

CDM-MP84-A10

Draft Standard

**Sampling and surveys for CDM project
activities and programmes of activities**

Version 09.0

DRAFT



United Nations
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Climate Change

COVER NOTE

1. Procedural background

1. The Methodologies Panel (MP), while working on the request for revision "SSC_805: Revision to include an option to use remote biogas monitoring in AMS-I.E., AMS-I.I. and AMS-III.R" (regarding AMS-I.I. ver. 4, AMS-I.E. ver. 11 and AMS-III.R. ver. 3), identified an issue related to sample size calculation for the proportion parameter if the expected proportion is close to 1.

2. Purpose

2. The purpose of this work is to revise the "Standard for sampling and surveys for CDM project activities and programmes of activities" (sampling standard).

3. Key issues and proposed solutions

3. The MP identified an issue related to sample size calculation for the proportion parameter if the expected proportion is close to 1, and agree to revise the sampling standard to address this issue. If the expected proportion is very high (e.g. close to 1) or very low (e.g. close to 0.1), then the equations and methods provided in the sampling standard and guidelines do not work. While this aspect had been already indicated in the sampling standard, it was observed that some project developers did not follow the requirements properly. Therefore, the MP was of the view that the issue should be further clarified.
4. Taking into account inputs from statistical experts, two solutions are proposed in the revised sampling standard: using a more stringent precision criterion (e.g. using a precision of 5 percent instead of 10 percent in relative terms), or lowering the expected proportion while keeping the same precision in relative terms.

4. Impacts

5. The proposed revisions will enhance the accuracy of sample size calculation for CDM surveys undertaken by project participants.

5. Subsequent work and timelines

6. The MP, at its 84th meeting, recommended that the Board approve the revision of the standard. No further work is envisaged.

6. Recommendations to the Board

7. The MP recommends that the Board to approve the draft revised standard, to be made effective at the time of the Board's approval.

| TABLE OF CONTENTS | | Page |
|--------------------------|--|-------------|
| 1. | INTRODUCTION | 4 |
| 2. | SCOPE, APPLICABILITY AND ENTRY INTO FORCE | 4 |
| 3. | DEFINITIONS | 4 |
| 4. | SAMPLING REQUIREMENTS | 5 |
| 5. | SPECIFIC SAMPLING REQUIREMENTS FOR PROGRAMMES OF ACTIVITIES | 10 |
| 6. | VALIDATION AND VERIFICATION OF SAMPLING PLANS | 11 |

1. Introduction

1. This document includes the requirements for sampling and surveys applied to clean development mechanism (CDM) project activities and programmes of activities (PoAs).

2. Scope, applicability and entry into force

2. This standard is applicable to CDM project participants, coordinating/managing entities and designated operational entities (DOEs).
3. This document specifies the reliability requirements and describes appropriate sampling methods and what is expected to be provided in a sampling plan. The general requirements shall be applicable to both small-scale and large-scale CDM project activities and PoAs,¹ with any requirements specified in the applied methodologies taking precedence. This document also provides sampling-related requirements pertaining to validation and verification, including the sampling approach to be undertaken by the validating/verifying DOEs. A definition of essential sampling terminology is contained in section 3 below.
4. This document only addresses random errors associated with sampling and does not address systematic (non-random) errors.
5. The date of entry into force is the date of the publication of the **EB XX** meeting report on **DD Month YYYY**.

3. Definitions

6. 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 PoAs; the sample is a subset of these households. A characteristic of the population, such as the average number of hours of operating a biogas stove, or the 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 achieve this;
 - (b) The distinction regarding different types of data (mean vs. proportion) is important when determining the size of the sample. “Mean (average) values” are derived from data that are often referred to as continuous variables, whilst “proportion (or percentage) values” are derived from data that are described as attributes, yes/no data or binary data. The following examples reflect different types of data when the

¹ Afforestation/reforestation (A/R) project activities and A/R PoAs are excluded in the current version.

determination of greenhouse gas (GHG) emission reductions achieved by a CDM project activity requires sampling:

- (i) Mean value for a parameter such as the average annual hours of operation of light bulbs to estimate energy savings or the average methane content in the biogas recovered from biogas digesters. It can also be the efficiency of replaced equipment to estimate the characteristics of an equipment or a technology, or it may be an output/input of an equipment or technology;
 - (ii) Proportion value such as the percentage of units still in operation included in a replacement programme to estimate the changes of the operating characteristics of a technology or process;
- (c) The parameter estimates that are calculated from the sample data should be: (a) “unbiased” and (b) “reliable” estimates of the population parameters since they will be used in the calculations of GHG emission reductions:
- (i) An unbiased estimate is one that does not systematically underestimate or overestimate the parameter value it is representing. Non-sampling errors are a main cause of estimates being biased, but the choice of sampling design can also have a bearing on whether an estimate is biased or unbiased;
 - (ii) Reliability of a sample-based estimate is typically expressed in terms of the probability that the population parameter value falls within a specified distance from the sample-based estimate. The probability is called the “confidence”, and the distance is referred to as the “precision”. Precision can be expressed in absolute units or in relative (percentage) terms, that is, as a percentage of the anticipated target value. This standard uses relative units for the proportion value of parameters as well as for the mean value of parameters used in the calculation. Confidence is the likelihood that the sampling has resulted in the target value within a certain range of values (i.e. precision);
 - (iii) A high level of confidence is desirable, and levels of 90 per cent and 95 per cent confidence are commonly used. Equally, small margins of error are desirable, and frequently a precision of ± 10 per cent is used. The required reliability (both precision and confidence) determines the sample size.
7. For mandatory provisions, the term “shall” is used throughout this standard. The term “should” is used for indicating a typical means for meeting a requirement, the term “may” is used to indicate what is permitted.

4. Sampling requirements

8. Project design documents (PDDs), programme of activities design documents (PoA-DDs), or component project activity design documents (CPA-DDs) utilizing sampling for the

determination of parameter values for calculating GHG emission reductions shall include² a sampling plan³ with a description of the sampling approach, important assumptions, and justification for the selection of the chosen approach.

9. The purpose of sampling is to obtain: (a) unbiased and (b) reliable estimates⁴ of the mean value of parameters used in the calculations of GHG emission reductions.⁵
10. Requirements for sampling are defined either in the applicable CDM methodology or in the paragraphs below, with the applied methodology having precedence.
11. Where there is no specific guidance in the applied methodology, the project participants or the coordinating/managing entity shall use 90/10 confidence/precision as the criteria for the reliability of sampling efforts for small-scale CDM project activities and 95/10 for large-scale CDM project activities.⁶ Where two or more project activities, CPAs or PoAs are grouped for undertaking a common survey it shall be ensured that a confidence/precision of 95/10 is achieved for each of the project activity, CPA or PoA that is included in the group for the survey. This reliability specification shall be applied to determine the sampling requirements for each individual parameter value determined through a sampling effort.^{7, 8}

² As per the requirements in the relevant sections of the “CDM project standard for project activities” or “CDM project standard for programmes of activities”, the project participants or the coordinating/managing entity may choose to submit the monitoring plan (of which the sampling plan is a part) for the proposed CDM project activity, PoA or CPA either at the time of validation or: (a) at any time prior to the submission of request for issuance for the first monitoring period; or (b) together with the request for issuance for the first monitoring period.

³ Revision to the sampling plan included in a registered PDD or PoA-DD, for example to shift to a single sampling plan across CPAs of a PoA from separate sampling efforts in each CPA, may be proposed following the procedures for changes to a registered CDM project activity or PoAs in the “CDM project cycle procedure for project activities” or the “CDM project cycle procedure for programmes of activities”, respectively.

⁴ See section 3 for essential sampling terminology.

⁵ Sampling may also be employed by DOEs to assess compliance with requirements, validity of assumptions or other information used within PDDs, PoA-DDs, CPA-DDs or monitoring reports (e.g. biomass availability, information on prevailing practice).

⁶ Minimum frequency of survey efforts to be undertaken for the purposes of monitoring and the use of the survey results for the respective monitoring reports are indicated in the methodologies or in the “General guidelines for SSC CDM methodologies”.

⁷ The reliability of a sample-based estimate depends on both the numerical size of the sample and the variability associated with the parameter of interest. The larger the sample size, the greater the reliability, whereas the relationship with the variability is the opposite, that is, the more variable the parameter, the less reliable the estimate. If a parameter has a large amount of variability, increasing the sample size will help to increase the reliability. An assessment of the variability will also deliver information on the need for stratification.

⁸ If there is more than one parameter to be estimated in a CDM project activity, then a sample size calculation should be done for each of them. Then either the largest number for the sample size is chosen for the sampling effort with one common survey, or the sampling effort and survey is repeated for each of the parameters. A random sub-sample within the common survey is allowed as long as: (i) the reliability specification (e.g. 90/10 confidence/precision for small-scale CDM project activities and 95/10 for large-scale CDM project activities) is achieved for each individual parameter; and (ii) the random sub-sample is consistent with the design of the survey and the corresponding sample size calculation.

12. Precision of 10 per cent, that is, ± 10 per cent in this standard, shall be interpreted:
- (a) As a relative unit when the parameter of interest is a proportion (or a percentage). For instance, ± 10 per cent in relative units means that the interval around a proportion value of 70 per cent is 63 per cent to 77 per cent. A proportion can describe either of the two possible scenarios of the success rate (p) or the failure rate ($1-p$), for example (i) cookstove still operational or (ii) cookstove no longer operational. The project participants or the coordinating/managing entity may use the larger of the two proportions in the sample size calculation, that is p or $(1-p)$, in any of the monitoring periods during the crediting period without having to revise the monitoring plan;⁹
 - (i) CDM project activities or PoAs that are registered or have requested for registration before the approval of version 3.0 of this standard, that is, before 13 September 2012 with the interpretation of 10 per cent precision as an 'absolute' unit in the PDD or PoA-DD shall apply the requirement of 'relative' unit for the precision through a revision of the sampling plan no later than 13 September 2015. The procedures for post-registration changes indicated in the "CDM project cycle procedure for project activities" or the "CDM project cycle procedure for programmes of activities" shall be followed to update the monitoring plans;
 - (b) When the parameter of interest is a proportion, it is essential to ensure in the sample size calculation that the target proportion $p + 10$ percent in relative terms remains below 1, as the proportion scale cannot exceed 1¹⁰. If this is not the case, the issue can be resolved by either:
 - (i) Applying a more stringent relative precision, i.e. using a relative precision sufficiently lower than 10 percent, or;
 - (ii) Lowering the anticipated value of p sufficiently away from 1;
 - (c) As a relative term when the parameter of interest is a mean. For example, ± 10 per cent in relative terms means that the interval around a mean value of 4 is 3.6 to 4.4.
 13. When developing a sampling plan, the project participants or the coordinating/managing entity shall calculate the sample size required to achieve a required level of reliability. The sample size should be determined manually or using appropriate statistical software. The

⁹ The check on meeting the reliability requirement should be based on the larger of the two proportions.

¹⁰ For example, consider the parameter corresponding to the proportion of cookstoves still in operation at the end of the monitoring period. If the expected value of this proportion (p) is very close 1 (say 0.95), then $p + 0.1p$ in relative terms will be: $0.95 + 0.1 \times 0.95 = 1.045$. However, the result of this calculation shall remain below 1. If there is evidence to support an expected proportion close to 1, using a more stringent precision criterion will solve this problem. In this case, using a precision of 5 percent instead of 10 percent in relative terms will give: $0.95 + 0.05 \times 0.95 = 0.9975$, which is below 1. Alternatively, lowering the expected proportion, say from 0.95 to 0.9, while keeping the same precision of 10 percent in relative terms will also cure the problem. In this case, using an expected proportion of 0.9 will give: $0.9 + 0.1 \times 0.9 = 0.99$, which is below 1. Therefore, when high proportions are expected, it is necessary to ensure that $p + 0.1p < 1$, by undertaking adjustments such as those described here.

calculation is dependent on all of the following as well as the target level of confidence and the precision (e.g. 90/10 or 95/10):¹¹

- (a) The type of parameter of interest, that is, mean value or proportion value;
 - (b) The target value, that is, the expected value of the parameter, which should be determined using the project participants' or the coordinating/managing entity's knowledge and experience.¹²
 - (c) Expected variance (or standard deviation)¹³ for that measure in the sample, based on the results from similar studies including other similar CDM project activities or previous monitoring periods, pilot studies,¹⁴ or from the project planner's own knowledge of the data.¹⁵
14. If the sample size calculation returns a value of less than 30 samples, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion.¹⁶ If the parameter of interest is a numeric mean value (i.e. not a proportion or percentage) the Student's t-distribution shall be used if the resulting sample size is less than 30.
15. Subject to the two requirements of unbiased estimates and achieving reliability levels for the specific parameter determination, the project participants or the coordinating/managing entity shall have a 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, and other conditions surrounding the project activity in question. Some of the most commonly used sampling methods are summarized in the "Guideline: 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 two or more project activities or PoAs, either stratified random sampling shall be applied or, if other methods of sampling are applied, it shall be demonstrated that the conservativeness and accuracy of the alternative method is at least at the same level as if stratified random sampling were conducted.

¹¹ It is a good practice to employ oversampling at the design stage, not only to compensate for any attrition, outliers or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved, and additional sampling efforts would be required. This would then be expensive, time-consuming and inconvenient.

¹² For example, 80 per cent of households will still have an operational cooker, the average household size is 4.5.

¹³ The variance is denoted by σ^2 (or s^2), and the standard deviation by σ or s . The standard deviation is the square root of the variance.

¹⁴ The project participants or the coordinating/managing entity may conduct a sample campaign before the monitoring period to determine the standard deviation.

¹⁵ If the parameter of interest is a proportion, or a percentage, then expected variance can be derived directly from the target value referred to in paragraph 132(b) above.

¹⁶ This is to improve the use of the normal approximation when calculating confidence intervals. for example in cases where a very high value is anticipated for the proportion of interest (that is $p > 0.9$ such as when 99 per cent of compact fluorescent lamps are functional) when calculations would return extremely small sample size.

16. Some CDM methodologies specify minimum required levels of precision and confidence for various categories of variables estimated by sampling. The samples shall be chosen so as to meet or exceed these minimum levels. The project participants or the coordinating/managing entity may request a revision of these requirements in the methodology or request a deviation from the methodology in accordance with the relevant procedures, providing sufficient justifications as to why a lower level is suitable for the planned application.
17. In addition to the parameters specifically indicated in the applied CDM methodologies that are to be determined through sampling, the project participants or the coordinating/managing entity may propose to obtain estimates of other variables using sampling techniques if that is the only practical or cost-effective means to obtain them. In those instances, the project participants or the coordinating/managing entity shall request a revision of the methodology, request deviation from the methodology, or request a clarification, in accordance with the relevant procedures before developing a sampling plan.
18. If the estimates from the actual samples fail to achieve the target minimum levels of precision,¹⁷ the project participants or the coordinating/managing entity shall either:
- (a) Perform additional data collection that is a supplemental or new sample to reach the required precision level; or
 - (b) Apply a correction to the estimates using one of the two options below:¹⁸
 - (i) Discounting the emission reduction estimates by either:
 - a. Taking the lower or the upper bound, whatever is the more conservative, of the 90 or 95 per cent confidence interval, depending on the type of methodologies applied; or
 - b. Discounting by no less than three times (x3) the percentage precision points missed (e.g. if the required precision is 90/10 and the attained precision is 90/11 then the GHG emission reduction estimates are discounted by 3 per cent);
 - (ii) Using a conservative default value included in the applied methodologies (e.g. 3.5 hours for lighting usage for AMS-II.J, default failure rates¹⁹ provided in equation 3 of AMS-II.J);
 - (c) The option in subparagraph (b) above is only eligible for the application to the survey undertaken during the first two years of the crediting period of the CDM project activity or component project activities (CPAs) (if sampling is undertaken at the PoA level, the two-year limit applies from the start date of crediting to the PoA),

¹⁷ The range of confidence and precision of data collected through sampling should be computed to see if the stipulated requirements in paragraph 10 are met.

¹⁸ Procedures for “temporary deviation from the monitoring plan as described in the registered PDD, PoA-DD, generic CPA-DD, or the monitoring methodology” of the CDM project cycle procedure do not need to be applied for this case.

¹⁹ Default values chosen should be conservative, for example by applying the failure rates of year X+2 for year X using the calculation method indicated in equation 3.

and when the attained confidence/precision from the actual samples is equal to or better than 90/15 for a small-scale CDM project activity and 95/15 for a large-scale CDM project activity.

19. When sampling is undertaken, unless otherwise specified in the applied CDM methodology, the sample mean (or proportion) value shall be used for the GHG emission reductions calculation, not the lower or upper bound of the confidence interval.
20. The recommended outline of a sampling plan is specified in the “Guideline: Sampling and surveys for CDM project activities and programmes of activities”. In all of the approaches, it shall be ensured that the samples are drawn in a manner that avoids any bias and that the data collection minimizes non-sampling (non-random, systematic) errors. In order to achieve these goals, the project participants or the coordinating/managing entity should observe sound practices in designing samples and administering surveys and field measurements as indicated in the “Guideline: Sampling and surveys for CDM project activities and programmes of activities”.

5. Specific sampling requirements for programmes of activities

21. This section covers specific sampling requirements for a PoA or a group of PoAs for application by the coordinating/managing entity to estimate parameter values through sampling.
22. Parameter values shall be estimated by sampling in accordance with the requirements in the applied CDM methodologies separately and independently for each of the CPAs included in the PoA except when a single sampling plan covering a group of CPAs is undertaken applying 95/10 confidence/precision²⁰ for the sample size calculation. In the latter case, the populations of all CPAs in the group are combined together, 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 when either homogeneity of included CPAs relative to the usage hours of light bulbs 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 the sample sizes may be calculated for each group. Currently PoAs applying large-scale CDM methodologies are not eligible for applying a single sampling plan covering a group of CPAs, pending further analysis.
23. In the case of CPAs solely composed of “microscale CDM units” as defined in the Methodological tool “Demonstration of additionality of microscale project activities”, 95/10 confidence/precision shall be applied for sampling surveys in all cases, even when they are conducted at the CPA level.

²⁰ 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. AMS-I.E, AMS-II.G or AMS-I.J.

6. Validation and verification of sampling plans

24. The proposed sampling plan shall be validated by a DOE²¹ to determine whether it will provide parameter value estimates in an unbiased and reliable manner. The validation includes determining:
- (a) Whether the proposed sample size and sampling method is adequate to achieve the minimum confidence/precision requirements. The DOE shall be able to reproduce the sample size calculation in order to validate the proposed sample size;
 - (b) Whether the proposed sampling plan will ensure that samples are randomly selected and are representative of the population.
25. The DOE shall verify whether the project participants or the coordinating/managing entity have implemented the sampling and surveys according to the sampling plan in the registered monitoring plan. The verification includes determining:
- (a) Whether the required confidence/precision has been met;
 - (b) Whether the selected sample was representative of the population.
26. The DOE may apply a sampling approach for on-site visits and/or remote surveys as part of validation/verification, applying the “Guideline: Sampling and surveys for CDM project activities and programme of activities”, irrespective of whether the above-mentioned sampling plan exists or the project participants or the coordinating/managing entity have undertaken sampling surveys.
27. When the project participants or the coordinating/managing entity have not applied a sampling approach, the DOE may apply a sampling approach, choosing a different confidence/precision than the ones indicated in paragraph 11 above, provided that samples are randomly selected and are representative of the population.
28. When the project participants or the coordinating/managing entity have applied a sampling approach, the DOE may apply acceptance sampling as described in the steps indicated in paragraphs 29–38 below as part of validation²²/verification activities.
29. For applying acceptance sampling, the DOE should follow the steps below:
- (a) Take a random sample of the project participants’ or the coordinating/managing entity’s sample records;
 - (b) Check, using its own professional judgement, the acceptability (or otherwise) of the data for each record in the project participants’ or the coordinating/managing entity’s sample records; and then

²¹ Recommended evaluation criteria are included in the “Guideline: Sampling and surveys for CDM project activities and programmes of activities”.

²² Assessment of parameters determined ex ante by the project participants or the coordinating/managing entity is included.

- (c) Based on the number of records where there is agreement, determine whether the project participants' or the coordinating/managing entity's sample records meet the requirements.
30. In order to determine the sample size, the DOE should specify in advance, using its own professional judgement:
- (a) Acceptable quality level (AQL) or the level of assurance, that is the proportion of acceptable discrepancies between the project participants' or the coordinating/managing entity's sample records and the DOE sample records (i.e. DOE field/on-site inspection results) (e.g. 1 per cent);
- (b) Unacceptable quality level (UQL), that is the proportion of unacceptable discrepancies between the project participants' or the coordinating/managing entity's sample records and the DOE sample records, e.g. 20 per cent.
31. The maximum errors associated with the determination indicated in paragraph 30 above should remain at levels indicated below:
- (a) A 10 per cent chance that the DOE will wrongly reject the project participants' or the coordinating/managing entity's records (i.e. reject a set of records of acceptable quality);²³
- (b) A 10 per cent chance that the DOE will wrongly accept the project participants' or the coordinating/managing entity's records (i.e. accept a set of records which is unacceptable).²⁴
32. Using provisions under paragraphs 30 and 31 above, the DOE should determine:
- (a) n : the size of the sample;²⁵
- (b) c : the acceptance number.
33. If the number of discrepant records is equal to or less than c , the project participants' or the coordinating/managing entities' set of records is accepted. The table 2 below showing, "Sample size and acceptance number based on producer and consumer risk", may be used as reference.
34. The table provides only idealised numerical targets. As indicated in paragraph 28(b), the DOE may exercise professional judgement to determine if its records are compatible with the project participants' or the coordinating/managing entities' set of records and hence determine if they can be accepted or not. The DOE may allow for factors affecting individual measurements, leading to discrepancies. For example, the DOE may consider

²³ This is called the "producer's risk".

²⁴ This is called the "consumer's risk".

²⁵ A DOE shall determine a sample size for each parameter. If there are multiple parameters, the DOE should take the largest sample size from the different parameters, for example if the sample size for parameter-1 is 50 and sample size for parameter-2 is 55, sample size chosen to cover both the parameters is 55.

if the discrepancy observed between the project participants' or the coordinating/managing entities' set of records and the DOE's record is attributed to:

- (a) A temporal issue (e.g. technology retention rate/performance is known to deteriorate over time); or
 - (b) A weather-related issue (e.g. flooding in which project technology or measuring instrument was affected during a specific period of time); or
 - (c) Another issue not under the control of the project participants (e.g. unexpected high or low voltage incidence in the grid); or
 - (d) Other issues related to technology characteristics and survey methods (see Table 2: Survey and data collection methods and preference for use of the "Guideline: Sampling and surveys for CDM project activities and programmes of activities").
35. In this respect, the DOE may reclassify initial discrepant records into conforming measurements and provide justification. The DOE should check that physical measurements were collected as per established methods in accordance with the applicable CDM standards/methodologies (See Table 2 of the "Guideline: Sampling and surveys for CDM project activities and programmes of activities").
36. If the number of discrepant records is greater than c , the DOE should ensure that due consideration was given to reasonable adjustments when comparing DOE and the project participants' or the coordinating/managing entities' set of records, as stated above, and document this.
37. The Table 1 below summarizes some example points to be considered in various scenarios.

Table 1. Example points to be considered when comparing DOE and the project participants' or the coordinating/managing entities' set of records

| Parameter | How the project participants or the coordinating/managing entity conducted sampling surveys (to obtain the project participants' or the coordinating/managing entities' records) | How the DOE could obtain records for verification | Criteria for deciding what ultimately constitutes a discrepancy |
|--|--|--|--|
| % of improved cook stoves (ICS) in operation | Sampling-based survey (e.g. questionnaire surveys/interviews) | Cross-check of a sample of project participants' samples (e.g. questionnaire surveys/interviews) | DOE results, accounting for duly justified differences |
| Efficiency of improved cook stoves (ICS) | Procedures allowed for efficient test prescribed by applicable CDM methodologies (e.g. ISO, Water Boiling Tests) | Check the test reports/methods; Check qualifications/capability of testers; | Whether conducted by qualified institutions/testers; Whether conducted in accordance with approved established |
| Water quality | Water quality tests prescribed by applicable CDM methodologies | Witnessing of testing, if feasible. | international/national standards, procedures and test methods prescribed by applicable CDM methodologies. |

38. If the DOE observes greater than c discrepant records in the sample, the project participants' or the coordinating/managing entities' set of records is not accepted. In this case, providing due justifications, one of the following options may be chosen:
- The DOE, if requested by the project participants or the coordinating/managing entity, may consider assessing additional samples (increasing the sample size by decreasing the UQL but not decreasing the consumer and producer risk). Denote the new acceptance number by c_{new} . If the resulting discrepancy is within the new specified limits (i.e. less than or equal to c_{new} discrepant records), the project participants' or the coordinating/managing entities' set of records is accepted. If the number of discrepant records remain greater than the acceptance number, now c_{new} , the DOE may raise a corrective action request to project participants or the coordinating/managing entity (e.g. revised estimation of emission reduction to err on the conservative side, undertaking additional surveys) or may reject the project participants' or the coordinating/managing entities' set of records; or
 - The DOE may raise a corrective action request to project participants or the coordinating/managing entity (e.g. revised estimation of emission reduction to err on the conservative side, undertaking additional surveys) or may reject the project participants' or the coordinating/managing entities' set of records.
39. A DOE may select a different sample size than the one indicated in paragraph 32 above, either by choosing a different value for the consumer risk and producer risk (e.g. 20 per cent for the consumer risk) when applying acceptance sampling or by using another approach, if any of the following conditions apply:
- The estimated volume of annual GHG emission reductions of the project activity or the PoA being verified is equal to or less than 100,000 t CO₂ eq.;
 - The security conditions in the project region prevents inspection of many samples (e.g. conflict zones); or
 - The project activity or the PoA is located in a least developed country or a host Party with 10 or fewer registered CDM project activities at the end of the monitoring period being verified.

Table 2. Sample size and acceptance number based on AQL, UQL, and producer and consumer risks

| Producer risk | | 5% | | 5% | | 5% | | 5% | |
|---------------|-----|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|
| Consumer risk | | 5% | | 10% | | 15% | | 20% | |
| AQL | UQL | Sample size (n) | Acceptance number (c) | Sample size (n) | Acceptance number (c) | Sample size (n) | Acceptance number (c) | Sample size (n) | Acceptance number (c) |
| 0.5% | 10% | 46 | 1 | 38 | 1 | 33 | 1 | 29 | 1 |
| 0.5% | 15% | 30 | 1 | 25 | 1 | 22 | 1 | 10 | 0 |
| 0.5% | 20% | 22 | 1 | 18 | 1 | 9 | 0 | 8 | 0 |
| 1.0% | 10% | 61 | 2 | 52 | 2 | 33 | 1 | 29 | 1 |
| 1.0% | 15% | 30 | 1 | 25 | 1 | 22 | 1 | 19 | 1 |
| 1.0% | 20% | 22 | 1 | 18 | 1 | 16 | 1 | 14 | 1 |

| Producer risk | | 10% | | 10% | | 10% | | 10% | |
|---------------|-----|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|-----------------|-----------------------|
| Consumer risk | | 5% | | 10% | | 15% | | 20% | |
| AQL | UQL | Sample size (n) | Acceptance number (c) | Sample size (n) | Acceptance number (c) | Sample size (n) | Acceptance number (c) | Sample size (n) | Acceptance number (c) |
| 0.5% | 10% | 46 | 1 | 38 | 1 | 19 | 0 | 16 | 0 |
| 0.5% | 15% | 19 | 0 | 15 | 0 | 12 | 0 | 10 | 0 |
| 0.5% | 20% | 14 | 0 | 11 | 0 | 9 | 0 | 8 | 0 |
| 1.0% | 10% | 46 | 1 | 38 | 1 | 33 | 1 | 29 | 1 |
| 1.0% | 15% | 30 | 1 | 25 | 1 | 22 | 1 | 10 | 0 |
| 1.0% | 20% | 22 | 1 | 18 | 1 | 9 | 0 | 8 | 0 |

Document information

| Version | Date | Description |
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| 09.0 | 12 April 2021 | MP 84, Annex 10 To be considered by the Board at EB 110. Revision to address the issue related to sample size calculation for the proportion parameter. |
| 08.0 | 28 November 2019 | EB 105, Annex 1 Revision to include additional requirements and guidance for DOEs to verify sampling surveys conducted by project participants and coordinating/managing entities. |
| 07.0 | 4 May 2017 | EB 94, Annex 2 Revision to include an option to undertake a common survey for a group of project activities or group of PoAs. |
| 06.0 | 23 February 2017 | EB 93, Annex 10 Revision to include more options (e.g. remote surveys) for sampling-based approach for validations and verifications by DOEs. |
| 05.0 | 16 October 2015 | EB 86, Annex 3 Revision to: <ul style="list-style-type: none"> Clarify the timing submitting a sampling plan for the case of the delayed submission of a monitoring plan by project proponents in line with section 7.2.8 of the CDM Project Standard, and; Clarify the requirements for sampling and survey when there is more than one parameter to be estimated in a CDM project activity. |
| 04.1 | 28 November 2013 | Editorial revision to correct a reference in document information table. |

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|----------------|-------------------|---|
| 04.0 | 26 July 2013 | <p>EB 74, Annex 6 Revision to include the requirements for programme of activities:</p> <ul style="list-style-type: none"> • To include discounting approaches to meet the reliability requirements for the survey; • To clarify the requirements on application of relative precision; • To include more options for sampling for validation and verification. |
| 03.0 | 13 September 2012 | <p>EB 69, Annex 4 Revisions are:</p> <ul style="list-style-type: none"> • To clarify that greater of the two proportions (success or failure rate), should be used in the sample size calculations; • To specify a minimum sample size of 30; • To allow the use of data from other CDM projects or other monitoring periods to estimate standard deviation as an option; • To clarify circumstances under which discounting or the lower bound or upper bound around the mean can be employed; • To clarify that acceptance sampling by the DOE to verify the sampling records of the project proponent is optional; • To move the appendix 1 to this standard to the new section of "Definitions"; • To delete all other appendices to include them in the "Guidelines for sampling and surveys for CDM project activities and programme of activities". |
| 02.0 | 25 November 2011 | <p>EB 65, Annex 2 To include:</p> <ul style="list-style-type: none"> • Requirements for large-scale projects and PoAs; • Sampling related specifications on validation/verification of CDM projects and PoAs by a DOE; • Title change due to new content in document. <p>This document supersedes General guidelines for sampling and surveys for SSC project activities (version 01.0) (Annex 30, EB 50 meeting report).</p> <p>Due to the overall modification of the document, no highlights of the changes are provided.</p> |
| 01.0 | 23 October 2009 | <p>EB 50, Annex 30 Initial adoption.</p> |

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