



**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

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Nepal Biogas Support Program – PoA

UNFCCC Reg. No.- 9572¹

A.2. Title of the CPA

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Nepal Biogas Support Program - CPA 4: 19,970 digesters.

Version 3.0

Date: 05/02/2014

A.3. Description of the CPA

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This CDM Program Activity (CPA) is part of the Nepal Biogas Support Program-Programme of Activity (PoA). This CPA includes 19,970 digesters which were implemented between 20/02/2011 and 28/02/2012.² Table 1 provides an overview of the digesters according to their size and location.

Table 1: Digesters listed in this CPA.

Size \ Region	Hill	Terai	Mountain or Remote Hill	Total
2 m³	694	20	17	731
4 m³	5,292	668	48	6,008
6 m³	4,691	7,784	58	12,533
8 m³	43	655	0	698
Total	10,720	9,127	123	19,970

A complete list of all digesters included in this CPA is available in Emission reduction Spread sheet. The eligibility criteria for inclusion of CPA in the PoA are elaborated in section D.5.

A.4. Entity/individual responsible for CPA

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AEPC is responsible for overall coordination and the implementation of all the CPAs under the Nepal Biogas Support Program-PoA.

¹ http://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ96O/view

² Validation started before 31 December 2009, allowing inclusion of CPAs with a start date before the start of validation. (47th EB meeting report, paragraph 72).

Each biogas digester household of each CPA under the PoA agrees by contract to transfer the title to the CO₂ emission reductions to AEPC.

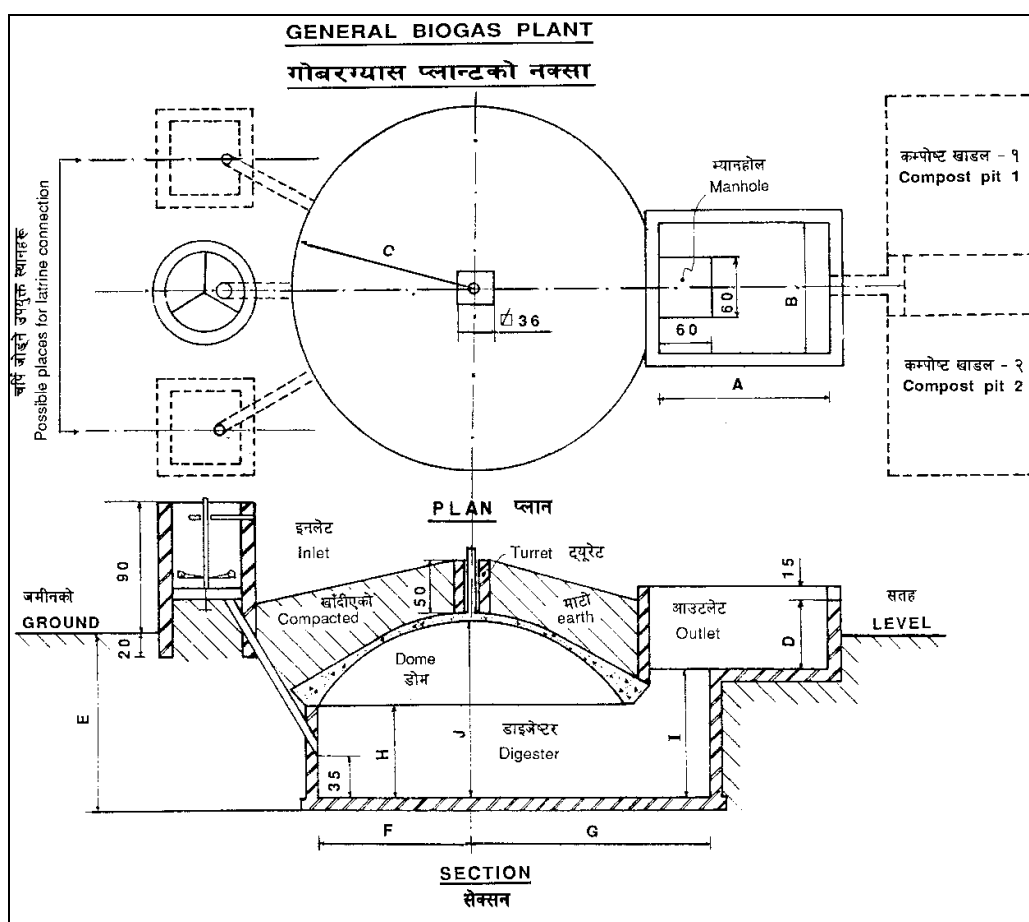
A.5. Technical description of the CPA

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The technologies used in this CPA are household biogas digesters with a sludge and gas holding capacity range of up to 10 m³. The different sizes of the digesters that would be included in the programme would be of 2, 4, 6, 8 and 10 m³. The programmes uses only one design i.e. GGC 2047 model. The biogas digesters are based on a uniform technical design and are manufactured and installed following established technical standards in Nepal. The digester itself is a closed underground container made of concrete or other materials.

The design of the digester is mentioned below:

Biogas Model GGC 2047



The GGC 2047 biogas digester consists of five main structures or components. They are the inlet, outlet, digester, dome and the compost pits. The required quantity of dung and water is mixed in the inlet tank and this mix in the form of slurry is allowed to be digested inside the digester. The gas produced in the digester is collected in the dome, called as the gas holder. The digested slurry flows to the outlet tank from the digester through the manhole. The slurry then flows through the overflow opening to the compost pit where it is collected and composted. The gas is supplied to the point of application through the pipeline.

**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)
Government of Nepal	Alternative Energy Promotion Center (AEPC)*	No

* AEPC is a public entity

A.7. Geographic reference or other means of identification

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The digesters in this CPA are located at various locations across Nepal. The geographical coordinates of Nepal are:

Latitude – North 26.20 degree to North 30.45 degree

Longitude – East 80.07 degree to East 88.20 degree

The CPA database contains the following information for each digester: owner's name, spouse name, VDC/NP or ward number, cluster, district, region, plant size, name of Installation Company, digester code and the commissioning date.

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

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20/02/2011

The CPA started with the construction of the first digester listed which is 20/02/2011.

The actual start of gas production will be 5 to 7 days after installation of biogas plant. The plant will be recorded in central database after 7-10 days of plant installation. Hence, by the time the plant is recorded in database, the gas production is already started.

A.8.2. Expected operational lifetime of the CPA

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The operational lifetime of each digester is 20 years. Since the first digester covered by the CPA was implemented on 20/02/2011, the operational lifetime of the small scale CPA is up to 19/02/2031.

A.9. Choice of the crediting period and related information

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Renewable crediting period**A.9.1. Start date of the crediting period**

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The crediting period starts at the date of inclusion of CPA in the PoA which is estimated to be 08/05/2014.

A.9.2. Length of the crediting period

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The duration of the crediting period is 7 years. Since the PoA will use renewable crediting period, the lifetime of the PoA will be 28 years after registration. PoA is registered on 31/01/2013, with an expected lifetime of 28 years, the end date of the PoA is 30/01/2041 and thereby creates limit on the duration of the crediting period of the CPA#4 i.e. the CPA#4 will have crediting period maximum up to 30/01/2041.

A.10. Estimated amount of GHG emission reductions

Based on a weighted average emission reductions of 3.32 tonnes CO₂e per household per year, the estimated amount of emission reductions over the chosen crediting period is as indicated in Table 2

Table 2: Estimated amount of emission reductions over the crediting period

Emission reductions during the crediting period	
Years	Annual GHG emission reductions (in tonnes of CO₂e) for each year
Year 1	66,397
Year 2	66,397
Year 3	66,397
Year 4	66,397
Year 5	66,397
Year 6	66,397
Year 7	66,397
Total number of crediting years	7
Annual average GHG emission reductions over the crediting period	66,397
Total estimated reductions (tonnes of CO₂e)	464,779

A.11. Public funding of the CPA

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The digesters listed in the CPA receive subsidies and technical support under the BSP program. The BSP program is funded by the entities listed below. These include:

- Danida
- Norway

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

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The proposed small scale CPA is not a de-bundled component of a large CDM project. Each of the independent subsystems (bio digesters) included in the CPA is not greater than 1% of the threshold defined for a small scale project.³ 1% of the 15 MW_{el} (45MW_{th}) threshold for type I projects is 150 kW_{el} (450kW_{th}). The capacity of a digester is 1.86 kW_{th} (see section E.2. of the CDM-SSC-PoA) and hence remains well below the 1% of 15 MW threshold.

A.13. Confirmation for CPA

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This small-scale CPA lists a unique set of digesters that are not part of any other CDM project activity or CPA. NSP registers all households that implement a digester under its BSP program. Each household by contract transfers the title to the emission reductions to BSP.

Double counting is avoided by giving each digester a unique code (biogas digester code) and GPS reading. Also for maintaining the subsidy scheme it is important to avoid double counting. To avoid that households try to optimise their subsidy revenues, BSP does not allow that more than one digester is

³ Guidelines on Assessment of Debundling for SSC Project Activities – Version 03, (EB 54, Annex 13)

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implemented per household. The digester codes listed in the BSP database and if necessary also the GPS coordinate (if biogas projects emerge in future that are not part of the BSP) will be used to confirm that each digester is counted only once and is not already included under a different CDM project or CPA.

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

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Please refer to the section C of CDM-SSC-PoA-DD

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

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Please refer to the section D.1 of the CDM-SSC-PoA-DD

C.2. Summary of comments received

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Please refer to the section D.3 of the CDM-SSC-PoA-DD

C.3. Report on consideration of comments received

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Please refer to the section D.4 of the CDM-SSC-PoA-DD

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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Title: Switch from non-renewable biomass for thermal applications by the user (AMS I.E. version 05)

Reference: <https://cdm.unfccc.int/methodologies/DB/WHTQUFLWCVNB9CIUZC198A712WGQR4>

D.2. Application of methodology(ies)

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The Nepal Biogas Support Project-CPA#4 meets the applicability criteria of AMS-I.E (version 05) as follows:

Criteria AMS-I.E. (version 05)	Explanation
Small-Scale project requirement: For biomass, biofuel and biogas project activities, the maximal limit of 15MW (e) is equivalent to 45 MW thermal output of the equipment or the plant (e.g. boilers). For thermal applications of biomass, biofuels or biogas (e.g. the cookstoves), the limit of 45 MW _{th} is the installed/rated capacity of the thermal application equipment or device/s (e.g. biogas stoves).	The biogas capacity of each stove is 400 litre/hour. With a methane content of 52%, this gives an annual natural gas capacity of not more than 1.86 kW _{th} per stove (Refer Calculation in the emission reduction spreadsheet). This means that around 24,000 stoves would still have an aggregated capacity below the 45MW _{th} small scale threshold value; however the CPA#4 is limited to 19,970 installations only.
This category comprises activities to displace the use of non-renewable biomass by introducing renewable energy technologies. Examples of these technologies include but are not limited to biogas stoves, solar cookers, passive solar homes, renewable energy based drinking water treatment technologies (e.g. sand filters followed by solar water disinfection; water boiling using renewable	The digesters are indeed “small thermal appliances that displace the use of non-renewable biomass by introducing new renewable energy end-user technologies”. AMS-I.E. even lists biogas stoves as an example of eligible end user technologies.



biomass).	
Project participants are able to show that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	The annual BUS conducted in 2012 demonstrated that the time needed to gather firewood, the price of firewood and the distance travelled to gather firewood is increasing at least since December 1989 (please refer to section E.4. for details). This conclusion was confirmed in the NRB survey⁴, conducted as a part of BUS, conducted during July/August 2012. In that survey the respondents were asked to provide averages for the time needed to gather firewood, the distance travelled and the price. The average of the estimates from all respondents, showed a clear increase on all three indicators, pointing towards the use of NRB. In addition, these trends seen are not on the account of the enforcement of national legislation. A relevant policy initiative is the development of community forests. However, the Nepal National Action Programme⁵ shows that community forestry has the opposite effect and significantly reduces the time spend on firewood gathering. Therefore the increase demonstrated by the BUS cannot be a result of this policy.

D.3. Sources and GHGs

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The CPA includes the following sources and gasses (this list is consistent with the list in section E.3. of the PoA).

Source	Gas	Included
Baseline: emissions from NRB use for cooking	CO ₂	Included
	CH ₄	Not included: conservative
	N ₂ O	Not included: conservative
Baseline: emissions from fossil fuel use for cooking	CO ₂	Not included: conservative
	CH ₄	Not included: conservative
	N ₂ O	Not included: conservative
Project: digester and biogas cooking stove	CO ₂	Negligible
	CH ₄	Not Included. Negligible.

D.4. Description of the baseline scenario

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The baseline scenario is continued use of non renewable biomass (NRB) i.e. firewood for cooking. In addition to non renewable firewood, the households also use small amounts amount of cow dung and agricultural waste for cooking. Fossil fuels like kerosene and LPG are hardly used. Only firewood consumption is considered for the baseline estimates. Thus, in the absence of the programme the

⁴The Non Renewable Biomass (NRB) survey, as a part of annual BUS, was conducted in 2012 to confirm that the biomass used by households has been subject to the trends listed in AMS-I.E. (version 05 paragraph 7) since 31 December 1989.

⁵Nepal, National Action Programme on Land Degradation and Desertification in the context of the United Nations Convention to Combat Desertification (UNCCD), Kathmandu, April 2004 (page 52)

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beneficiaries would have continued the use of non renewable biomass (firewood) leading to its associated GHG emissions. Hence, use of non renewable biomass is considered as the baselines and emission reductions will be claimed only for the displacement of non renewable fuelwood.

The baseline scenario has been determined at the PoA level (refer section E.4 of the PoA-DD for detail information in baseline)

D.5. Demonstration of eligibility for a CPA

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Topic	No.	Eligibility Criteria	Possible Verification source	Complied Yes/No
Geographical boundary	1	- All biogas digesters in the CPA#4 are located within the geographical boundaries of Nepal. - This is confirmed by the CME by ensuring that each individual installation is a) located at an address that lies within the geographical boundaries of Nepal as demonstrated by providing the address of all biogas digesters in the CPA database; and b) has GPS coordinates that are situated within the geographical boundaries of Nepal.	- Commissioning Report from Biogas Companies (BC). - CPA Database indicating digester code, address and GPS coordinate.	- Yes
Double counting	2	- Double counting is avoided by assuring that no digester is already included to a different CDM project or CPA. - This is confirmed by the CME based on a) the digester codes listed in the BSP database and b) if necessary also GPS coordinates (the latter applies if biogas projects emerge under the CDM that is not part of the BSP).	- CPA Database indicating digester code, address and GPS coordinate. - Unique GPS reading of each digester. - CDM website indicating potential further projects not included to BSP using the same technology.	- Yes
Technology	3	- AEPC has implemented this CPA as part of the BSP. - All digesters listed in the CPA#4 are household biogas digesters with a sludge and gas holding	- Commissioning Report from Biogas Companies (BC). - Technical	- Yes



		- capacity range of 2-10 m3. - Biogas is supplied to a stove with a maximum capacity of 400 l/h leading to a maximum annual gas capacity of not more than 1.86 kWth per stove. - The equipment for each biogas plant installation under CPA#4 is new and not transferred from other project activities.	specification documents detailing digester models and equipment applied.	
Start Date	4	- The start date of a CPA#4 is the date of commissioning of the first biogas digester included in the respective CPA. - The start date of CPA#4 is 20/02/2011, which is the date of commissioning of the first digester in CPA#4. - The start of CPA#4 is after the date of commissioning of the last installation included in CPA#3 i.e. 19/02/2011. - The date of commissioning is recorded in the Commissioning Report, which is archived and the date recorded in the CPA database.	- Commissioning Report from Biogas Companies (BC), indicating the commissioning date. - CPA Database	- Yes
Compliance with applied methodology	5	- The activity replaces non renewable biomass. This is confirmed through Biogas Users' Survey conducted by an independent third party for the biogas digesters implemented by BSP.	- Report confirming use of non-renewable biomass as firewood prior to installation of digesters (e.g. BUS)	- Yes
Diversion of official development assistance	6	- The CPA does not result into the diversion of official development assistance.	- Declaration from CPA implementer / AEPC. - Confirmation of ODA non diversion.	- Yes
Target	7	- The target groups	- Installation	- Yes



Group and distribution mechanism		within the CPA are households.	confirmation from Biogas Companies (BC) indicating that the digesters are installed in a household.	
Threshold check	8	- Number of biogas digester included in each CPA shall not exceed 20,000 units, which assures compliance with the small scale limit of 45MWth. ⁶	- BSP/AEPC database to confirm the number of digesters in CPA#4 is 19,970.	- Yes
Other / Voluntary action	9	- The owners of the digesters listed in the CPA#4 have signed an agreement in which it allows AEPC to market the emission reductions from the installation and operation of the digester. - Digesters implemented in CPA#4 is a voluntary action and not mandated by the Government of Nepal	- Contract of AEPC and owners of digesters confirming emission reduction purchase. - Confirmation that each CPA is a voluntary action not mandated by the Government of Nepal	- Yes

The additionality of the SSC CPA is demonstrated in line with “Standard on the Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities, Version 03”. If the above indicated eligibility criteria on technology and thresholds are met, additionality is complied with automatically (Please refer to section E.5.1, E.5.2 and A.4.2.2 of the registered PoA-DD). Hence by complying with the eligibility criteria 3 and 8, the CPA need not be further assessed for additionality.

D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

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According to AMS-I.E. version 05, para 05, the emission reductions under a CPA are calculated as the following:

$$ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected_fodssilfuel}$$

1

In which:

⁶Estimated maximum capacity of 1.86 kWth per stove. Considering that the limit for SSC is 45 MW_{th}, the maximum number of digesters allowed under a CPA (20,000) remains well below the SSC threshold.

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ER_y	Emissions Reductions during the year y (tCO _{2e})
B_y	Quantity of woody biomass that is substituted or displaced in tonnes
$f_{NRB,y}$	Default value of fraction of non renewable biomass for Nepal, EB 67 Annex 22 "Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)". Use a value of fNRB 86%
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne. The value is according to the methodology AMS I.E.
$EF_{projected, fossilfuel}$	Emission factor for substitution of non renewable woody biomass by similar consumers. Use a value of 81.6tCO ₂ /TJ.

Following option a) of paragraph 6, B_y is “calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year)”.

In the case of the present CPA, “the number of appliances” as deducted from the internal records (commissioning report / database) is corrected with the share of digesters actually in operation. The “average annual consumption of woody biomass per appliance (tonnes/year)” is the biomass substituted or displaced, which is fixed ex ante at 3.33tonnes/year per appliance.

Thus, B_y will be calculated as follows:

$$B_y = N_{sr} \times P \times Q_{NRB repl.}$$

1

In which:

N_{sr}	The number of appliances. The parameter refers to the number of digesters in each size and category and is hence unitless.
P	Performance of digesters as the share of digesters implemented that is actually operational, determined through survey methods (%)
$Q_{NRB repl.}$	Average quantity of biomass replaced per appliance and year (tonnes/year)

Calculations will be carried out based on Excel spread sheets using the data of the BSP database. The database provides e.g. commissioning date. The commissioning date plus 7-10 days up to operation start will provide the starting date for the emission reduction achieved by the individual digester.

Leakage

The default factor of 0.95 is used to account for any potential leakage, as prescribed by the methodology. Thus the leakage emission under a CPA is calculated as the following:

$$LE_y = 0.05 \times B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected_fossilfuel}$$

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**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 biomass that is substituted
Source of data	This value will be kept up to date with the IPCC guidelines.
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	AMS-I.E. requires using this value.
Purpose of data	Calculation of baseline emission
Additional comment	N/A

Data / Parameter	$EF_{\text{projected_fossil fuel}}$
Unit	tCO ₂ /TJ
Description	Emission factor for the projected fossil fuel consumption in the baseline.
Source of data	Approved small scale methodology AMS I.E. (version 5.0)
Value(s) applied	81.6
Choice of data or Measurement methods and procedures	AMS-I.E. requires using this value.
Purpose of data	Calculation of baseline emission
Additional comment	N/A

Data / Parameter	$f_{NRB,y}$
Unit	%
Description	Fraction of biomass used in the absence of the project activity in year y that can be established as non renewable biomass using nationally approved methods
Source of data	"Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)" EB 67 Annex 22
Value(s) applied	86%
Choice of data or Measurement methods and procedures	Default approved by the CDM EB as the value for the fraction of NRB in Nepal.
Purpose of data	Calculation of baseline emission
Additional comment	EB 67 Annex 22 decision stipulates using this value



Data / Parameter	$N_{s,r}$				
Unit	Numbers				
Description	Number of digesters in each size category (in m ³) and region (Terai, Hill and, if available, Remote Hill or Mountain) implemented under the CPA				
Source of data	BSP-Nepal database, including 19,970 digesters with starting date between 20 February 2011 and 28 February 2012 included in the CPA.				
Value(s) applied	These digesters are divided over the various regions as indicated in the table in section A.2, table 1.				
	Region Size	Hill	Terai	Mountain or Remote Hill	Total
	2 m³	694	20	17	731
	4 m³	5,292	668	48	6,008
	6 m³	4,691	7,784	58	12,533
	8 m³	43	655	0	698
	Total	10,720	9,127	123	19,970
Choice of data or Measurement methods and procedures	The registration procedure of the BSP database avoids double counting of digesters and the registration of digesters that have not been commissioned. The BSP database is the basis for subsidy disbursement. The data used to maintain this database is gathered according to defined procedures, making it a reliable source of information.				
Purpose of data	Calculation of baseline emissions				
Additional comment	Based on the size category of digester implementation between 20/02/2011 and 28/02/2012.				

Data / Parameter	$Q_{NRB repl.}$
Unit	Tonne per year and appliance
Description	Quantity of woody biomass that is substituted or displaced in tonnes per year and appliance
Source of data	Calculated
Value(s) applied	3.33
Choice of data or Measurement methods and procedures	Calculated based on survey and historic data, such as Biogas User Survey (BUS) The BUS is based on survey techniques and has been confirmed in the context of registered CDM project 5416⁷.
Purpose of data	Calculation of baseline emissions
Additional comment	- To be re-assessed at renewal of crediting period of CPA. - As per paragraph 6 (a) of the methodology <i>B_y represents: The estimated average annual consumption of woody biomass per appliance (tonnes/year) derived from surveys or historic information.</i> - As per SSC WG clarification SSC 543 the estimate can be fixed ex ante

⁷<http://cdm.unfccc.int/Projects/DB/RWTUV1321020993.82/view>

**D.6.3. Ex-ante calculation of emission reductions**

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The emission reduction calculation is based on data that is specified to digester size and region. This section provides a short explanation of the calculations made. For further detail please refer to Annex 3 to this CDM-SSC-CPA to the CDM-SSC-POA.

According to AMS-I.E (version 05), the emission reductions under a CPA are calculated as the following:

$$ER_y = B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected, fossilfuel}$$

In which:

ER_y	Emissions Reductions during the year y (tCO ₂ e)
B_y	Quantity of woody biomass that is substituted or displaced in tonnes
$f_{NRB,y}$	Default value of fraction of non renewable biomass for Nepal, EB 67 Annex 22 "Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)". Use a value of f_{NRB} 86%
$NCV_{biomass}$	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne. The value is according to the methodology AMS I.E.
$EF_{projected, fossilfuel}$	Emission factor for substitution of non renewable woody biomass by similar consumers. Use a value of 81.6tCO ₂ /TJ.

Following option a) of paragraph 6, B_y is “calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year)”.

In the case of the present CPA, “the number of appliances” as deducted from the internal records (commissioning report / database) is corrected with the share of digesters actually in operation. The “average annual consumption of woody biomass per appliance (tonnes/year)” is the biomass substituted or displaced, which is fixed ex ante at 3.33tonnes/year per appliance.

Thus, B_y will be calculated as follows:

$$B_y = N_{sr} \times P \times Q_{NRB repl.}$$

1

In which:

N_{sr}	The number of appliances (19,970)
P	Performance of digesters as the share of digesters implemented that is actually operational (99.8%) ⁸
$Q_{NRB repl.}$	Average quantity of biomass replaced per appliance and year (3.33 tons/year taken as ex-ante fixed value)

Leakage

⁸ Biogas Users’ survey conducted for Project Activity 4 on 2011/12 came up with the result that 99.8% of digesters implemented were operational on the weightage average basis for sample digesters of all size categories distributed across all ecological zones.

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The default factor of 0.95 is used to account for any potential leakage, as prescribed by the methodology. Thus the leakage emission under a CPA is calculated as the following:

$$LE_y = 0.05 \times B_y \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected_fossilfuel}$$

4

From the above equations,

$$B_y = 69,892$$

$$LE_y = 3,495$$

$$ER_y = 66,397$$

Please refer ER calculation spreadsheet and appendix 4 for further details of the calculation.

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)
Year 1	69,892	0	3,495	66,397
Year 2	69,892	0	3,495	66,397
Year 3	69,892	0	3,495	66,397
Year 4	69,892	0	3,495	66,397
Year 5	69,892	0	3,495	66,397
Year 6	69,892	0	3,495	66,397
Year 7	69,892	0	3,495	66,397
Total	489,244	0	24465	464,779
Total number of crediting years	7			
Annual average over the crediting period	69,892	0	3,495	66,397



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D.7. Application of the monitoring methodology and description of the monitoring plan

D.7.1. Data and parameters to be monitored

Data / Parameter	P
Unit	%
Description	The share of digesters operational (based on the total number implemented using non renewable biomass).
Source of data	Performance report elaborated at least biennial (as part of BUS or as part of internal quality control reports of AEPC or other monitoring reports)
Value(s) applied	
Measurement methods and procedures	The value of parameter P used for ex-post emission reduction calculation will be based on the operation report elaborated at least biennial and conducted for each individual CPA. The report will be based on a survey. The survey shall also reconfirm the use of non-renewable biomass. Sampling shall follow the established sampling plan.
Monitoring frequency	Annual
QA/QC procedures	The Internal Quality Control system samples 5% of the digesters that are newly implemented, 2.5% of the digesters that are two year in operation and 2.5% of the digesters that have been operational for three years as part of the Internal Quality Control system. If, for the digesters listed in the CPA, the outcome of this survey is a lower percentage than the outcome of the operation report (as e.g. included to BUS), the lower of the two values will be used. After the three-years after sales service is over, this value will depend on the performance report or other monitoring reports. The selection of households under the surveys will ensure that these percentages are met also for each individual CPA included in the PoA.
Purpose of data	ER calculation
Additional comment	Requirements as defined in the sampling plan shall be met.

D.7.2. Description of the monitoring plan

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The various aspects to be monitored according to the methodology are presented in the table below:

Aspects to be monitored according to Methodology	Applicability to the Project	Parameter to be Monitored (YES/NO/Not Applicable)
Monitoring shall consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent in service appliance.	Emission reductions is directly proportional to the number of appliances (digesters in case of the project) still performing. So this needs to be monitored.	Yes (based on operation reports carried out at least biennial)
In order to assess the leakages specified under paragraph 10 of the methodology, monitoring shall include data on the amount of woody biomass saved under the project activity that is used by non-	The methodology allows the use of a default factor of 0.95 to account for leakage. So this will not be monitored in the project.	No (Instead a default factor of 0.95 shall be used)



project households/users (who previously used renewable energy sources). Other data on non-renewable woody biomass use required for leakage assessment shall also be collected		
Monitoring should confirm the displacement or substitution of the non-renewable woody biomass at each location.	This shall be ensured by monitoring the number of appliances (digesters in case of the project) still performing	Yes (based on the performance reports carried out at least biennial, e.g. BUS, and in addition to eligibility criteria that also confirm use of NRB)

Further descriptions on the monitoring plan of a CPA

Internal monitoring activities as part of the overarching BSP programme

AEPC carries out thorough quality control activities to ensure that the biogas digesters are built according to high quality standards. This includes setting up random sampling, field visits, on the spot advice to biogas companies and biogas owners, collecting and analyzing data obtained through questionnaire during visits, adopting “rewards or punishment” system to biogas companies etc. At least 5% of the constructed digesters in any year are visited by staffs of BSP-Nepal for quality control. Note that this quality control is carried out to ensure quality of the digesters but not necessarily to calculate the emission reductions. BSP-Nepal also provides support to calculate a Biogas Performance Index (BPI) which is a composite of allocated points for Production, Average Default, Average Penalty, Average Feeding %, Accuracy, Maintenance, and After Sales Service Progress. BPI helps to show the status of each participating biogas company. District Energy and Environment Units/Sections (DEEU/Ss) will monitor the digesters in the respective district. AEPC randomly samples and provides list of digester to DEEU/S for monitoring.

CDM monitoring

1) Digester performance

The performance of the bio-digesters and continued displacement of NRB will be assessed based on the performance reports. The corresponding survey may be conducted as part of the quality control procedures of AEPC.

A statistically representative sample will be surveyed individually for each CPA of the PoA. The survey will be conducted according to the sampling plan and following “Standard for sampling and surveys for CDM project activities and programme of activities” (version 04.0) Annex 6, EB 74.

To obtain reliable and accurate data on the digesters implemented under each CPA of the PoA, the surveyed digester population will include a statistically significant sample for each CPA reflecting all sizes and ecological zone categories.

A stratified random sampling method will be applied during sample selection in the Biogas User Survey. Sample size will be chosen for 90% confidence interval and 10% margin of error for parameter values as stipulated by the Executive Board.

In order to have an unbiased and independent assessment, the survey is carried out through an independent agency. A structured questionnaire will be used to collect data and information to assess the performance of the biogas digesters implemented under each CPA.

The sample size will be calculated using stratified random sampling technique. Resulting sample will then be proportionately distributed among various sizes of the biogas plant belonging to each strata i.e. ecological zone.



Thus, the at least biennial performance reports will be used for the identification of the proportion of biogas digesters included in the CPAs that are operational. The proportion of biogas digesters that are operational will be counted towards the emission reduction for the CPAs while the proportion of the non-operational plants will not be considered towards ER calculation.

For the detail sampling plan please refer Annex 4 (Monitoring Information) of the PoA DD.

2) Displacement of NRB

The “average annual consumption of woody biomass per appliance (tonnes/year)” is the biomass substituted or displaced, which is fixed ex ante at 3.33tonnes/year per appliance. This value is based on the details given in Annex 3 / baseline of the CDM SSC PoA DD. The value may be updated at the renewal of the crediting period of CPAs.

For the fraction of non renewable biomass in Nepal a default of 86% will be used as established by EB 67 Annex 22 "Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)".

SECTION E. Approval and authorization

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The host country DNA issued approval for the PoA on 31/12/2009.

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

Organization	Alternative Energy Promotion Centre
Street/P.O. Box	Khumaltaar Height/ 14364
Building	
City	Lalitpur
State/Region	
Postcode	
Country	Nepal
Telephone	+977-1-5539390
Fax	+977-1-5539392
E-mail	govind.pokhrel@aepe.gov.np
Website	www.aepc.gov.np
Contact person	Prof. Dr. Govind Raj Pokhrel
Title	Executive Director
Salutation	Prof. Dr.
Last name	Pokhrel
Middle name	Raj
First name	Govind
Department	
Mobile	+977-9851111006
Direct fax	+977-1-5542397
Direct tel.	+977-1-5539237
Personal e-mail	



Appendix 2: Affirmation regarding public funding

Please refer to CDM SSC PoA DD.



Appendix 3: Applicability of the selected methodology(ies)

Please refer to section D.2 above.

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

$N_{s,r}$ Number of digesters in each size category (in m3) and region (Terai, Hill and, if available, Remote Hill or Mountain) implemented under the CPA

Size	TE (Terai)	HI (Hill)		RH (Mountain)		Grand Total
2	20	694		17		731
4	668	5,292		48		6,008
6	7,784	4,691		58		12,533
8	655	43		0		698
Grand Total	9,127	10,720		123		19,970
Shares	45.7%	53.7%		0.6%		
		TE (Terai)	HI (Hill)	RH (Mountain)	Total	Remarks
QNRB repl.	Tons/HH/Year	3.33	3.33	3.33	3.33	As defined for entire POA based on >50000 digesters
P	Performance of digesters as the share of digesters implemented that is actually operational, determined through survey methods (%)	100.0%	100.0%	75.0%	99.8%	BUS 2011/12 for PA-4
By	Weighted average quantity of biomass that is substituted or displaced (tonnes/year)	3.33	3.33	2.50	3.32	Calculations
fNRB,y	Fraction of biomass used in the absence of the project activity in year y that can be established as non renewable biomass using nationally approved methods Fraction of biomass used in the absence of the project activity in year y that can be established	86.00%	86.00%	86.00%	86.0%	Ex-ante fixed value in PoA DD (EB 67 annex 22)



NCVbiomass	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel: 0.015 TJ/tonne)	0.015	0.015	0.015	0.015	IPCC default/AMS-I.E. version 5
EFprojected_fossil fuel	Emission factor for the substitution of non-renewable woody biomass by similar consumers. (81.6 tCO ₂ /TJ)	81.6	81.6	81.6	81.6	AMS-I.E. version 05
ERy	Emission reductions under the CPA during the year y (tCO ₂ e)	3.51	3.51	2.63	3.50	

Size	TE (Terai)	HI (Hill)	RH (Mountain)	Grand Total
2	70	2,433	45	2,547
4	2,342	18,550	126	21,018
6	27,285	16,443	152	43,881
8	2,296	151	0	2,447
Grand Total	31,923	35,144	279	69,892

LeakageLy	Leakage Factor	5%	5%	5%
Ly	Leakage under the CPA during the year y (tCO ₂ e)	0.2	0.2	0.1

Size	TE (Terai)	HI (Hill)	RH (Mountain)	
2	4	122	2	127
4	117	928	6	1,051
6	1,364	822	8	2,194
8	115	8	0	122
Total	1,600	1,879	16	3,495

Year	Estimation of emission reductions	Estimation of leakage	Estimation of overall emission reductions
	(tonnes of CO ₂ e)	(tonnes of CO ₂ e)	(tonnes of CO ₂ e)
Year 1	69,892	3,495	66,397
Year 2	69,892	3,495	66,397
Year 3	69,892	3,495	66,397
Year 4	69,892	3,495	66,397
Year 5	69,892	3,495	66,397
Year 6	69,892	3,495	66,397
Year 7	69,892	3,495	66,397
Total	489,244	24,465	464,779



Appendix 5: Further background information on monitoring plan

Please refer to section D.7 above.



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		