| COMPONENT PROJECT DESIGN DOCUMENT FORM FOR |
| SMALL-SCALE COMPONENT PROJECT ACTIVITIES (F-CDM-SSC-CPA-DD) |
| Version 02.0 |

COMPONENT PROJECT ACTIVITIES DESIGN DOCUMENT (CPA-DD)

SECTION A. General description of CPA
A.1. Title of the proposed or registered PoA
>>
Programme to Reduce Non-Renewable Biomass Consumptions through Introduction of High-Efficiency Cook Stoves
Version number: 02.1
Completion date: 4/3/2013

A.2. Title of the CPA
>>
CPA-1_HCS programme in Nepal
Version number: 02.1
Completion date: 4/3/2013

A.3. Description of the CPA
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The micro scale CPA is implemented by the Coordinating or Managing Entity (hereinafter referred to as the CME) in the geographical boundary of the PoA in Nepal. The aim of the CPA is to reduce the non-renewable biomass consumption by introducing the HCS to the local households. The # 1 CPA (hereinafter referred to as the CPA-1) aims to disseminate up to 1,500 HCSs mainly around Kavrepalanchouk district in Bagmati zone, Nepal.

Credit Interest and Sales Agreement
The interest of the emission reduction of each HCS belongs to the CME, on the other hands, the households own HCS itself. It is clearly defined by making agreement between the CME and those households when the HCS sold. Furthermore the sales agreement does include the confirmation article whether a household intend to buy the HCS is not included in any other project in Nepal.

Management Scheme
The HCS sold under the CPA are managed based on its serial number attached on each HCS. The CME will continuously monitor the operation status of HCS during the monitoring period by checking the sampled household. The CME establish a monitoring structure to supervise the staffs and data collected.

A.4. Entity/individual responsible for CPA
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The entity responsible for implementing CPA-1 is Shubhalakshya Developers Pvt.Ltd., which is also in charge of CME of the PoA. The detailed contact information is shown in Appendix 1.

A.5. Technical description of the CPA
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The technology applied for the PoA is high-efficiency cook stove (HCS), which is made of insulating brick. Owing to the insulating brick, the combustion efficiency is improved up to 30% approximately because of its heat retentive characteristic. The HCS has a closed combustion system with doors and chimney, so that the dissemination of the system would greatly contribute to the reduction of woody biomass consumption, thus it leads to the decrease of NRB consumption.

The following pictures are the TCS which is currently used at typical Nepalese households. Without the implementation of the CPA under the PoA, a large quantity of woody fuel is consumed within those TCS. The baseline scenario is the same with the situation prior to the implementation of the CPA, i.e., the households continuously use a large quantity of woody fuel within TCS.
According to AMS-II.G (ver.05.0), the default values 10% and 20% are set for the replaced TCS efficiency if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney or other types of systems respectively. The left picture below is categorized into the former type of system (applies 10% default value), while the right one into the later default value (20%).

The efficiency has been set at the PoA level as 20% for conservative purpose.

Figure 11. Three-stone fire type (left) and other type with chimney (right)

The arrangement and the accessories of HCS at each household are shown in the following figure. There are two pots on and have two doors for putting wood inside. Furthermore one chimney is set for emitting the smoke outside the room. Accordingly, fresh air is drawn from the doors automatically and the smoke is never emitted indoors. The monitoring activity is conducted bringing some instruments required for doing *water boiling test* like standard pots, scale, thermometer, dried wood, smart phone (for data input), etc. to the households using the HCS.
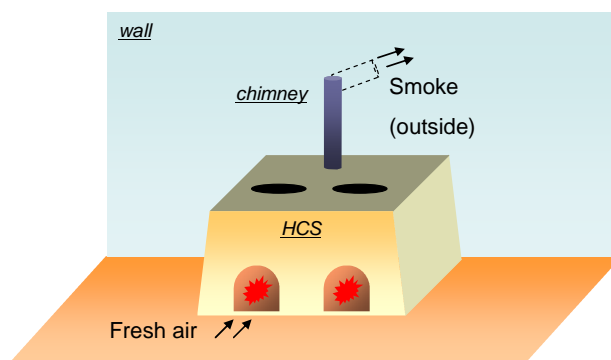
Figure 12. Arrangement of HCS installed at each household

A.6. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) CPA implementer(s) (as applicable)	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Federal Democratic of Nepal (host)	Shubhalakshya Developers Pvt.Ltd	No

A.7. Geographic reference or other means of identification

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The geographical target area of CPA-1 is around Kavrepalanchouk district described as following.
Kavrepalanchouk district locates in the Bagmati zone in the Central region, Nepal.
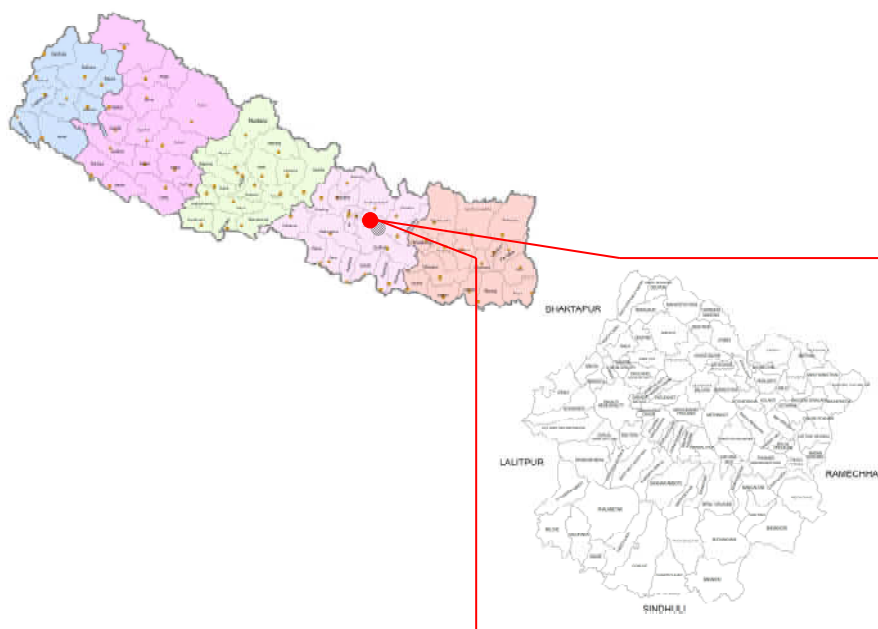

Figure 13. Target area of CPA-1 (Kavrepalanchok district)

A.8. Duration of the CPA
A.8.1. Start date of the CPA

>>

01/01/2014
(The date the first HCS is sold.)

A.8.2. Expected operational lifetime of the CPA
>>
The life time of HCS is theoretically semi permanent.

A.9. Choice of the crediting period and related information
>>
Fixed crediting period is selected for CPA-1.

A.9.1. Start date of the crediting period
>>
01/01/2014

A.9.2. Length of the crediting period
>>
10 years
(The crediting period does not exceed the end date of the PoA.)

A.10. Estimated amount of GHG emission reductions

Emission reductions during the crediting period	
Years	**Annual GHG emission reductions (in tonnes of CO_2e) for each year**
2014	1,139
2015	2,401
2016	2,280
2017	2,165
2018	2,056
2019	1,953
2020	1,855
2021	1,761
2022	1,671
2023	1,587
Total number of crediting years	10
Annual average GHG emission reductions over the crediting period	1,886
Total estimated reductions (tonnes of CO_2e)	18,868

A.11. Public funding of the CPA
>>
There is no public funding included in the CPA-1.

A.12. Debundling of small-scale component project activities

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According to the paragraph 10 of "*Guidelines on assessment of de-bundling for SSC project activities*" (ver.03), the CPA of the PoA is not considered to be a de-bundled component of a large scale activity if the amount of the energy saving achieved by one HCS is less than 1% of small-scale thresholds defined by AMS-II.G, i.e., 60GWh.

10. If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied, then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity.

According to the paragraph 10 of the guideline, the maximum number of subsystem included in CPA-1 is 1,500 and the maximum amount of the energy saving achieved under the CPA-1 corresponds to 10.53 GWh. Therefore the amount of energy saving achieved by one subsystem is about 0.007 GWh which is obviously less than 1% of the small-scale thresholds (i.e., 60GWh) defined by the methodology applied. Therefore the CPA-1 is not considered to be a de-bundled component of another project

A.13. Confirmation for CPA

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The CPA-1 is neither registered as an individual CDM project activity nor is part of another registered PoA.

SECTION B. Environmental analysis
B.1. Analysis of the environmental impacts

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The environmental impact analysis has been done at PoA level.

SECTION C. Local stakeholder comments
C.1. Solicitation of comments from local stakeholders

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The stakeholder consultation is done at CPA level. The reason why the stakeholder consultation has been done at CPA level is that the result can reflect the more localized around each CPA targeted area. The area of this stakeholder consultation covers Bagmati zone, which includes whole boundary of CPA-1. The stakeholder consultation at Bagmati zone was conducted in August to September in 2012 as a part of the baseline survey of the CPA. As to the survey, the overview of the CPA and the PoA is introduced as well as their current TCS-related concerns, situations, health status and expectations are heard face to face. Their comments are input to the data collection forms installed into smart phones and the results automatically aggregated into excel form.

The total interviewee of the survey was 400 in 4 districts: Dhading, Kavrepalanchok, Nuwakot and Sindhupalchok, in Bagmati zone; among these households, 353 households are confirmed using TCS.

C.2. Summary of comments received

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145 out of the above 400 households have commented. Among them, more than 85% of the respondents are female and the rest are male.

As it can be seen in the following figure, most of the households own single pot TCS and only 10 households own improved cook stove (hereinafter referred to as ICS).
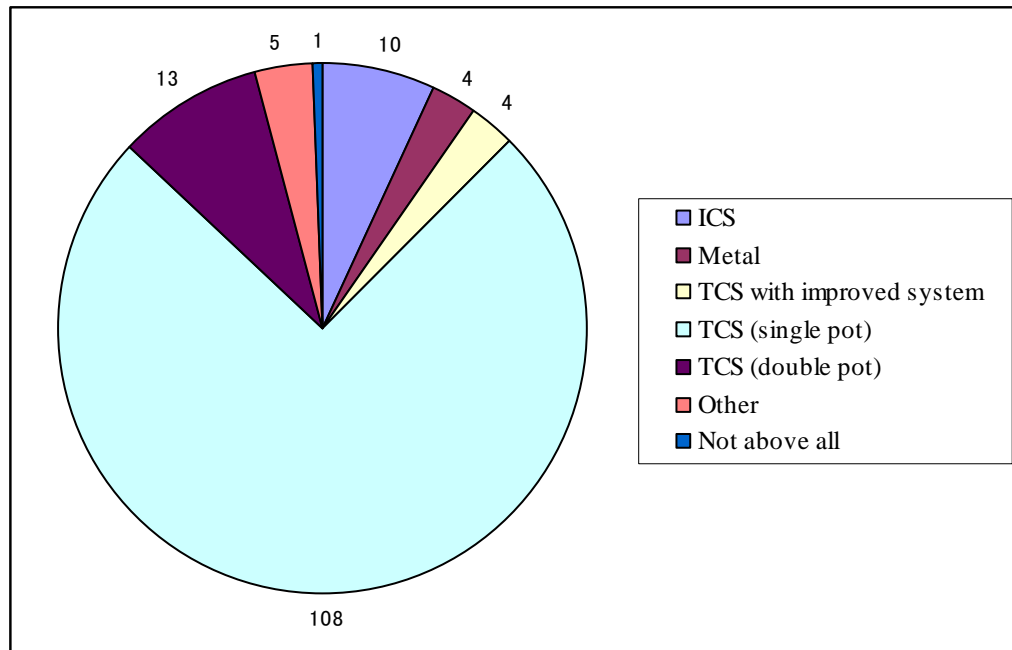

Figure 14. Cook stove share

As to the interview survey result, a TCS user concerns it takes long time to cook with their cook stove with fuel wood, i.e., "Firewood is only used when there is a free time." or "Wants to use LPG but cannot afford" because of its higher cost for fuel. And another respondent answered "Difficult to clean utensils when cooked with fuel wood" since TCS without any air ventilation or some relevant improved system emit a large amount of ash and so on.
On the other hands, a TCS user interviewee answers that they had ICS before but destroyed because it consume more fuel than TCS.

C.3. Report on consideration of comments received
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The HCS is customized to satisfy the potential local HCS users demand, the above interview results are considered into its design of HCS.
When designing the HCS, the HCS disseminated under the PoA is designed sure to consume less fuel wood by dynamically improving its combustion efficiency and its utility for saving their cooking time.

SECTION D. Eligibility of CPA and Estimation of emissions reductions
D.1. Title and reference of the approved baseline and monitoring methodology(ies) selected:
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AMS-II.G "Energy efficiency measures in thermal applications of non-renewable biomass" (ver.05.0) is applied here.

D.2. Application of methodology(ies)

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According to the AMS-II.G (ver.05.0), the following conditions to be met for applying the methodology;

	Condition	CPA status
1	This category comprises efficiency improvements in thermal applications of nonrenewable biomass. Examples of applicable technologies and measures include the introduction of high efficiency[10] biomass fired cook stoves[11] or ovens or dryers and/or energy efficiency improvements in existing biomass fired cook stoves or ovens or dryers.	The HCS installed under the CPA is more efficiently than the TCS currently used by the household. The default values 10% and 20% are set in AMS-II.G (ver.05.0) for a 3-stone fire or a conventional system with no improved combustion air supply or flue gas ventilation system, and for other types of systems respectively. Among these 2 default values, 20% is applied in conservative purpose. The efficiency of HCS exceeds 20%. Therefore the CPA is applicable to the condition.
2	Project participants shall be able to show that non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	According to the AMS-II.G (ver.05.0), at least 2 of the following indicators to be sown to exist for supporting the use of NRB referring to published literature, official reports or statistics; a) A trend showing an increase in time spent or distance travelled for gathering fuelwood, by users (or fuel-wood suppliers) or alternatively, a trend showing an increase in the distance the fuel-wood is transported to the project area; b) Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area; c) Increasing trends in fuel wood prices indicating a scarcity of fuel-wood; d) Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass. As stated in Appendix 3 of this document, the forest area is getting smaller at least from 1978; therefore the indicator b) above must exist. Furthermore, the cooking fuel type has been changing that many households tend to use more LPG than wood before as shown in Appendix 3. So the indicator d) above also exists. To sum up, NRB has been used since 31 December 1989, and then the condition is applicable.

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[10] The efficiency of the project systems as certified by a national standards body or an appropriate certifying agent recognized by that body. Alternatively, manufacturers' specifications may be used.

[11] Single pot or multi pot portable or in-situ cook stoves with specified efficiency of at least 20%.

Furthermore, according to "*CDM project standard*" (ver.02.1), the CPA under the PoA aims to reduce energy consumption through the reduction of NRB consumption every year during the crediting period, it qualifies as Type II project.

Then, AMS-II.G (ver.05.0) requires satisfying the following applicability.

	Applicability	CPA status
1	The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.	Each CPA are developed as microscale project, i.e., the aggregated amount of annual energy saving will not exceed 20GWh. Therefore the CPA under the PoA sure to satisfy this applicability.

D.3. Sources and GHGs

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The sources of GHG emission included in the CPA are as follows;

	Source	Gas	Included?	Justification/Explanation
Baseline	Combustion of non renewable biomass for cooking, Emission Factor for combustion of fossil fuels for cooking	CO_2	Included	Main emission source
		CH_4	Excluded	Not required in the methodology.
		N_2O	Excluded	Not required in the methodology.
Project	Combustion of non renewable biomass for cooking, Emission Factor for combustion of fossil fuels for cooking	CO_2	Included	Main emission source
		CH_4	Excluded	Not required in the methodology.
		N_2O	Excluded	Not required in the methodology.

As per the paragraph 9 of the applied methodology AMS-II.G (ver.05.0), "The project boundary is the physical, geographical site of the efficient devices that burn biomass." The geographical area within CPA-1 included in the PoA implemented is Nepal.

The baseline scenario is the same with the situation prior to the implementation of the CPA, i.e., the households continuously use a large quantity of woody fuel within TCS.

The mass and energy flow are shown in the following figure. The same amount of thermal energy is supplied after implementation of CPA with smaller quantity of woody biomass owing to the efficiency improvement of cook stove. Thus the part of fossil fuel used by the similar consumers which is created as NRB is reduced.
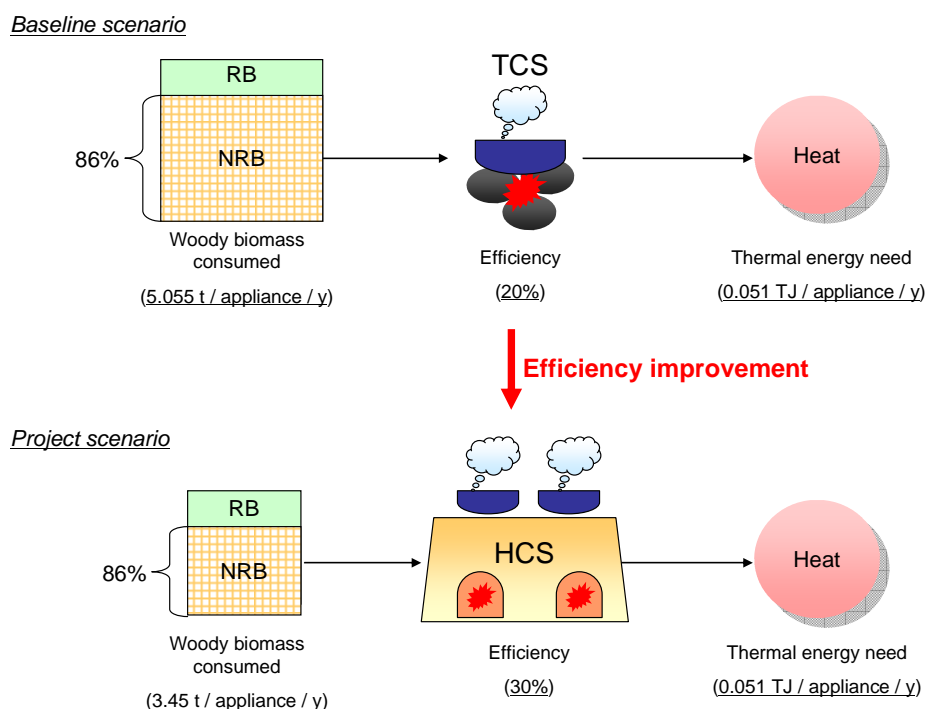
Figure 15. Mass and energy flow

D.4. Description of the baseline scenario

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According to AMS-II.G, the baseline scenario is the use of fossil fuel for meeting similar thermal energy needs by the households included in the CPA, PoA. Without the project implementation, a large quantity of NRB would have been continuously consumed within TCS. Owing to the improvement of combustion efficiency by installing HCS, the consumption of wood fuel is reduced and accordingly, the corresponding amount of fossil fuel for generating the same energy contained in the wood fuel.

D.5. Demonstration of eligibility for a CPA

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	Eligibility Criteria	CPA-1	Tick
a	All CPAs are to be located in Nepal. The date of the installation at each household and the location of HCS are checked whether it is earlier than the expiration date of the PoA duration and it locates within the geographical boundary of PoA on the HCS sales receipt, while the locations of sampled HCSs are monitored through GPS installed into smart phone.	The boundary of each CPA is the physical, geographical site of the efficient systems using biomass. The geographical area where CPA-1 of the PoA locates is Nepal. The latest date of HCS sold under the CPA-1 is on 1/2/2014, which is earlier than the expiration date of the PoA.	☒
b	All HCSs installed through the CPA under PoA are given its own serial numbers.	All HCS included in CPA-1 have its own serial number on it.	☒
c	The HCS to be disseminated is tested its efficiency to ensure that the efficiency is higher	The efficiency test of HCS sold under the CPA-1 has been conducted by the professional	

	than 20% at a professional institute before sold to each household.	institute. The efficiency is turned out to be 30 %.	⊠
d	The starting date of the CPA is checked with the sales receipt of HCS to ensure that it is later than the starting date of PoA, i.e., 5/2/2013.	The starting date of CPA-1 is 1/1/2014 which is later than 5/2/2013. The sales receipts of all HCS are kept at the CME office and it would have been kept for at least 2 years after the crediting period.	⊠
e	All CPAs comply with the applicability and other requirements of the methodology AMS-II.G (ver.05.0).	The CPA-1 satisfies all requirements stated at D.2.	⊠
f	The maximum annual energy saving achieved by the CPA under the PoA is less than 20GWh in consideration of the requirements mentioned in the following standard and guideline: As to the CPA, the annual energy saving is less than 20GWh and the CPA of the PoA applies the single technology / measure and / or methodology, the following statement in "*Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities*" (ver.02.1) to be met; 8. PoAs that consist of one or more microscale projects as CPAs shall include eligibility criteria derived from all the relevant requirements of the "*Guidelines for demonstrating additionality of microscale project activities*" According to the paragraph 3 of the guideline, the CPA satisfies: (a) The geographic location of the project activity is in an LDC/SIDS or special underdeveloped zone of the host country identified by the government and / or (b) The project activity is an energy efficiency activity with both conditions (i) and (ii) below satisfied: (i) Each of the independent subsystems / measures in the project activity achieves an	The maximum energy saving is calculated as 37.91 TJ[12], which equals to 10.53 GWh[13] in a year, therefore it must be less than 20GWh. The location of all HCS is included in Nepal.	⊠

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[12] Woody biomass saved under CPA-1 * Total households included in CPA-1 * Net calorific value of woody biomass

$= \{5.055\ t * (1 – 20\ \% / 30\ \%)\} * 1{,}500\ (\text{households}) * 0.015\ (\text{TJ/t})$

$= 37.91\ (\text{TJ})$

[13] The total calories of the woody biomass saved / 3.6 (TJ/GWh)

$= 37.91\ (\text{TJ}) / 3.6\ (\text{TJ/GWh})$

$= 10.53\ (\text{GWh})$

	estimated annual energy savings equal to or smaller than 600 megawatt hours; (ii) End users of the subsystems or measures are households/communities/SMEs.			
g	The local stakeholder consultation is undertaken at CPA level. As to the environmental impact analysis has been done at PoA level, so it has not to undertake at CPA level.	The local stakeholder consultation is conducted at the CPA level. EIA is done at the PoA level.	⊠	
h	The CME confirms there is no public funding from Annex I parties to each CPA. It is confirmed on the official document from the local government.	There is no public funding to the CPA-1.	⊠	
i	The target group of each CPA is determined based on the commercial marketing plan by CME.	The target area of the CPA-1 is around Kavrepalanchouk district in Bagmati zone.	⊠	
j	Sampling is conducted for doing monitoring activity based on the "*Standard for sampling and surveys for CDM project activities and programme of activities*" (ver.03.0).	The sample size for the CPA-1 is calculated based on a 90% confidence interval and a 10% margin of error.	⊠	
k	The aggregated scale of the annual energy saving per each CPA does not exceed 20GWh during the crediting period.	The maximum quantity of woody biomass saved of the CPA-1 in a year approximately equals to 10.53 GWh, which is less than 20GWh.	⊠	
l	Each CPA is not a de-bundled component of another project. It is demonstrated whether the energy saving achieved by one operating HCS is no larger than 1% of 60GWh in accordance with the following article in "Guidelines on assessment of de-bundling for SSC project activities"; 10. If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied,[9] then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity.	The CPA-1 is not a de-bundled component of another project in consideration of paragraph 10 of "Guidelines on assessment of de-bundling for SSC project activities". The maximum number of subsystem included in CPA-1 is 1,500 and the maximum amount of the energy saving achieved under the CPA-1 corresponds to 10.53 GWh. Therefore the amount of energy saving achieved by one subsystem is about 0.007 GWh which is obviously less than 1% of the small-scale thresholds (i.e., 60GWh) defined by the methodology applied.	⊠	

D.6. Estimation of emission reductions
D.6.1. Explanation of methodological choices
>>
The emission reduction achieved under the CPA is calculated as follows:

$$ER_y \quad = \quad B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} * N_{y,i} \tag{1}$$

Where:

ER_y	Emission reductions during year y in tCO2e
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes per device
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (f_{NRB}) values available on the CDM website
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, wet basis)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. The value is determined on a weighted average basis which consists of solid fuel (96 tCO2/TJ), liquid fuel (71.5 tCO2/TJ) and gaseous fuel (63.0 tCO2/TJ). Use a value of 81.6 t CO2/TJ.
$N_{y,i}$	Number of project devices of type i operating in year y

As to the CPA under the PoA, the default value of f_{NRB} is accepted by the Nepalese DNA on June 7th, 2012. The weight of each fossil fuel for $EF_{projected\_fossilfuel}$ is investigated as a part of baseline survey.

● $\underline{B_{y,savings}}$ is estimated using one the following methods:

According to the paragraph 12 of AMS-II.G (ver.05.0), there are 3 options to calculate the quantity of woody biomass saved.

<Option 1>

$$B_{y,savings,KPT} \quad = \quad B_{old} - B_{y,new} \tag{2}$$

Where:

B_{old}	Quantity of woody biomass used in the absence of the project activity in tonnes per device
$B_{y,new,KPT}$	Annual quantity of woody biomass used in year y in tonnes per device, measured as per the Kitchen Performance Test (KPT) protocol. The KPT should be carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the KPT procedures specified by the Partnership for Clean Indoor Air (PCIA) <http://www.pciaonline.org/node/1049)>

<Option 2>

$$B_{y,savings} \quad = \quad B_{old} * (1 - \eta_{old} / \eta_{new,y}) \qquad (3)$$

$$B_{y,savings} \quad = \quad B_{y,new,survey} * (\eta_{new,y} / \eta_{old} - 1) \qquad (4)$$

Where:

B_{old}	Quantity of woody biomass used in the absence of the project activity in tonnes per device
$B_{y,new,survey}$	Annual quantity of woody biomass used during the project activity in tonnes per device, determined through a survey
η_{old}	1. Efficiency of the device being replaced (fraction); measured using representative sampling methods or based on referenced literature values use weighted average values if more than one type of device is being replaced; 2. A default value of 0.10 may be optionally used if the replaced device is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; for other types of devices, a default value of 0.2 may be optionally used
$\eta_{new,y}$	Efficiency of the device being deployed as part of the project activity (fraction), as determined annually using the water boiling test (WBT) protocol carried out in accordance with national standards (if available) or international standards or guidelines. Use weighted average values if more than one type of system is being introduced by the project activity

<Option 3>

$$B_{y,savings} \quad = \quad B_{old} * (1 - SC_{new,y} / SC_{old}) \qquad (5)$$

Where:

SC_{old}	Specific fuel consumption or fuel consumption rate7 of the baseline devices i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour, respectively. Use weighted average values if more than one type of device is being replaced
$SC_{new,y}$	Specific fuel consumption or the fuel consumption rate in year y of the devices deployed as part of the project i.e. fuel consumption per quantity of item/s processed (e.g. food cooked) or fuel consumption per hour respectively. Use weighted average values if more than one type of system is being introduced by the project activity

The CPA applies for the equation (3) of <Option 2> above by using default value η_{old} and testing the HCS efficiency at the professional institute.

● $\underline{B_{old}}$ is determined by using one of the following two options:

According to the paragraph 13 of AMS-II.G (ver.05.0), one of the following two options is to be chosen for determining B_{old}.

(a) Calculated as the product of the number of devices multiplied by the estimated average annual consumption of woody biomass per device (tonnes/year). This may be derived from historical data or a survey of local usage;

OR

(b) Calculated from the thermal energy generated in the project activity as:
$$B_{old} \quad = \quad HG_{p,y} / (NCV_{biomass} * \eta_{old}) \tag{6}$$

Where:
$HG_{p,y}$ Amount of thermal energy generated by the project devices in year y (TJ), if the thermal output of the devices can be directly measured

The average annual consumption of woody biomass is investigated at the stage of baseline survey; the CPA applies option (a) above.

Furthermore, "B_{old}" is multiplied by a net to gross adjustment factor of 0.95 to account for leakages in consideration of paragraph 20 of AMS-II.G (ver.05.0).

D.6.2. Data and parameters that are to be reported ex-ante

Data / Parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted.
Source of data	IPCC default value for wood fuel.
Value(s) applied	0.015 TJ/t
Choice of data or Measurement methods and procedures	Adopted the IPCC default value indicated in the AMS-II.G (ver.05.0).
Purpose of data	Calculation of baseline emissions.
Additional comment	AMS-II.G requires directly calculating the emission reduction.

Data / Parameter	$EF_{projected\_fossilfuel}$
Unit	tCO$_2$e/TJ
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers.
Source of data	IPCC default values for LPG, kerosene and coal.
Value(s) applied	81.6 tCO$_2$e/TJ
Choice of data or Measurement methods and procedures	Adopted the IPCC default values for each fossil fuel indicated in the AMS-II.G (ver.05.0).
Purpose of data	Calculation of baseline emissions.
Additional comment	AMS-II.G requires directly calculating the emission reduction.

Data / Parameter	B_{old}
Unit	t
Description	Quantity of woody biomass used in the absence of the project activity per household
Source of data	Baseline survey
Value(s) applied	5.055 t
Choice of data or Measurement methods and procedures	The value is referred to the official literature. The each referenced literature is: *Energy Sector Synopsis Report* (Jul. 2010, Water and Energy Commission Secretariat), *District Development Profile of Nepal 2012* (Jan. 2012, Mega Publication & Research Centre) and *NEPAL LIVING STANDARDS SURVEY 2010/11* (Nov. 2011, Central Bureau of Statistics, Nepal). Please refer to Appendix 4 for detail.
Purpose of data	Calculation of baseline emissions.
Additional comment	AMS-II.G requires directly calculating the emission reduction.

Data / Parameter	η_{old}
Unit	%
Description	Efficiency of the system being replaced.
Source of data	UNFCCC default value from AMS-II.G (ver.05.0).
Value(s) applied	20 %
Choice of data or Measurement methods and procedures	The value is weighted based on the number of each types of TCS categorized into either 1) the system categorized into a three stone fire or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney, then applies for 10% or 2) the system categorized into other types of system, then applies for 20%. For the conservative purpose, 20% default value is applied to the all CPA under the PoA.
Purpose of data	Calculation of baseline emissions.
Additional comment	AMS-II.G requires directly calculating the emission reduction.

D.6.3. Ex-ante calculation of emission reductions

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According to B6.1 of Part II above, the maximum annual emission reduction is calculated as follows;

$$ER_y \quad = \quad B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel} * N_{y,i} \tag{1}$$
$$1.60 \text{ t} * 86\,\% * 0.015 \text{ TJ/t} * 81.6 \text{ tCO}_2/\text{TJ} * 1,500$$
$$2,526.33 \text{ tCO}_2\text{e}$$

In consideration of leakage emission, 5 % of B_{old} is deducted in accordance with the paragraph 20 of AMS-II.G (ver.05.0). Therefore the actual amount for determining $B_{y,savings}$ is calculated as follows;

$$B_{y,savings} \quad = \quad B_{old} * 95\,\% * (1 - \eta_{old} / \eta_{new}) \tag{3}$$
$$5.055 \text{ t} * 95\% * (1 - 20\,\% / 30\,\%)$$
$$1.60 \text{ t}$$

D.6.4. Summary of the ex-ante estimates of emission reduction

Year	Baseline emissions (t CO$_2$e)	Project emissions (t CO$_2$e)	Leakage (t CO$_2$e)	Emission reductions (t CO$_2$e)
2014	1,139	0	N/A	1,139
2015	2,401	0	N/A	2,401
2016	2,280	0	N/A	2,280
2017	2,165	0	N/A	2,165
2018	2,056	0	N/A	2,056
2019	1,953	0	N/A	1,953
2020	1,855	0	N/A	1,855
2021	1,761	0	N/A	1,761
2022	1,671	0	N/A	1,671
2023	1,587	0	N/A	1,587
Total	18,868	0	N/A	18,868
Total number of crediting years				10
Annual average over the crediting period	1,886	0	N/A	1,886

D.7. Application of the monitoring methodology and description of the monitoring plan
D.7.1. Data and parameters to be monitored

Data / Parameter	N_y
Unit	-
Description	Number of project devices that are operating in year y
Source of data	Monitoring survey
Value(s) applied	Max. 1,500
Measurement methods and procedures	Monitoring shall consist of checking of a representative sample thereof, at least once every two years (biennial) to determine if they are still operating; those devices that have been replaced by an equivalent in-service device can be counted as operating.
Monitoring frequency	At least once every two years (biennial)
QA/QC procedures	The maintenance records are kept in paper media and compiled at the CME office.
Purpose of data	Calculation of baseline emissions.
Additional comments	AMS-II.G requires direct calculation of the emission reduction.

Data / Parameter	$\eta_{new,y}$
Unit	%
Description	Efficiency of the device being deployed as part of the project activity in year y
Source of data	Monitoring survey
Value(s) applied	Basically 30 %
Measurement methods and procedures	The water boiling test is applied. Monitoring shall consist of determining the efficiency of representative samples annually. For more information, please refer to Appendix 5.
Monitoring frequency	Annual
QA/QC procedures	Conduct a monitoring survey for checking the efficiency of representative sample households to ensure that they are still operating at the specified efficiency. As to implementing the monitoring survey, the some households are chosen as interviewee in accordance with AMS-II.G (ver.05.0) and a corresponding sampling standard.
Purpose of data	Calculation of baseline emissions.
Additional comments	AMS-II.G requires direct calculation of the emission reduction.

Data / Parameter	$f_{NRB,y}$
Unit	%
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	The data accepted by Nepalese DNA
Value(s) applied	86%
Measurement methods and procedures	Check the latest available value which has been accepted by the Nepalese DNA on the CDM website. http://cdm.unfccc.int/DNA/fNRB/index.html
Monitoring frequency	Yearly
QA/QC procedures	N/A
Purpose of data	Calculation of baseline emissions.
Additional comments	AMS-II.G requires direct calculation of the emission reduction.

D.7.2. Description of the monitoring plan

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● *Monitoring Frequency*

The monitoring activity for HCS efficiency (η_{new}) is conducted annually. Other parameters the number of project devices that are operating in year y (N_y), the total number of HCS installed within CPA-1 and the confirmation of disposal of TCS which is displaced by HCS are monitored at least once every two years.

● *Monitoring Structure*

CME establishes a monitoring structure that ensures an efficient monitoring activity and a certain monitoring result. The CME sets several Supervisors in one district as per the population, and some Monitoring Staffs are distributed under the supervisor. It must be noted that the Supervisors and Monitoring Staffs have concurrent duties as sales staffs of HCS.

The Monitoring Staffs do visit each households selected as the sampling and conduct a water boiling test (hereinafter referred to as WBT). The test result is reported to the Supervisor and then the compiled test results are handed in to the Project Manager.
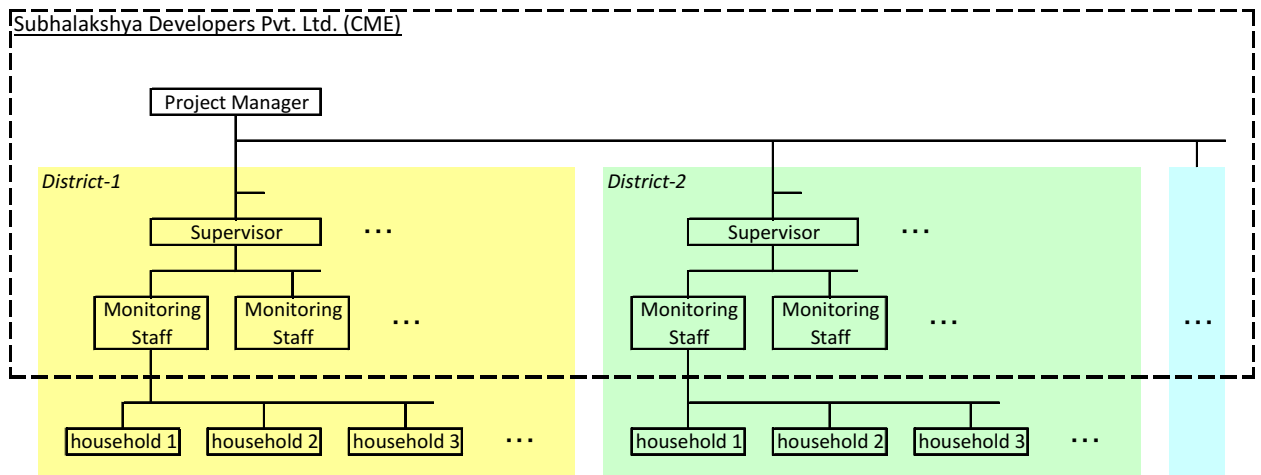
Figure 16. Monitoring structure

- *Data Collection*

The Monitoring Staffs are trained regularly. They use a smart phone to input and aggregate the surveyed data and confirm the location of each HCS by the GPS function installed in the smart phone. A special application for the monitoring activity called "*True Grid*" is installed to those smart phones; the application contains some options to choose and direct input form including the WBT result. The data input are exported as Excel, CSV file and/or PDF forms and checked by the Supervisor.
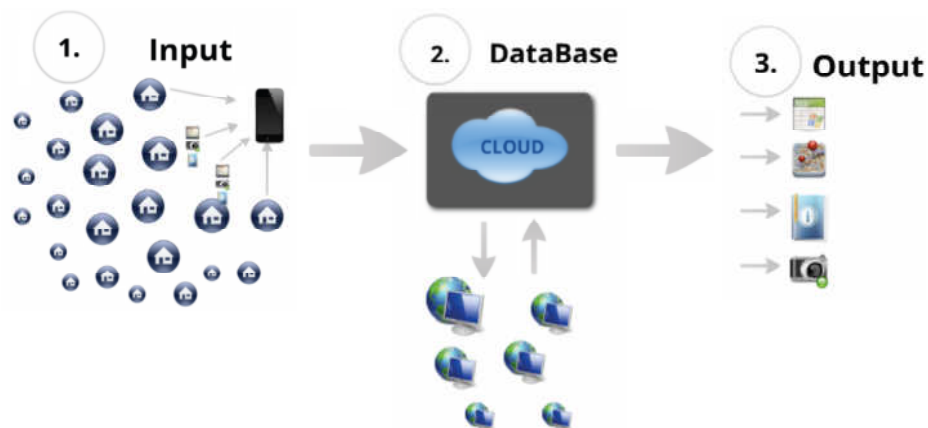

Figure 17. Data collection image

- *Water Boiling Test (WBT)*

The households to be monitored for "η_{new}" are chosen in consideration of "Standard for sampling and surveys for CDM project activities and programme of activities" (ver.03.0). The sampling size calculation is shown in the Appendix 5 of this document.

The efficiency test follows the national testing protocol in Nepal. According to the protocol, WBT will be conducted at each sampled household. The boiling point is corrected based on the altitude of the household locates.

SECTION E.   Approval and authorization
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The letters of approval (hereinafter referred to as the LoA) from the host country and the Annex I party, i.e., Nepal and Japan, is not available at the time of submitting the CPA-DD to the validating DOE.
As to the CME letters of authorization of its coordination of the PoA from each party are not submitted yet, too.

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Appendix 1: Contact information on entity/individual responsible for the CPA

Organization	Subhalakshya Developers Pvt. Ltd.
Street/P.O. Box	11362
Building	Swornim Bhawan
City	Kathmandu
State/Region	Bagmati
Postcode	N/A
Country	Nepal
Telephone	+977-1-4491080
Fax	+977-1-4493407
E-mail	bpaperl@hotmail.com
Website	N/A
Contact person	Pranab Lal Shrestha
Title	Project Manager
Salutation	Mr.
Last name	Shrestha
Middle name	Lal
First name	Pranab
Department	N/A
Mobile	N/A
Direct fax	N/A
Direct tel	N/A
Personal e-mail	pranab_shrestha@hotmail.com

Appendix 2: Affirmation regarding public funding

No public funding from parties in Annex I is involved in the CPA or PoA.

Appendix 3: Applicability of the selected methodology(ies)

(a) Non-renewable biomass has been used since 31 December 1989.

1. Carbon stock change

According to "*Energy Sector Synopsis Report*" published by water and Energy Commission Secretariat in July 2010, it has been confirmed that the forest and shrub coverage area in Nepal has been decreasing after 1964. The forest and shrub coverage area in 2005 is about 5,533 ha, which only equals to 85.6% compared to 1964 – 1965.

Figure 18. Forest and Shrub Area change in Nepal

	Forest and Shrub Area (000 ha)	Area Change to 1964-65 (%)
1964 - 1965	6,466.9	100.0%
1978 - 1979	6,306.4	97.5%
1985 - 1986	6,224.0	96.2%
1987 - 1998	5,828.0	90.1%
2000	5,653.0	87.4%
2005	5,533.0	85.6%

Furthermore, the average depleting rate of forest area in Nepal is most significant in South Asia from 1990 to 2000 based on "*Global Forest Resources Assessment 2000*" published by FAO.

Figure 19. Forest Area change in South Asia 1990 - 2000

Country / area	Land area	Forest area					Area change 1990 – 2000 (total forest)	
		Natural forest	Forest plantation	Total forest				
	000ha	000ha	000ha	000ha	%	ha/capita	000ha/year	%
Bangladesh	13,017	709	625	1,334	10.2	n.s.	17	1.3
Bhutan	4,701	2,995	21	3,016	64.2	1.5	n.s.	n.s.
India	297,319	31,535	32,578	64,113	21.6	0.1	38	0.1
Maldives	30	1	-	1	3.3	n.s.	n.s.	n.s.
Nepal	14,300	3,767	133	3,900	27.3	0.2	-78	-1.8
Pakistan	77,087	1,381	980	2,361	3.1	n.s.	-39	-1.5
Sri Lanka	6,463	1,625	316	1,940	30.0	0.1	-35	-1.6
Total South Asia	412,917	42,013	34,652	76,665	18.6	0.1	-98	-0.1
Total Asia	3,084,746	431,946	115,847	547,793	17.8	0.2	-364	-0.1
TOTAL WORLD	13,063,900	3,682,722	186,733	3,869,455	29.6	0.6	-9,391	-0.2

Thus it can be concluded that the carbon stock must have been depleting after 31st December, 1989.

2. Trends in the types of cooking fuel

The major source of cooking fuel in Nepal has been wood from long time ago. However, the share of cooking fuel defers from time to time as shown in the below figures. The share is determined depending on the number of households using each fuel.

The share of wood is the highest in whole Nepal however, the fossil fuel has become the most popular cook fuel source in urban area which is relatively developed in that country. In the figures show the trend the Nepali households getting more dependency on LPG as their cook fuel is common in any areas in Nepal. And after 2004, the wood share is decreasing slightly. In conclusion, the trend in types of cooking fuel shows the scarcity of woody biomass.
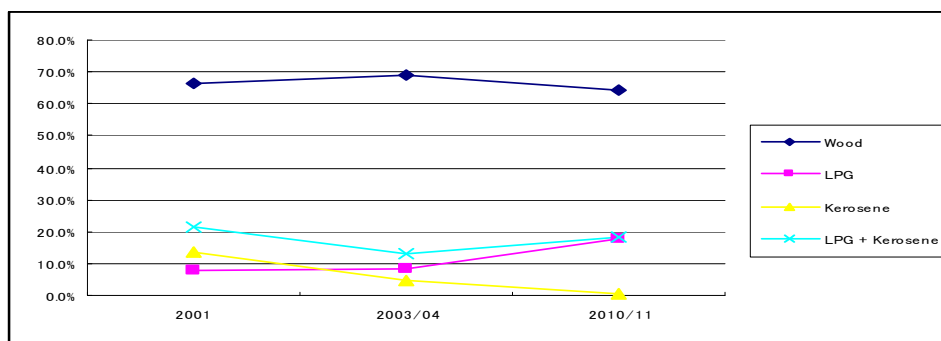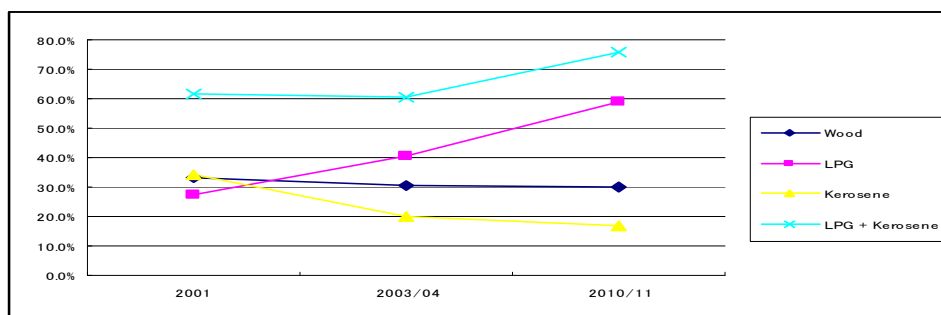

Figure 20. Cook fuel trend in whole Nepal

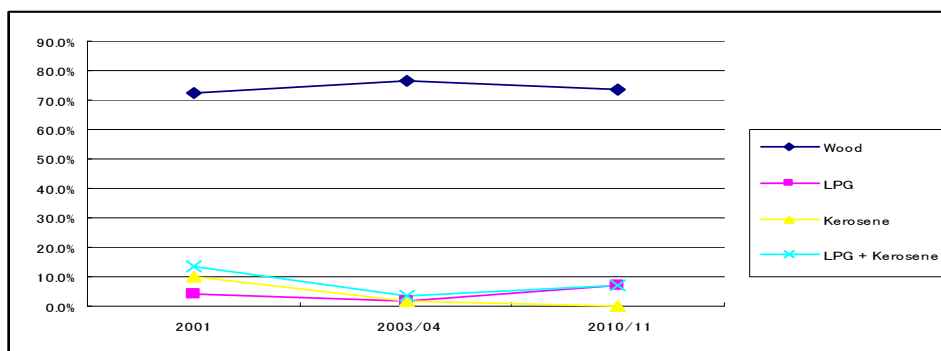Figure 21. Cook fuel trend in urban area

Figure 22. Cook fuel trend in rural area

* Data in 2001: "Population Census 2001", Central Bureau of Statistics
** Data in 2003/04: "Nepal Living Standard Survey 2003/04", Central Bureau of Statistics
*** Data in 2010/11: "Nepal Living Standard Survey 2010/11", Central Bureau of Statistics

Appendix 4: Further background information on ex ante calculation of emission reductions

(a) Baseline Parameters

As to the calculation of emission reduction, B_{old} (quantity of woody biomass used in the absence of the project activity per household) is set ex ante before the registration of the PoA-DD.

The detailed process is shown below.

- Annual fuelwood consumption per household

  5.055798 t / household

	Item	Unit	Value	Source
1	Total Fuelwood Consumption in Nepal (2008)	TJ	311,167.30	Energy Sector Synopsis Report (Water and Energy Commission Secretariat)
2	Calorific value of wood fuel	TJ / t	0.01675	Energy Sector Synopsis Report (Water and Energy Commission Secretariat)
3	Residential Fuelwood Consumption	%	99.20%	Energy Sector Synopsis Report (Water and Energy Commission Secretariat)
4	Total Household in Nepal	households	5,659,984	District Development Profile of Nepal 2012 (Mega Publication & Research Centre)
5	Fuelwood share for cooking purpose in Nepal	%	64.40%	NEPAL LIVING STANDARDS SURVEY 2010/11
6	Fuelwood Consumption per Households	t / hhs / y	5.055798322	Calculation (= 1 / 2 * 3 / (4 * 5))

According to *Energy Sector Synopsis Report* published by Water and Energy Commission Secretariat in July 2010, total fuelwood consumption in whole Nepal is 311,167.30 TJ in 2008, which equals to about 5,212 t[14] in a year. Among the whole fuelwood consumption, 99.20% of fuelwood is used for residential purpose and rest for industrial and commercial purposes. In addition, the fuelwood is consumed within 64.40% of total households for primary cooking purpose in Nepal.

Furthermore, leakage emission has to be considered in accordance with AMS-II.G (ver.05.0); B_{old} is multiplied by a net to gross adjustment factor of 0.95 to account for leakage.

Thus the annual fuelwood consumption per households is calculated as follows;

B_{old} = $B_{old} * f_{leakage}$
          =   5.055798 * 0.95
          =   4.803008406 (t/y)

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[14] 311,167.30 TJ * 0.01675 TJ/t = 5,212.052275 t
(* 0.01675 TJ/t : *Energy Sector Synopsis Report* (Water and Energy Commission Secretariat), July 2010)

(b) Emission Reduction Calculation

- ER(y) = B(y,savings) * f(NRB,y) * NCV(biomass) * EF(projected fossilfuel) * N(y,i)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
=	1,139	2,401	2,280	2,165	2,056	1,953	1,855	1,761	1,671	1,587	tCO2e / y

18,868

- B(y,savings) = B(old) * (1 - n(old) / n(new))
  = 1.601002802

- B(old) = B(old) * f(leakage)
  = 4.803008406 t / y

Where:

	Factor	Value	Reference	Description
1	f(NRB,y)	86%	Nepal's DNA	(Default) Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
2	NCV(biomass)	0.015	IPCC	(Default) Net calorific value of the non-renewable woody biomass that is substituted (TJ/tonne)
3	EF(projected fossilfuel)	81.6	AMS-II.G	(Default) Emission factor of solid fossil fuel for the substitution of non-renewable woody biomass by similar consumers (tCO2/TJ)
9	B(old)	5.0558	BL survey	Quantity of woody biomass used per appliance in the absence of CPA-1 activity (t)
10	n(old)	20%	AMS-II.G	(Default) if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney
14	n(new)	30.00%	Monitoring	Efficiency of the system being deployed as part of the project activity (fraction), as determined using the water boiling test (WBT) protocol.
15	N(y,i)	1500	Monitoring	Number of project devices of type I operating in year
16	f(leakage)	95%	AMS-II.G	(Default) gross adjustment factor to account for leakage

Appendix 5: Further background information on monitoring plan

For determining the "Number of project devices that are operating in year y (N_y)" and "Efficiency of the device being deployed as part of the project activity in year y ($\eta_{new,y}$)", the monitoring is carried out to the households selected in accordance with "Cluster Sampling" shown in "*Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities*" (ver.02.0).

As to the sampling method, the 1,500 households are grouped into small clusters; for example 10 households for a 1 cluster. Then total 150 clusters are included in CPA-1. In order to have some understanding of the proportion of cook stoves still operating and the variation in this proportion between villages, a small preliminary sample has been taken.

Then the equation for the number of villages that need to be sampled is:

$$c \geqq 1.645^2 \, MV / \{(M - 1) * 0.1^2 + 1.645^2 * V\} \tag{a}$$

Where:

$$V = SD_B^2 / p^2 \tag{b}$$

c	Number of clusters to be sampled
M	Total number of clusters
1.96	Represents the 90% confidence required
0.1	Represents the 10% relative precision required

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project design document form for small-scale component project activities" (EB 66, Annex 17).
01	EB33, Annex44 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		