(a) Guidance on concept note: EB 90 (18 to 22 July);

(b) Draft revised regulatory documents: EB 91 (12 to 16 September), in conjunction with the draft revised "CDM project standard" (PS), "CDM validation and verification standard" (VVS) and the PCP, also planned for consideration at that Board meeting;

(c) Final adoption of revised regulatory documents: EB 92 in conjunction with the revised PS, VVS and PCP, also planned for adoption at that Board meeting;

(d) Revision of methodologies: EB 93 to EB 98 (during 2017).

6. Recommendations to the Board

25. The secretariat recommends that the Board approve the proposed work plan and adopt the proposed revised text included in Appendix 3 and Appendix 4.

Appendix 1. CDM pipeline analysis

1. The relevant methodologies and the registered PAs and PoAs involving households and communities are provided in Table 1. The registration rate is calculated as a number of registered PAs or PoAs over the number of total PAs or PoAs in the CDM pipeline.

Table 1. Registered CDM projects and PoAs under the relevant methodologies

Methodology	Title	CDM PA registered	CDM PA registration rate	PoA registered	PoA registration rate
AM0046	Distribution of efficient light bulbs to households	1	33.33%	0	
AM0072	Fossil Fuel Displacement by Geothermal Resources for Space Heating	2	100.00%	0	
AM0091	Energy efficiency technologies and fuel switching in new and existing buildings	0		0	
AM0094	Distribution of biomass based stove and/or heater for household or institutional use	0		0	
AM0113	Distribution of compact fluorescent lamps (CFL) and light-emitting diode (LED) lamps to households	0		0	
AMS-I.A.	Electricity generation by the user	27	60.00%	1	33.33%
AMS-I.B.	Mechanical energy for the user with or without electrical energy	0		1	100%
AMS-I.E.	Switch from non-renewable biomass for thermal applications by the user	19	79.17%	11	68.75%
AMS-I.I.	Biogas/biomass thermal applications for households/small users	0		0	
AMS-I.K.	Solar cookers for households	0		0	
AMS-I.L.	Electrification of rural communities using renewable energy	0		2	100%

Methodology	Title	CDM PA registered	CDM PA registration rate	PoA registered	PoA registration rate
AMS-II.C.	Demand-side energy efficiency activities for specific technologies	11	32.35%	8	34.78%
AMS-II.E.	Switch from non-renewable biomass for thermal applications by the user	13	37.14%	1	16.67%
AMS-II.G.	Energy efficiency measures in thermal applications of non-renewable biomass	34	75.56%	44	75.86%
AMS-II.J.	Demand-side activities for efficient lighting technologies	36	70.59%	20	80.00%
AMS-II.K.	Installation of co-generation or tri-generation systems supplying energy to commercial building	2	100.00%	0	
AMS-II.L.	Demand-side activities for efficient outdoor and street lighting technologies	0		0	
AMS-II.M.	Demand-side energy efficiency activities for installation of low-flow hot water savings devices	0		1	100.00%
AMS-II.N.	Demand-side energy efficiency activities for installation of energy efficient lighting and/or controls in buildings	0		0	
AMS-II.O.	Dissemination of energy efficient household appliances	0		0	
AMS-II.Q.	Energy efficiency and/or energy supply projects in commercial buildings	0		0	
AMS-II.R.	Methane recovery in agricultural activities at household/small farm level	0		0	
AMS-III.AE.	Energy efficiency and renewable energy measures in new residential buildings	0		0	
AMS-III.AR.	Substituting fossil fuel based lighting with LED/CFL lighting systems	2	50.00%	0	
AMS-III.AV.	Low greenhouse gas emitting safe drinking water production systems	0		9	75.00%
AMS-III.AW.	Electrification of rural communities by grid extension	0		0	

Methodology	Title	CDM PA registered	CDM PA registration rate	PoA registered	PoA registration rate
AMS-III.BB.	Electrification of communities through grid extension or construction of new mini-grids	0		0	
AMS-III.BL.	Integrated methodology for electrification of communities	0		0	
AMS-III.R.	Methane recovery in agricultural activities at household/small farm level	7	100.00%	0	
AMS-III.X.	Energy Efficiency and HFC-134a Recovery in Residential Refrigerators	0		0	
AMS-III.D.	Methane recovery in animal manure management systems	118	52%	15	83%

2. The following table provides:

(a) **Implementation ratio**. Calculated as a number of PAs or PoAs that received CERs at least for one monitoring period over the total number of the registered PAs or PoAs under the same methodology;

(b) **Issuance ratio.** Calculated as an amount of CERs issued over the quantity of the CERs expected, i.e. ex-ante estimation in PDDs.

Table 2. Performance of the PA and PoA

Methodology	Title	CDM PA implementation ratio	CDM PA issuance ratio	PoA implementation ratio	PoA issuance ratio
AM0046	Distribution of efficient light bulbs to households	100.00%	12.09%		
AM0072	Fossil Fuel Displacement by Geothermal Resources for Space Heating	50.00%	175.87%		
AMS-I.A.	Electricity generation by the user	25.93%	35.27%	100.00%	62.15%
AMS-I.E.	Energy efficiency and fuel switching measures for buildings	47.37%	65.48%	9.09%	149.78%

Methodology	Title	CDM PA implementation ratio	CDM PA issuance ratio	PoA implementation ratio	PoA issuance ratio
AMS-II.C.	Demand-side energy efficiency activities for specific technologies	36.36%	84.10%	12.50%	3.67%
AMS-II.G.	Energy efficiency measures in thermal applications of non-renewable biomass	11.76%	23.83%	20.45%	26.94%
AMS-II.J.	Demand-side activities for efficient lighting technologies	25.00%	84.88%	5.00%	142.82%
AMS-III.R.	Methane recovery in agricultural activities at household/small farm level	57.14%	96.80%		
AMS-III.D.	Methane recovery in animal manure management systems	38.98%	44.66%		

Appendix 2. Requirements and content of a data-handling protocol (DHP)

1. The DHP, where feasible, shall be submitted together with the monitoring plan and contain the following sections:

   (a) Organizational structure. This section should include roles and responsibilities of the staff involved in the data collection and processing

   (b) Data collection procedure, including a procedure for data collection under normal conditions and alternative procedures and back-up instruments in case of failures of meters or delays;

   (c) Data processing procedure. This section should include guidance on how the different data and source of information to be acquired are processed together;

   (d) Data Archiving Procedure. This section should include methods for data archiving and roles and responsibilities of the staff involved in this process;

   (e) Data back-up procedure. This section should provide instructions for the cases of meter failure or survey delays and should contain, where appropriate, the following:

      (i) Decision tree leading to the choice of a predefined method for dealing with data gaps;

      (ii) Data-flow diagram (flowchart) with the primary and secondary metering equipment;

      (iii) Equations to calculate the monitoring parameters using the supplementary sources of data. Equations should contain adjustment factors to discount the result in a conservative manner. For example, adjustment factors could be based on maximum permissible error of the supplementary meter;

      (iv) Depending on the methodology requirements:

         a. List of primary and supplementary metering equipment, including serial numbers, accuracy levels, calibration frequency; or

         b. Primary (preferred) and supplementary sampling approach and data collection method.

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Appendix 3. Proposed revision to the Project Standard

1. Paragraph 65 (f): Specifications of the calibration frequency for the measuring equipment~~s~~. In cases where neither the selected methodology and, where applicable, the selected standardized baseline, nor the Board's guidance specify any requirements for calibration frequency for measuring equipment~~s~~, project participants or the coordinating/managing entity shall ensure that the equipment~~s~~ is calibrated either in accordance with the local/national standards or as per the manufacturer's specifications. If local/national standards or the manufacturer's specifications are not available,~~, international standards may be used~~ any one of the following standards may be applied:

   (a) A national standard covering requirements for calibration adopted in another country; or

   (b) An international standard covering requirements for calibration that applies to a particular region; or

   (c) A globally applicable international standard covering requirements for calibration.

2. Section 2 of Appendix 1: Temporary deviations from the registered monitoring plan, applied methodology or applied standardized baseline.

3. If during a certain monitoring period, the calibration has been delayed and the calibration has been implemented after the monitoring period in consideration (i.e. the results of delayed calibration are available), the following conservative approach shall be adopted in the calculation of emission reductions:

   (a) Applying the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, if the results of the delayed calibration do not show any errors in the measuring equipment, or if the error is smaller than the maximum permissible error; or

   (b) Applying the error identified in the delayed calibration test, if the error is beyond the maximum permissible error of the measuring equipment.

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Appendix 4. Proposed revision to the Standard "Sampling and Surveys for CDM Project Activities and Programme of Activities"

1. Paragraph 5: The following definitions are applied in this document:

   (a) A sample is a subset of a population. The population could be, for example, all households included in a CDM project activity or PoA or in a group of project activities or group of PoAs; the sample is a subset of these households. A characteristic of the population, such as average number of hours of operating a biogas stove, or proportion of installed refrigerator units still in operation, will be referred to as a parameter. The population parameter is unknown unless the whole population is studied, which is often not feasible or possible. A population parameter can, however, be estimated using data collected from a sample. It is therefore important that the sample is representative of the population. The correct choice of sample design can help to achieve this;

2. Paragraph 14: Subject to the two requirements of unbiased estimates and achieving reliability levels for the specific parameter determination, project participants have broad discretion in the sampling approach they propose to use to obtain the estimates. The choice depends on several considerations, including the known characteristics of the population, the cost of information-gathering, the number of project activities/PoAs covered by the survey (e.g. a single project activity/PoA or a group of project activities/PoAs), and other conditions surrounding the project in question. Some of the most commonly used sampling methods are summarized in the "Guidelines for sampling and surveys for CDM project activities and programmes of activities", along with typical circumstances where each may be most appropriate to apply.

3. Paragraph 20: This section covers specific sampling requirements for PoAs or a group of project activities/PoAs for application by a CME to estimate parameter values through sampling.

4. Paragraph 21: Parameter values shall be estimated by sampling in accordance with the requirements in the applied methodology separately and independently for each of the CPAs included in a PoA except when a single sampling plan covering a group of CPAs included in one PoA or in a group of PoAs is undertaken applying 95/10 confidence/precision[1] for the sample-size calculation. In the latter case, the populations of all CPAs in the group are combined, the sample size is determined, and a single survey is undertaken to collect data; for example if the parameter of interest is the daily usage hours of light bulbs, it may be feasible to undertake a single sampling and survey effort spread across geographic regions of several CPAs included in one PoA or in a group of PoAs when either homogeneity of included CPAs relative to the light usage hours can be demonstrated or the differences among the included CPAs is taken into account in the sample-size calculation. Several groups of CPAs may be formed and sample sizes may be calculated for the groups. Furthermore, a single sampling plan may also be undertaken

1 This is consistent with the approach in many approved methodologies to aim at higher confidence/precision when the sampling/survey effort is undertaken less frequently (e.g. methodologies AMS-I.E, AMS-II.G or AMS-I.J).

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for a group of project activities/PoAs applying 95/10 confidence/precision. Currently PoAs applying large-scale CDM methodologies are not included for applying a single sampling plan covering a group of CPAs pending further analysis.

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Document information

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