<新方法論> 別添１

PROPOSED NEW BASELINE AND MONITORING METHODOLOGIES
(CDM-NM) - Version 03.1

CDM – Executive Board

CDM: Proposed New Methodology **Meth Panel recommendation to the Executive Board** **To be completed by UNFCCC Secretariat**	
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NM0xxx Version ## (to be completed by UNFCCC)

CLEAN DEVELOPMENT MECHANISM
PROPOSED NEW BASELINE AND MONITORING METHODOLOGIES
(CDM-NM)
(Version 03.1)

CONTENTS

Instructions for using this form

In using this form, please follow the guidance established in the following documents:

- Guidelines for completing the project design document (CDM-PDD) and proposed new baseline and monitoring methodologies (CDM-NM);
- Technical guidelines for the development of new baseline and monitoring methodologies (contained in part III of the above);
- Relevant methodological guidance by the Executive Board.

This guidance can be found at <https://cdm.unfccc.int/Reference/Guidclarif/index.html>

Formatting Instructions:

- The form provides the formatted headings which should be used throughout the document;
- Please note that each paragraph in section C and D should have a paragraph number, as demonstrated through example. When adding further paragraphs, please ensure it is numbered;
- Please use word equation editor to write equations;
- Please format figures, tables and footnotes to update automatically;
- Please note the footnotes have a separate format (Times New Roman - size 10).[1]

Please complete sections B to E. In section C, the text shaded in grey shall not be changed, whereas other text is used as an example and may be changed or deleted.

[1] Format for footnotes.

Section A. Recommendation by the Methodological Panel (to be completed by the Meth Panel)

Recommendation (preliminary or final / approval or rejection / consolidation)

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2. Major changes required

>>

3. Minor changes required

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Section B. Summary and applicability of the baseline and monitoring methodology

1. Methodology title (for baseline and monitoring), submission date and version number

Methodology for introduction of energy efficient air conditioners to households
Version 01.1
27/10/2011

2. If this methodology is based on a previous submission or an approved methodology, please state the reference numbers (NMXXXX/AMXXXX/ACMXXXX) here. Explain briefly the main differences and their rationale.

This is a new methodology submission. This methodology is applicable specifically to the replacement of the existing air conditioners by new energy efficient air conditioners, and to new installation of energy efficient air conditioner.

The methodology uses elements from the following approved methodologies:

- AM0046: Distribution of efficient light bulbs to households - Version 2.0
- AM0060: Power savings through replacement by energy efficient chillers - Version 1.1
- AM0086: Installation of zero energy water purifier for safe drinking water application - Version 1.1.0
- AMS-II.C: Demand-side energy efficiency activities for specific technologies – Version 13.0

Among above approved methodologies listed, AM0060 is used as a basis for the applicability condition related to refrigerants handling within the project activity, where as AM0046 and AM0086 are used as basis for sampling process adopted in the methodology.

3. Summary description of the methodology, including major baseline and monitoring methodological steps

This methodology applies to project activities that involve installation and operation of energy efficient air conditioners in individual households within the project area.

1) Applicability conditions

This methodology is applicable to the replacement of the existing air conditioners by new energy efficient air conditioners, and to new installation of energy efficient air conditioner. In the absence of project activity, continuing use of existing conventional air conditioners or installation of new but less efficient air conditioners of similar rated cooling/heating capacity would occur.

2) Baseline scenario selection

Baseline scenario is determined either by conducting a baseline sampling survey to identify the common practice exist in the project area or by conducting a market sampling survey to identify the most economically attractive alternative available in the project area.

3) Demonstration of additionality

Additionality of the project activity is demonstrated by applying investment analysis against the identified alternatives or the benchmark and demonstrating that the project activity would not be financially attractive in the absence of CDM.

4) Baseline emission calculations

Baseline emissions consist of the electricity consumption by air conditioners that would have been used within the project area. The electricity consumption under the baseline scenario is determined using the increase of the energy efficiency and the monitored electricity consumption under project scenario.

5) Project emission calculations

Project emissions consist of the electricity consumption by energy efficient air conditioners installed by the project activity. Actual metered electricity consumption by selected air conditioners is used to calculate the total electricity consumed by the air conditioners under the project activity.

6) Leakage emission calculations

No leakage emission is envisaged from the project activity covered under the methodology.

7) Emission reductions

Emission reductions are calculated as the difference between baseline emissions, and project and leakage emissions.

Section C. Proposed new baseline and monitoring methodology

Draft baseline and monitoring methodology AMXXXX

"Methodology for introduction of energy efficient air conditioners to households"

I. SOURCE, DEFINITIONS AND APPLICABILITY

Sources

This consolidated baseline and monitoring methodology is based on some elements from the following approved baseline and monitoring methodologies:

- AM0046 "Distribution of efficient light bulbs to households" - Version 2.0
- AM0086 "Installation of zero energy water purifier for safe drinking water application" - Version 1.1

- AM0060 "Power saving through replacement by energy efficient chillers" - Version 1.1.0
- AMS-II.C. "Demand-side energy efficiency activities for specific technologies" – Version 13.0

This methodology also refers to the following tool:

- Tool to calculate the emission factor for an electricity system – Version 2.2.1.

For more information regarding the approved new methodologies and the tools as well as their consideration by the Executive Board please refer to http://cdm.unfccc.int/goto/MPappmeth.

Selected approach from paragraph 48 of the CDM modalities and procedures

1. "Emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment"

Definitions: Please provide definitions of key terms that are used in this proposed new methodology

2. For the purpose of this methodology, the following definitions apply:

- **Air conditioner:** A home appliance, system, or mechanism designed to dehumidify and to extract heat from an area, in order to provide comfort during either hot or cold weather. An air conditioner is a "heat pump" that diverts heat from one location (the "source") at a lower temperature to another location (the "sink" or "heat sink") at a higher temperature using mechanical work. It uses a vapor-compression refrigeration device that includes a reversing valve and optimized heat exchangers so that direction of heat flow may be reversed.
- **Conventional air conditioner**: An air conditioner with a single operation mode, that is, only fully "on", otherwise it is "off".
- **Energy efficient air conditioner**: An air conditioner with a device or mechanism that varies its operation in a manner that conserves energy consumption, e.g. variable motor rotation speed according to the desired room temperature.
- **Rated cooling/heating capacity:** The amount of heat (kW) diverted from/to a space under standard testing conditions.
- **Cooling/heating capacity**: The capacity associated with the change in air enthalpy to raise or lower its temperature which includes both the Latent (i.e. associated with a change in humidity ration) and Sensible (associated with a change in dry-bulb temperature) capacities (kW)
- **Annual Performance Factor (APF)**: One of the measures of energy efficiency for air conditioners. The ratio of sum of heat removed from indoor atmosphere and heat added to the indoor atmosphere by an air conditioner throughout cooling and heating periods and the total amount of electricity consumed during the same periods. Takes into account not only power

consumption at rated time but also load conditions, such as the type of building where air conditioners are used, purpose of use of the building, outside air temperature while cooling or heating and efficiency of the air conditioner depending on the differing capacities of inverter devices, thus making it possible to evaluate energy consumption performance against utilization.

- **Coefficient of Performance (COP)**: One of the measures of energy efficiency for air conditioners. Ratio of cooling/heating capacity (kW) to the amount of energy input (kW), used generally as a measure of the energy-efficiency of air conditioners, space heaters and other cooling and heating devices. The higher the COP, the higher the efficiency of the equipment.

- **Integrated Part Load Value (IPLV)**: One of the measures of energy efficiency for air conditioners, especially those which are capable of capacity reduction. A single number cooling part-load figure of merit calculated per the method established by Air-Conditioning, Heating and Refrigeration Institute (AHRI). A simplified index established by ARI (Air conditioning & Refrigeration Institute) of the U.S. defining seasonal performance factor from Coefficients of Performance (COP) of four points with varying load conditions.

- **Project coordinator:** Entity which is a project participant organizing the project activity.

- **Project area:** Total geographical area in which energy efficient air conditioners are installed under the project activity.

- **Project activity implementation plan:** Project activity implementation plan provides basic information on how to implement the project activity. The information in the project activity implementation plan are the specific description of project area, project coordinator details, the total number of energy efficient air conditioners that are planned to be installed under the project activity in the project area over the duration of the crediting period, specification of energy efficient air conditioners implemented under the project activity, installation schedule, and database management plan.

- **Project sampling group (PSG):** Group of households in the project area which installed energy efficient air conditioner under the project activity. Electricity consumptions by the energy efficient air conditioner installed by this group of households are monitored throughout the crediting period to estimate the project and baseline emissions.

Applicability conditions

3. This methodology applies to the project activities in the category of energy demand.

4. This methodology applies to project activities that involve installation and operation of energy efficient air conditioners in individual households within the project area. This methodology is applicable to the replacement of the existing air conditioners by new energy efficient air conditioners, and/or new installation of energy efficient air conditioners. In the absence of project activity, continuing use of existing conventional, less efficient air conditioners and/or installation of new but less efficient air conditioners of similar rated cooling/heating capacity would occur.

5. The methodology is applicable under the following conditions:

- Electricity from the grid is the only energy used by air conditioners under project and baseline scenarios.

- All households participating in the project activity are connected to a national or regional electricity grid.

- Energy efficient air conditioners installed under the project activity are new and not transferred from another activity.

- The rated cooling capacity of the energy efficient air conditioners installed under the project activity at each household is not significantly smaller (maximum -10%) or significantly larger (maximum +50%) than the baseline air conditioner.

- Refrigerants that are contained in the energy efficient air conditioners installed under the project activity shall be CFC free.

- If the project activity involves replacement of existing air conditioners, the refrigerant contained in the existing air conditioner will be recovered and destroyed, or stored in suitable containers within suitable premises to ensure that the recovered, stored refrigerant gases can be monitored and tracked. Stored refrigerant gases may be withdrawn from storage for re-use, or for destruction by a method approved under regulations by the host country and/or pursuant to international treaties signed by the host country under Montreal, Kyoto or other Protocol that may in the future apply.

- Location of all energy efficient air conditioner installed under the project activity is traceable throughout the crediting period. In case any household stops the use of air conditioners installed under the project activity, this should be noted in the database and removed from the emissions reduction calculation.

- A measure is established within the project area which ensures all households participating in the project activity receive CDM benefit in a form other than CERs. Individual households participating in the project activity agree not to claim CER from the project activity.

- A project activity implementation plan that specifies the procedures for establishing the project activity is available and fully documented in the CDM-PDD. The information in the project activity implementation plan includes, but not limited to, the project area, project coordinator details, the total number of energy efficient air conditioners that are planned to be installed under the project activity in the project area over the duration of the crediting period, installation schedule, and database management plan.

6. Lastly, this methodology is not applicable if the identification of baseline scenario conducted prior to the project implementation concludes that the use of energy efficient air conditioner is the most plausible scenario in the project area.

II. BASELINE METHODOLOGY PROCEDURE

Project boundary

7. The **spatial extent** of the project boundary encompasses the physical, geographical location of the project area. The project boundary includes each energy efficient air conditioner installed under the project activity. The distinct geographical boundary of the project area shall be clearly identified in the CDM-PDD.

8. The project boundary also includes all electricity systems[2] (grid) to which participants to the project activity are connected. The spatial extent of an electricity system is as defined in the latest version of the "Tool to calculate emission factor for an electricity system".

9. The greenhouse gases included in or excluded from the project boundary are shown in Table 1.

Table 1: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from electricity consumption for operation of conventional air conditioners under the baseline scenario	CO_2	Yes	Main source of emissions.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
Project activity	Emissions from electricity consumption for operation of energy efficient air conditioners under the project scenario	CO_2	Yes	Main source of emissions.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.

Identification of the baseline scenario

10. The most plausible baseline scenario is identified through the following:

Identify the most economically advantageous air conditioner available in the market prior to the start of the project activity by adopting an investment analysis. The baseline scenario is that the air conditioner available in the market which is the most economically attractive course of action will be installed in individual households in the absence of the project activity.

11. The project participants shall identify the most plausible baseline scenario among realistic and credible alternatives available in the market within the project area by applying Step 2 (Investment analysis) of the latest approved version of the "Tool for the demonstration and assessment of additionality" (here after referred as the additionality tool).

12. The project participants shall conduct an investment analysis for air conditioners available in the market in the project area prior to the start of the project activity.

13. Identification of the air conditioners available in the market shall be determined through an official or third-party market research report (in the order of preference), if available, or through a market analysis conducted in a systematic and transparent manner by project participants. Details of how market analysis is conducted shall be described in CDM-PDD.

[2] Refer to the latest approved version of the "Tool to calculate the emission factor for an electricity system" for definition of an electricity system.

Through the investment analysis, project participants shall assess alternatives available in the market prior to the start of the project activity and identify the most economically attractive scenario in the absence of the project activity.

14. The identified most economically attractive alternative is considered as the baseline scenario and the energy efficiency of the identified alternative are considered as the baseline energy efficiency for the project activity.

15. This investment analysis is conducted once prior to the implementation of the project activity, and once at the time of crediting period renewal.

Additionality: Please describe the procedure for demonstrating additionality

16. To demonstrate additionality of the project activity, the project participants shall apply following two steps described in the latest version of the additionality tool approved by the Board.

Step 1: Identification of alternatives to the project activity consistent with mandatory laws and regulations.
Step 2: Investment analysis

17. Project participant is allowed to apply either Option II (investment comparison analysis) or Option III (benchmark analysis) under Step 2 of the additionality tool.

18. When investment analysis is conducted for identification of the baseline scenario, a separate assessment is not necessary and the investment analysis result from the identification of the baseline scenario can be utilized for demonstrating additionality.

Baseline emissions

19. Baseline emissions include CO_2 emissions from electricity would have been consumed by conventional air conditioner that would have been in operation in the absence of the project activity.

20. The baseline emissions are conservatively determined by incorporating the standard deviation in electricity consumption monitored during the project activity.

21. The baseline emissions are calculated as follows:

$$BE_y = BE_{EC,y} = EC_{BL,y} \times EF_{CO2,ELEC,y} \quad (1)$$

Where:

BE_y = Baseline emissions in year y (t CO_2/yr)

$BE_{EC,y}$ = Baseline emissions from electricity consumption in year y (t CO_2/yr)

$EC_{BL,y}$ = Quantity of electricity that would be consumed by conventional air conditioners in the absence of the project activity in year y (MWh/yr)

$EF_{CO2,ELEC,y}$ = CO_2 emission factor for electricity from the grid from which electricity is supplied to the air conditioners in the absence of the project activity in year y (t CO_2/MWh)
This value is calculated using the latest version of "Tool to calculate the emission factor for an electricity system".

Determination of electricity consumptions by conventional air conditioners in the absence of the project activity ($EC_{BL,y}$)

22. Electricity consumptions under the baseline scenario is calculated as follows:

$$EC_{BL,y} = n_{ac,PJ,y} \times (1 - DF_y) \times \left(\frac{\eta_{ac,PJ}}{\eta_{ac,BL}} \right) \times \left(\mu_{EC,PGS,y} - \frac{\sigma_{EC,PSG,y}}{\sqrt{n_{ac,PSG,y}}} \right) \quad (2)$$

Where:

$EC_{BL,y}$ = Quantity of electricity that would be consumed by conventional air conditioners in the absence of the project activity in year y (MWh/yr)

$n_{ac,PJ,y}$ = The total number of energy efficient air conditioners installed within the project area under the project activity in year *y* (unit). The ex-ante value is stated in the project implementation plan. Updated annually based on the project database managed by project coordinator.

DF_y = Discount factor accounting for project air conditioners that are installed under the project activity but no longer operating in year *y*. This value is determined by the procedure set forth in Paragraph 24 thru 27 and equation (4) in the methodology.

$\eta_{ac,PJ}$ = Efficiency of the energy efficient air conditioner under the project scenario. Representative indicator is selected by the project participant. This is the value of the selected representative indicator for the project air conditioner installed under the project activity. This figure, determined by using one of the two options mentioned in the monitoring methodology is provided in the project implementation plan and fixed throughout each crediting period. This value is updated at the time of each crediting period renewal.

$\eta_{ac,BL}$ = Efficiency of the air conditioner under the baseline scenario. Representative indicator is selected by the project participant.
This value is identified as the result of baseline scenario determination process in the methodology. This value is determined once prior to the start of the project activity and fixed throughout each crediting period. This value is updated at the time of each crediting period renewal.

$\mu_{EC,PSG,y}$ = Mean annual electricity consumption by an energy efficient air conditioners monitored under the project activity (MWh/yr/unit)
This value is calculated using the below equation (5) in the methodology.

$\sigma_{EC,PSG,y}$ = Standard deviation of annual electricity consumption by an energy efficient air conditioner monitored under the project activity (MWh/yr/unit)
This value is calculated using the below equation (6) in the methodology.

$n_{ac,PSG,y}$ = Total number of energy efficient air conditioners installed in the PSG households under the project activity that is operating in year *y* (unit)

Determination of the total number of energy efficient air conditioners installed within the project area under the project activity in year y ($n_{ac,PJ,y}$)

23. The total number of energy efficient air conditioners installed under the project activity during a specific year within the crediting period is updated based on the project database managed by project coordinator.

Determination of a discount factor accounting for project air conditioners that are installed under the project activity but no longer operating in year y (DF_y)

24. A random sampling survey among households participating in the project activity is conducted annually to determine the discount factor which accounts for project air conditioners that are no longer operating.

25. Project participants shall apply the following two steps for random spot check:

Step 1: Determination of the sample size for the random survey
Step 2: Conduct a random survey as a spot check

26. The detailed procedure of the random spot check is given below.

Step 1: Determination of the sample size for the random survey

Sample size is determined by the formula[3] given below.

$$n_{ac,rss,total,y} = \frac{z^2 \cdot x \cdot y \cdot N_{PJ,y}}{e^2\left(N_{PJ,y} - 1\right) + z^2 \cdot x \cdot y} \quad (3)$$

Where:

$n_{ac,rss,total,y}$ = The total number of air conditioners included in the sample group for random sampling survey for DF determination (unit).

$N_{PJ,y}$ = Population size in the project area. The population will be restricted to the number of households participating in the project activity in year *y* (unit).

x = Estimate of variance in the primary variables of interest in the survey (0.5)

[3] The formula known as Cochran formula for a finite population

y = 1-x (0.5)

e = Precision level or acceptable margin of error (5% or 0.05)

z = Z-value as the value of the standard variate at 95% confidence level, to be obtained from the z-distribution table (1.96)

Step 2: Conduct a random survey as a spot check

A random survey is conducted among households participating in the project activity by using the questionnaires as given in Appendix A to this methodology. Household included in PSG survey is determined in accordance with the sampling plan stipulated in Appendix A to this methodology.

The following survey principles shall be applied for the survey:

(1) Systematic random sampling should be ensured;
(2) The starting point of sampling for survey is randomly selected;

The PSG survey is conducted annually.

27. Discount factor is determined as follows

$$DF_y = \frac{n_{ac,rss,stopped,y}}{n_{ac,rss,total,y}} \quad (4)$$

Where:

DF_y = Discount factor accounting for project air conditioners that are installed under the project activity but no longer operating in year y.

$n_{ac,rss,total,y}$ = The total number of air conditioners included in the sample group for random sampling survey for DF determination (unit).

$n_{ac,rss,stopped,y}$ = The number of air conditioners included in the sample group for random sampling survey for DF determination that are no longer operating (unit).

Determination of the mean annual electricity consumption by an energy efficient air conditioner ($\mu_{EC,PSG,y}$)

28. The average annual electricity consumption by an energy efficient air conditioner installed under the project activity is calculated applying the following equation:

$$\mu_{EC,PSG,y} = \frac{\sum_j \sum_i EC_{PSG,i,j,y}}{n_{ac,PSG,y}} \quad (5)$$

Where:

$\mu_{EC,PSG,y}$ = Mean annual electricity consumption by an energy efficient air conditioner monitored under the project activity (MWh/yr/unit)

$EC_{PSG,i,j,y}$ = Annual electricity consumption by energy efficient air conditioner *i* in household *j* in PSG, in year *y* (MWh/yr)
Monitored.

$n_{ac,PSG,y}$ = Total number of energy efficient air conditioners installed in the PSG households under the project activity that is operating in year *y* (unit)

Determination of the standard deviation of annual electricity consumption by an energy efficient air conditioner monitored under the project activity ($\sigma_{EC,PSG,y}$)

29. The standard deviation of annual electricity consumption by an energy efficient air conditioner installed under the project activity is calculated applying the following equation:

$$\sigma_{EC,PSG,y} = \sqrt{\frac{\sum_j \sum_i \left(EC_{PSG,i,j,y} - \mu_{EC,PSG,y}\right)^2}{n_{ac,PSG} - 1}} \quad (6)$$

Where:

$\sigma_{EC,PSG,y}$ = standard deviation of annual electricity consumption by an energy efficient air conditioner monitored under the project activity (MWh/yr/unit)

$EC_{PSG,i,j,y}$ = Annual electricity consumption by energy efficient air conditioner i in household j in PSG, in year y (MWh/yr)
Monitored.

$\mu_{EC,PSG,y}$ = Mean annual electricity consumption by an energy efficient air conditioner monitored under the project activity (MWh/yr/unit)

$n_{ac,PSG,y}$ = Total number of energy efficient air conditioners installed in the PSG households under the project activity that is operating in year y (unit)

Project emissions

30. Project emissions include emissions due to electricity consumption by the energy efficient air conditioners installed under the project activity.

31. Project emissions are conservatively estimated by incorporating standard deviation in electricity consumption monitored during the project activity.

32. Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} = n_{ac,PJ,y} \times \left(\mu_{EC,PSG,y} - \frac{\sigma_{EC,PSG,y}}{\sqrt{n_{ac,PSG,y}}} \right) \times EF_{CO2,ELEC,y} \quad (7)$$

Where:

PE_y = Project emissions in year y (t CO_2/yr)

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (t CO_2/yr)

$n_{ac,PJ,y}$ = The total number of energy efficient air conditioners installed within the project area under the project activity in year y (unit)

$\mu_{EC,PSG,y}$ = Mean annual electricity consumption by an energy efficient air conditioner monitored under the project activity (MWh/yr/unit)

$\sigma_{EC,PSG,y}$ = Standard deviation of annual electricity consumption by an energy efficient air conditioner monitored under the project activity (MWh/yr/unit)

$n_{ac,PSG,y}$ = Total number of energy efficient air conditioners installed in the PSG households under the project activity that is operating in year y

$EF_{CO2,ELEC,y}$ = CO_2 emission factor for electricity from the grid from which electricity is supplied to the air conditioners in the absence of the project activity in year y (t CO_2/MWh)
This value is calculated using the "Tool to calculate the emission factor for an electricity system".

Leakage

33. No significant leakage is anticipated from the project activity, provided that a system is in place within the project area to ensure that the replaced conventional air conditioners are not used elsewhere.

34. To demonstrate that the replaced air conditioners are not used, the project proponents shall provide documentary evidence that the air conditioners were scrapped and refrigerant in the scrapped air conditioners are recovered and destroyed or stored/monitored/tracked.

35. Verification by the DOE determining that replaced air conditioners have been scrapped is required.

Emission reductions

36. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (8)$$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)

BE_y = Baseline emissions in year *y* (t CO_2e/yr)

PE_y = Project emissions in year *y* (t CO_2/yr)

LE_y = Leakage emissions in year *y* (t CO_2/yr)

Changes required for methodology implementation in 2nd and 3rd crediting periods

37. At the renewal of the crediting period, both baseline scenario and energy efficiency of baseline air conditioners will be re-established. The procedure outlined under identification of baseline scenario section above should be used for this purpose.

38. In assessing the continued validity of the baseline scenario, a change in the relevant national and/or regional regulations effective at the start of the new crediting period has to be examined.

Data and parameters not monitored

39. The provisions on data and parameters not monitored in the tools referred to in this methodology apply.

III. MONITORING METHODOLOGY

40. Describe and specify in the CDM-PDD all monitoring procedures, including the type of measurement instrumentation used, the responsibilities for monitoring and QA/QC procedures that will be applied. Where the methodology provides different options (e.g. use of default values or on-site measurements), specify which option will be used.

PSG Survey

41. The project sampling group survey (PSG survey) among households participating in the project activity is conducted and actual annual electricity consumption by energy efficient air conditioners are be monitored.

42. Project participants shall apply the following five steps for PSG survey:

Step 1: Identification of the project area
Step 2: Determination of the sample size of the survey
Step 3: Establishment of sampling database and sampling plan
Step 4: Implementation of the survey

43. Details of each step are explained as follows:

Step 1: Identification of the project area

The same project area identified during baseline scenario determination is used throughout the project activity.

Step 2: Determination of the sample size of the PSG survey

The minimum sample size of the survey (*n*) is determined by the formula[4] given previously as equation (4).

Step 3: Establishment of PSG database

A PSG data base is established in accordance with the project activity implementation plan established by the project participant and documented in the CDM-PDD.
The following information shall be included in PSG database:

(a) Project area;
(b) Total number of household participating in the project activity in the project area;
(c) A list of households included in PSG (e.g. name, address, number of people in the household);
(d) Information according to sample survey questionnaires included in Appendix B of the methodology for each household included in PSG;
(e) Number of energy efficient air conditioners installed and operating in each household included in PSG.
(f) Annual electricity consumption by each energy efficient air conditioner installed and operating at each household included in PSG.
(g) Any additional information can also be collected on need basis;

Step 4: Implementation of PSG survey

Household included in PSG survey is determined in accordance with the sampling plan. The PSG survey is carried out by using the questionnaires as given in Appendix B to this methodology by visiting selected households within the project area.

[4] The formula known as Cochran formula for a finite population

The following survey principles shall be applied for the survey:

(1) Systematic random sampling should be ensured;
(2) The starting point of sampling for survey is randomly selected;

44. The PSG survey is conducted annually.

45. All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated otherwise in the tables below. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.

46. In addition, the monitoring provisions in the tools referred to in this methodology apply.

Data and parameters monitored

47. In addition to the parameters listed in the tables below, the provisions on data and parameters monitored in the tools referred to in this methodology apply.

Data / parameter:	$n_{ac,PJ,y}$
Data unit:	(unit)
Description:	Total number of energy efficient air conditioners installed within the project area under the project activity
Source of data:	PSG survey conducted by project participant
Measurement procedures (if any):	PSG survey as per Appendix A
Monitoring frequency:	PSG survey conducted and reported annually
QA/QC procedures:	Cross checked with the project implementation plan
Any comment:	Left blank on purpose

Data / parameter:	$n_{ac,PSG,y}$
Data unit:	(unit)
Description:	Total number of energy efficient air conditioners installed in the PSG households under the project activity that is operating in year *y*
Source of data:	PSG survey conducted by project participant
Measurement procedures (if any):	PSG survey as per Appendix A
Monitoring frequency:	PSG survey conducted and reported annually
QA/QC procedures:	Cross checked with the project implementation plan
Any comment:	Left blank on purpose

Data / parameter:	$N_{PJ,y}$
Data unit:	(unit)
Description:	Population size in the project area. The population will be restricted to the number of households participating in the project activity in the monitoring year *y*
Source of data:	Database of project participation entry
Measurement procedures (if any):	PSG survey as per Appendix A
Monitoring frequency:	Confirmation of the database conducted and reported annually
QA/QC procedures:	Left blank on purpose
Any comment:	Left blank on purpose

Data / parameter:	$n_{ac,rss,stopped,y}$
Data unit:	(unit)
Description:	The number of air conditioners included in the PSG that are no longer operating during the monitoring year *y*
Source of data:	PSG survey conducted by project participant
Measurement procedures (if any):	PSG survey as per Appendix A
Monitoring frequency:	PSG survey conducted and reported annually
QA/QC procedures:	Left blank on purpose
Any comment:	Left blank on purpose

Data / parameter:	$EC_{PSG,i,j,y}$
Data unit:	MWh/yr
Description:	Annual electricity consumption of energy efficient air conditioner *i* in the household *j* in PSG during the monitoring year *y*
Source of data:	PSG survey conducted by project participant
Measurement procedures (if any):	Electricity meter and recording device installed at selected household in PSG
Monitoring frequency:	Metered continuously, recorded monthly, reported annually
QA/QC procedures:	Meter calibration is conducted as per manufacturer's specification
Any comment:	Left blank on purpose

Data / parameter:	$P_{PSG,i,j,y}$
Data unit:	kW
Description:	Power rating of the energy efficient air conditioner *i* in household *j* in PSG during the monitoring year *y*
Source of data:	PSG survey conducted by project participant
Measurement procedures (if any):	PSG survey as per Appendix A
Monitoring frequency:	PSG survey conducted and reported annually
QA/QC procedures:	PSG survey result is cross checked with catalogue values provided by the air conditioner producer.
Any comment:	Monitored to ensure the following applicability condition is met. - The rated cooling capacity of the energy efficient air conditioners installed under the project activity at each household is not significantly smaller (maximum -10%) or significantly larger (maximum +50%) than the baseline air conditioner.

Data / parameter:	$\eta_{ac,BL}$
Data unit:	-
Description:	Efficiency of the air conditioner available in the market that is the most economically attractive identified though investment analysis.
Source of data:	Project participant selects indicator such as COP, APF, or IPLV representing air conditioner efficiency applicable to the project activity One of the below two sources can be used: (1) Calculated by the project participant following the industry standard testing procedures. (2) Catalogue values provided by the air conditioner producer
Measurement procedures (if any):	If (1) is selected as the data source, the industrial standard testing procedures is followed to derive the selected indicator.
Monitoring frequency:	Once in a crediting period
QA/QC procedures:	The compliance with the industrial standard testing procedures is validated by the DOE at the time of verification.
Any comment:	Left blank on purpose

Data / parameter:	$\eta_{ac,PJ}$
Data unit:	-
Description:	Efficiency of the energy efficient air conditioner under the project scenario
Source of data:	Project participant selects indicator such as COP, APF, or IPLV representing air conditioner efficiency applicable to the project activity One of the below two sources can be used: (1) Calculated by the project participant following the industry standard testing procedures. (2) Catalogue values provided by the air conditioner producer
Measurement procedures (if any):	If (1) is selected as the data source, the industrial standard testing procedures is followed to derive the selected indicator.
Monitoring frequency:	Once in a crediting period
QA/QC procedures:	The compliance with the industrial standard testing procedures is validated by the DOE at the time of verification.
Any comment:	Left blank on purpose

IV. REFERENCES AND ANY OTHER INFORMATION

No additional information is provided.

Section D. Explanations / justifications to the proposed new baseline and monitoring methodology

Selected approach from paragraph 48 of the CDM modalities and procedures

48. Approach 48 (b), emissions from a technology that represents an economically attractive course of action, taking into account barriers to investment, is deemed most appropriate for the proposed new methodology. Given the myriad alternatives for air conditioners targeted by this methodology, investment analysis allows quantitative assessment of alternatives available in the market.

Definitions

49. All required definitions for the application of the proposed new methodology are presented. For some definitions, the following sources are used as references:

ANSI/AHRI Standard 340/360-2007 “2007 Standard for Performance Rating of Commercial and industrial unitary Air conditioning and Heat Pump Equipment” for definition of rated cooling/heating capacity;

Japanese Industrial Standard (JIS) B 8616:2006 “Package air conditioners” for definitions of , annual performance factor (APF), coefficient of performance (COP), and integrated part load value (IPLV); and

AM0046 and AM0086 for definition of BSG, PSG, Project area, Project coordinator.

Applicability conditions

50. The energy efficiency measures adopted in the methodology are only applicable to air conditioners. Therefore, the applicability of this methodology is limited to installation of energy efficient air conditioners.

51. The rated capacity of the energy efficient air conditioners installed by the project activity should not be significantly smaller or larger than the baseline. As in AMS-II.C., an approved methodology for demand-side energy efficiency activities, this applicability condition allows the emission reduction calculated as the difference for baseline electricity consumption to be estimated based on the monitored electricity by project air conditioners and the difference of the energy efficiency between baseline and project scenarios.

52. All energy efficient air conditioners installed under the project activity shall not be transferred from outside the project area. This is a common requirement in order to prevent potential leakage emissions due to transfer of equipment.

53. The recovery and destruction of the refrigerants used in the project air conditioners are necessary to limit the possible leak of the refrigerants. The methodology is not applicable to project activity where such leakage is envisaged. This is adapted from applicability conditions of AM0060.

54. The removal of a household from the emission reduction calculation in case of stopping the use of air conditioners installed under the project activity is adapted from the survey principles in AM0086.

Project boundary

55. No additional explanation/justification is required. The project boundary encompasses the physical, geographical location of air conditioners installed by the project activity and also includes all electricity systems to which participants to the project activity are connected, combining elements from the definition of project boundary set by AM0046, AM0086, and AM0060.

Identification of the baseline scenario

56. The methodology has been developed to promote the use of energy efficient air conditioners in the project area where air conditioners of less energy efficient or conventional technology would have been used in the absence of the project activity.

57. The methodology prescribes for identification of the baseline scenario: identification of the most economically attractive air conditioner available in the market through market research.

58. The approach used to identify the most economically attractive air conditioner available in the market is the investment analysis which allows quantitative assessment of alternatives available in the market. The available options in the market is identified using an official or third-party market

research or through a market analysis conducted in a systematic and transparent manner by project participant.

59. Market research leads to identification of the most plausible alternative available in the project area as well as the energy efficiency rating of baseline air conditioners.

Additionality

60. Investment analysis (investment comparison analysis or benchmark analysis) is mandated in order to demonstrate additionality of the project activity under this methodology.

61. By adopting the investment analysis, additionaltiy of the project activity will be quantitatively demonstrated. With this approach qualitative argument, often the result of the barrier analysis, is avoided altogether.

Baseline emissions

62. The baseline emission is sourced from the electricity consumed by the conventional air conditioners that would have been in operation at the households participating in the project activity in the absence of the project activity. The data required for baseline emission calculation are the grid emission factor for the grid which provides electricity to the households participating in the project activity and the electricity consumption by the conventional air conditioners under the baseline scenario.

63. Grid emission factor is determined as per the "Tool to calculate the emission factor for an electricity system – Version 2.2.1" which is the methodological tool approved by the CDM Executive board specifically for the purpose of grid emission factor determination.

64. The baseline electricity consumption is estimated using the monitored project electricity consumption and the energy efficiency of baseline air conditioners as well as project air conditioners.

65. The difference in energy efficiency ratings between baseline air conditioners and project air conditioner constitutes the basis for the baseline electricity consumption.

66. The methodology ensures the conservativeness in estimating baseline emissions by taking into account the standard deviation of the monitored electricity consumptions for the project air conditioners as well as the discount rate to accurately reflect the continuing operation of the project air conditioners.

67. The determination of the random survey sample size for discount factor is based on the procedure in AM0086 / Version 01.1.0.

Project emissions

68. The project emission is sourced from the electricity consumed by the energy efficient air conditioners installed under the project activity. The data required for project emission calculation are gird emission factor for the grid which provide electricity to the households participating in the project activity and the electricity consumption by the project air conditioners.

69. The methodology mandates direct monitoring of electricity consumption by selected air conditioners under the project activity. Number of monitoring location is determined to ensure 95% confidence level. This is the level of accuracy often adopted in the approved methodology such as AM0086, AM0046.

70. Grid emission factor is determined as per the "Tool to calculate the emission factor for an electricity system – Version 2.2.1" which is the methodological tool approved by the CDM Executive board specifically for the purpose of grid emission factor determination.

Leakage

71. No leakage emission is envisaged from the project activity covered under the methodology. Possible source of leakage emission is that when the project activity involves replacement of existing air conditioners and the replaced air conditioner is not handled properly and causes release of refrigerant into the atmosphere. However, applicability conditions of the proposed methodology are laid out so that cases where refrigerant of scrapped air conditioners cannot be traced are not allowed to use this new methodology.

Emission reductions

72. No additional explanation/justification is required.

Changes required for methodology implementation in 2nd and 3rd crediting periods

73. No special comment besides that approach taken by the proposed new methodology ensures the baseline scenarios and energy efficiency of baseline air conditioners to reflect the actual conditions in the project area at the renewal of crediting period by re-establishing both baseline scenarios and baseline energy efficiency.

Monitoring methodology, including data and parameters not monitored

74. No additional explanation/justification is required as all parameters required for the emission reduction calculation are properly described.

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History of the document

Version	Date	Nature of revision(s)
03.1	20 May 2008	• Second bullet of formatting instructions changed to refer to Sections C and D, rather than Section B; • Change in numbering of paragraphs.
03	EB 38, Annex 6 14 March 2008	• Revision of the structure of the document to reflect the sections of a standard approved baseline methodology. • Section A. Recommendation by the Methodological Panel • Section B. Summary and applicability of the baseline and monitoring methodology • Section C. Proposed new baseline and monitoring methodology • Section D. Explanations / justifications to the proposed new baseline and monitoring methodology
02	EB 32, Annex 17 22 June 2007	• The form “CDM-NM” was merged with the recommendation form “F-CDM-NMmp”. The F-CDM-NMmp discontinued to be used. • The change was adopted in line with the revised “Procedures for submission and consideration of a proposed new methodology” in order to simplify and streamline the process of consideration of new methodologies.
01	EB 08, Annex 02 29 September 2006	Initial adoption

Appendix A: Sample format for the survey questionnaire for Project Sample Group (PSG)

PSG Survey:
Objective: A survey would be conducted to establish project and baseline emissions. The households included in this group participate in the project activity.
Procedure:
(a) Population:
(b) Sampling frame: Existing list of household participating in the project activity
(c) Sampling Unit: Households installed energy efficient air conditioner under the project activity
(d) Determine Sample Size: The Sample size is determined using Cochran formula for categorical and dichotomous variables in case of finite population
(e) Sampling Plan: Systematic sampling involves the selection of elements from an ordered sampling frame and adopts equal-probability method, in which every k^{th} element in the frame is selected, where *k*, the sampling interval is calculated as:
Sampling interval *k* = population size (*N*) /sample size (*n*)
(f) Select the sample: Carry out office and fieldwork necessary for the selection of the sample.

Household Profile							
Date of survey					Respondent Number:		
Project Area Number:					Project air conditioner ID number:		
Name:					Gender:	Male	Female
Address:					Age:		
					Telephone number:		
Household size:		Adults:		Children:			
Household type:		Single	Nuclear	Joint	Extended		
Note: This information is only used to grasp demographic patterns and will not be directly used for analysis of project emissions.							

Air Conditioner Use				
Number of energy-efficient air conditioner units currently installed:				
	Power rating (kW)	Capacity	Energy efficiency rating (COP, APF, IPLV, etc.)*1	Electricity consumption (kWh/year)
Unit 1				
Unit 2				
Unit 3				
Surveyd By:			Date:	
*1: COP: Coefficient of Performance, APF: Annual Performance Factor, IPLV: Integrated part-load Value				