

**CDM-MP71-A13**

## Concept Note

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

Version 01.0



**United Nations**  
Framework Convention on  
Climate Change

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## **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. The Board at its ninetieth meeting considered the concept note on cost-effective and context-appropriate approaches for monitoring, reporting, and verification and requested the MP, in consultation with the SSC WG and the secretariat, to propose revisions to regulatory documents and provide additional analysis taking into account the guidance from the Board provided below:
  - (a) In principle, the Board agreed with the proposed options to address data gaps. However, the use of the data backup procedure should be optional to the project proponent. The requirements in the data backup procedure should not overlap with requirements already included in the "CDM project standard" and should differentiate between mandatory and optional elements;
  - (b) The Board agreed that the proposed language for additional guidance on calibration requirements was appropriate;
  - (c) With regard to the proposal to allow common surveys that span boundaries of several PoAs and non-CDM activities, the Board requested further analysis on potential implications including the compliance with the CDM modalities and procedures (CDM M&P).

## **2. Purpose**

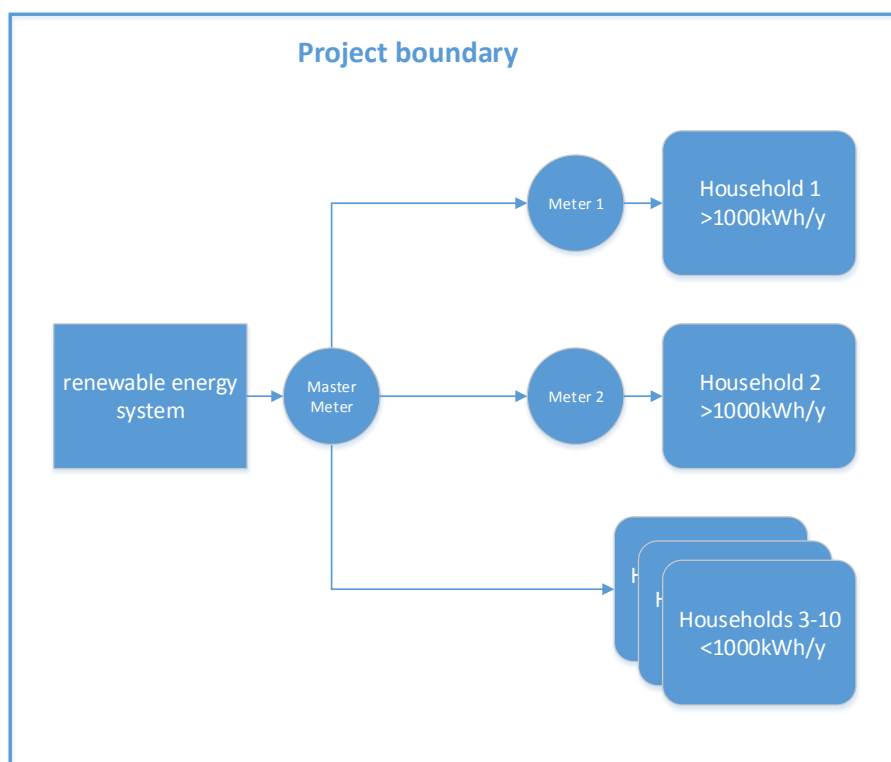
3. The purpose of this note is to make recommendations on specific aspects requested by the Board in paragraph 2(a) and 2 (c) above.

## **3. Key issues and proposed solutions**

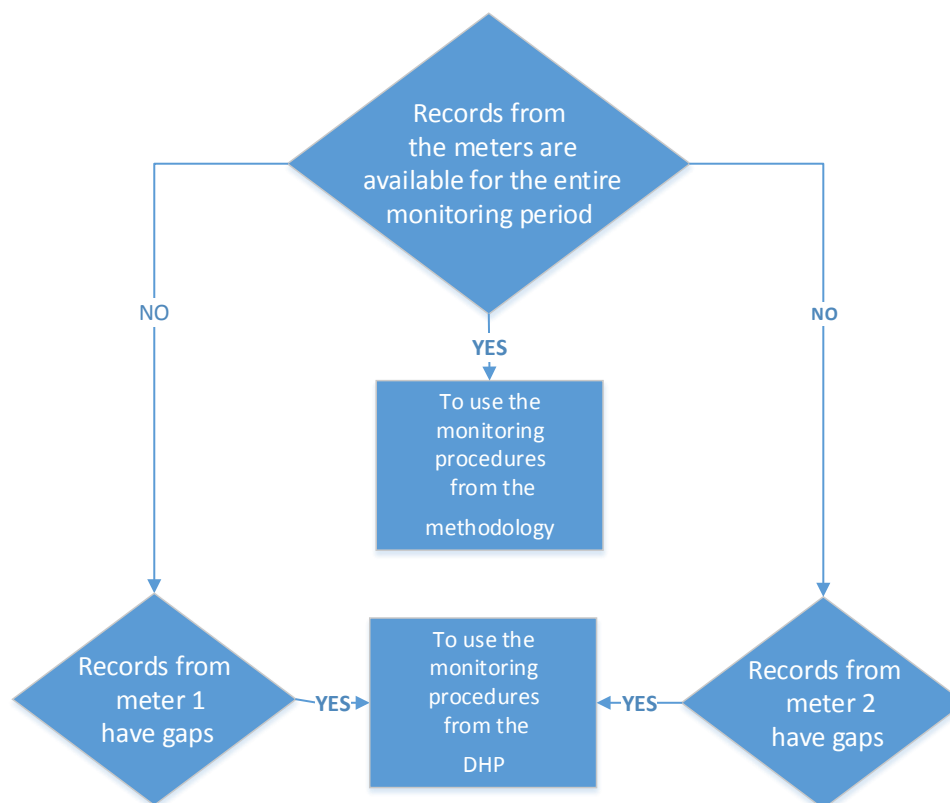
### **3.1. Procedures to manage data gaps**

4. As indicated in the concept note [CDM-MP70-A19](#), proposed solutions to manage data gaps are: (a) to include solutions in the standard "Sampling and surveys for CDM project activities and programme of activities" (sampling standard) for the cases where a survey is delayed and (b) to include an option in the procedures to enable the project proponent to provide a data handling protocol (DHP) as an element of the monitoring plan. The DHP could also be submitted with the revised monitoring plan of registered projects. The DHP should contain a decision tree leading to the choice of predefined and prioritized alternative methods for dealing with data gaps in a conservative but pragmatic manner.

5. The following example illustrates the DHP. A project activity will install renewable energy system along with distribution lines to supply electricity to a community. Within the community ten households in total will be connected to the proposed project activity, whereas two households are anticipated to consume more than 1000 kWh annually. According to the requirement of the methodology 'AMS-III.BL: Integrated methodology for electrification of communities' households consuming >1000 kWh/year should be equipped with electricity meters. Electricity consumption by each household that is not equipped by meters is determined as a difference between total net electricity supplied by the energy system less electricity consumption of metered households and divided by number of not metered households (i.e. eight).
6. The DHP included in the monitoring plan provides instructions on how to manage data gaps that could occur as follows:
- (a) Data-flow diagram (flowchart) with the metering equipment:



- (b) Decision tree leading to the choice of a predefined method for dealing with data gaps:



- (c) Equations to calculate the monitoring parameters using the supplementary sources of data. For missing data from meter 1 or meter 2 up to 30 consecutive days, electricity consumption can be estimated as the average historical electricity consumption adjusted by its standard deviation:

$$EC_1 = (EC_{1,h} - \sigma_{1,hist}) \times GAP$$

$$EC_2 = (EC_{2,h} - \sigma_{2,hist}) \times GAP$$

Where:

$EC_1$	=	Estimated electricity consumption by household 1 for the data missing period (kWh)
$EC_2$	=	Estimated electricity consumption by household 2 for the data missing period (kWh)
$EC_{1,h}$	=	Average daily historical electricity consumption by household 1 since the start of the project activity (kWh)
$EC_{2,h}$	=	Average daily historical electricity consumption by household 2 since the start of the project activity (kWh)

$GAP$	=	Period for which data is missing (days)
$\sigma_{1,hist}$	=	standard deviation of the historical daily electricity consumption by household 1 since the start of the project activity (kWh)
$\sigma_{2,hist}$		standard deviation of the historical daily electricity consumption by household 2 since the start of the project activity (kWh)

- (d) The estimated electricity consumption ( $EC_1$ ,  $EC_2$ ) is used to determine the baseline emissions. Hence taking the lower bound estimate of electricity consumption is conservative. On the other hand, similar estimation of project emissions would have required to take the upper bound to be conservative.
- (e) To demonstrate that the power generating equipment is operational during the missing data period, the records from the master meter will be provided.
7. The requirements for the DHP are included in Appendix 1 for possible inclusion in the PS, whereas the guidance for the project activities with the delayed surveys is included in Appendix 2.

#### 4. Surveys to cover multiple PoAs

8. As proposed in the concept note [CDM-MP70-A19](#), enabling the sampling surveys undertaken for the group of the CDM project activities or Programme of Activities (PoAs) could considerably reduce the cost of monitoring surveys without compromising environmental integrity as long as appropriate survey methods are employed. The approved sampling standard and the guidelines for “Sampling and surveys for CDM project activities and programme of activities” include guidance for carrying out sampling when the included activities are not uniform e.g. use of stratified sampling.
9. As per the CDM M&P, the requirements for monitoring include a monitoring plan in the Project Design Document (PDD): (a) for the collection and archiving of all relevant data necessary for estimating project emissions, baseline emissions occurring within the project boundary during the crediting period and (b) for 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 CDM M&P also require quality assurance and control procedures for the monitoring process and procedures for the periodic calculation of the reductions of anthropogenic emissions by sources by the proposed CDM project activity, and for leakage effects. The CDM M&P also assigns responsibility to the Designated Operational Entity (DOE) to determine if the proposed monitoring method is ‘appropriate to the circumstances of the proposed project activity and has been successfully applied elsewhere’ and ‘reflects good monitoring practice appropriate to the type of project activity’. Thus the CDM M&P do not forbid the sampling and surveys that span across multiple CDM project activities or PoAs provided they meet the requirements described above. On the other hand, CMP has allowed bundling of small-scale projects for any stage of CDM project cycle as one means of reducing CDM related transaction costs. It is stated “Several small-scale CDM project activities may be bundled for the purpose of validation”. An overall monitoring plan that monitors performance of the constituent project activities on a sample basis may be proposed for bundled project activities. If bundled project activities are registered with an

overall monitoring plan, this monitoring plan shall be implemented and each verification/certification of the emission reductions achieved shall cover all of the bundled project activities (4/CMP.1, Annex II, paragraph 19)". Furthermore, the CDM sampling standard referred above acknowledges that "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 gathering the information, and other conditions surrounding the project in question". Several methods are described in the sampling standard and guidelines including the 'Stratified Random Sample' which may be the most appropriate one for sampling across PoAs as it is suitable "When the population under study is not homogeneous but instead consists of several subpopulations which are known (or thought) to vary, then it is better to take a simple random sample from each of these sub-populations separately".

10. In case the cross-PoA sampling results in increase in the actual GHG emission reductions achieved during the current monitoring period as compared to ex ante estimations, this would be managed following the existing procedure, i.e. paragraphs 256 to 257 of the CDM project standard.
11. In case there are errors in the cross-PoA sampling that are noted during verification, a solution would need to be sought using the existing procedures, for example by undertaking more sampling, likely specific to the PoA or project activity in question, and filing a request for post-registration changes. However, the existing procedures would adequately cover this scenario and would not result in a more-burdensome solution than those that currently are possible for sampling applied across a single project activity or PoA.
12. The changes to the sampling standard are provided in the Appendix 2.

## **5. Impacts**

13. 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.

## **6. Proposed work and timelines**

14. The proposed work plan is as follows:
  - (a) Guidance on concept note: EB 92 (31 October to 4 November);
  - (b) Draft revised regulatory documents: EB 93;
  - (c) Final adoption of revised regulatory documents: EB 94;

## **7. Recommendations to the Board**

15. The secretariat recommends that the Board adopt the proposed revised text included in Appendix 1 and Appendix 2.

## **Appendix 1. Revision of the Project Standard to include requirements and content for a data-handling protocol (DHP)**

### **Section of the Project Standard 7.2.8.3. Other elements of monitoring plan**

66. The Project participants or the coordinating/managing entity of the proposed CDM project activity in addition to the requirements outlined in paragraph 65 may choose to submit a data handling protocol (DHP). If included, the DHP shall provide instructions for dealing with data gaps, i.e. meter failure or failure of other measuring devices or methods, and contain the following:
- (a) Brief description of the monitoring system, including, line diagrams (graphical schemes) showing approximate location of the relevant monitoring points with the primary and secondary metering equipment;
  - (b) Decision tree leading to the choice of a predefined method for dealing with data gaps;
  - (c) 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. The adjustment factors should be based on the standard deviation of the average value of the same parameter recorded either during the monitoring period surrounding the data gap period<sup>1</sup> for parameters with seasonal variations, or in other cases for the period of twelve months preceding data gap;
  - (d) Justification of the adjustment factors to discount the result;
  - (e) Depending on the methodology requirements:
    - (i) List of primary and supplementary metering equipment, including serial numbers, accuracy levels, calibration frequency; or
    - (ii) Primary (preferred) and supplementary sampling approach and data collection method.
67. In cases where the data gap is the result of measuring equipment failure, the procedures outlined in the DHP could be used for up to 30 consecutive days for one data gap within twelve consecutive months, unless otherwise specified in a methodology applied by the proposed CDM project activity.
68. The DHP can be submitted with the original monitoring plan or be included to the registered monitoring plan applying the procedure for permanent changes to the registered monitoring plan.

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<sup>1</sup> For example, if data are missing for ten days in the month of March, standard deviation shall be determined using the monitoring data for the month of March. This requirement would address the seasonal variations for certain monitoring parameters.



## Appendix 2. Proposed revision to the Standard “Sampling and Surveys for CDM Project Activities and Programme of Activities”

16. 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;

17. 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. In case a survey covers a group of project activities or PoAs, stratified random sampling method shall be applied or if other methods of sampling are applied justification is provided for the choice that demonstrates the conservativeness and accuracy of the alternative procedure to be at least at the same level of the random sampling.

18. Paragraph 20: The General Guidelines for SSC CDM Methodologies provide simplified requirements on monitoring of distributed units. To apply these simplified requirements, there shall be no more than a gap of 24 months between consecutive surveys, and PAs/CPAs shall implement their first survey within 24 months of the implementation of the first unit of the PA/CPA.

19. If the survey is delayed for a period up to six months, an alternative 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 to collect data for the period of the delay. 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 justified by the project participants and validated by a DOE.

20. If the survey is delayed for a period up to six months and the original data collection method indicated in the monitoring plan was applied within 6 months from the date when

it was due<sup>2</sup>, and no alternative methods are applied as per the previous paragraph, then the penalty of ten per cent is applied to the emission reduction estimates for the period of the delay to which the survey results apply.

21. Paragraph 20: This section covers specific sampling requirements for PoAs or a group of project activities/PoAs for application by CME(s) to estimate parameter values through sampling.
22. 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<sup>3</sup> 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 cook-stoves, 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-cooking habits 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 for a group of project activities/PoAs applying 95/10 confidence/precision. Currently PoAs applying large-scale CDM methodologies are not included allowed to bundle for applying a single sampling plan covering a group of CPAs pending further analysis.

## Document information

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01.0	14 October 2016	MP 71, Annex 13 To be considered by the Board at EB92
Decision Class: Regulatory Document Type: Information note Business Function: Methodology Keywords: MRV, calculations, monitoring plan, management of official documentation, residential consumer		

<sup>2</sup> 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.

<sup>3</sup> 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).