CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-SSC-CPA-DD)
Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for submission of CPAs that apply a small scale approved methodology using the provision of the proposed small scale CDM PoA.

(ii) The coordinating/managing entity shall prepare a CDM Small Scale Programme Activity Design Document (CDM-SSC-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the SSC PoA DD. At the time of requesting registration the SSC PoA DD must be accompanied by a CDM-SSC CPA-DD form that has been specified for the proposed SSC PoA, as well as by one completed CDM-SSC CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the SSC PoA must submit a completed CDM-SSC CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of small scale CDM programme activity (CPA)

A.1. Title of the small-scale CPA:

Improved Cooking Stoves in Bangladesh – CPA No.01 Grameen Shakti

Version 01
17/08/2009

A.2. Description of the small-scale CPA:

The small-scale CPA ("SSC-CPA") involves the installation and maintenance of a certain number domestic and non-domestic improved cooking stoves ("ICS") by a specific Partner Organization ("PO") in Bangladesh. The replacement of traditional cooking stoves with ICS, results in a significant reduction of fire-wood used as fuel, therefore reducing the amount of carbon dioxide emitted into the atmosphere. The proposed SSC-CPA is a voluntary initiative taken by the coordinating/managing entity of the PoA, JPMVEC, and implemented on a voluntary basis by the Partner Organization.

Contribution of the proposed SSC-CPA to sustainable development

Environmental benefits:

- *Air quality:* Children and mothers will be exposed to fewer air pollutants through reduced emission of not only CO_2, but also carbon monoxide and particulate matter. Air pollution from cooking with solid fuel is a key risk factor for childhood pneumonia as well as many other respiratory diseases and cancer[3].
- *Biodiversity:* will be improved as the programme reduces pressure on remaining forest reserves in Bangladesh.

Social and Economic benefits:

- *Employment:* the programme give rise to employment opportunities for new ICS technicians, assistants, office staff and other related jobs in Bangladesh.
- *Livelihood of the poor:* the circumstances of poor families will be improved since the stoves reduce fuel cost, providing financial savings. Reduction in wood consumption implies relief from drudgery and more opportunity for productive activity, arising from less time spent collecting fuel.
- *Access to energy services:* The ICS require less fuel, which in many areas can be a scarce resource or very expensive to buy; also, users have found ICS more convenient, shortening the cooking time.
- *Human and institutional capacity:* is raised through business development component of the project. The challenge of dealing with large-scale promotion and advertising matched quality

[3] World Health Organization, 2005 - http://www.who.int/mediacentre/factsheets/fs292/en/index.html

control and branding initiatives, together with the introduction of improved production and accounting systems, is already having a positive effect.

- *Technological self-reliance:* the introduction of a locally manufactured technology with optimized energy efficiency helps to build technological self-reliance.

A.3. Entity/individual responsible for the small-scale CPA:

The entity responsible for the proposed SSC-CPA is Grameen Shakti – a Project Participant to the POA, under the coordination of JPMVEC, the coordinating/managing entity of the POA.

JPMorgan Ventures Energy Corporation ("JPMVEC") is a registered Project Participant, Focal Point to all Scopes of Authority and the coordinating/managing entity to the SSC-PoA.

A.4. Technical description of the small-scale CPA:

The project will disseminate ICSs that are constructed individually by local technicians trained and acting under a contractual basis on behalf of the PO. The stoves which will initially be installed are made of mud and/or brick and have as accessories a chimney with a cap and grates. ICSs are more efficient than traditional stoves as they reduce the heat loss. The current domestic model gives an average of 50% savings of firewood to cook the same amount of food in comparison to traditional stoves.

The PO expects to install up to 11,000 stoves in the first year of which 80% are domestic while the remainder are non-domestic, at an approximate average rate of 900 per month. If it does not reach this figure in practice, it will continue to install up to this target figure in the second year. After this, the PO will cease to sell stoves[4], but instead monitor performance and concentrate on after-sales services to make sure of customer satisfaction and effective performance of the installations already made. If the stoves are found to perform well for 3 years, but then need replacement, a repeated 11,000 stoves will be sold in the 4th year of the project, followed by cessation of sales. If the stoves perform well for the following 3 years, no repeat sales will be made till the 7th year. The CPA may adopt an alternative strategy installing at a lesser monthly rate in all tears or following other patterns, in which case the schedule is determined by the need to optimize carbon-saving revenue just as the above strategy is determined.

Operational and management plan

The PO and its associated technicians are responsible for sales and installation of ICSs. The operation of the ICS is carried out by the user, and training on how to operate and maintain the ICS is given by the

[4] The pattern of sales is determined by the requirement for carbon finance to ensure the viability of the stoves distribution operation (the CPA). Stove sales are restricted to numbers which do not exceed an energy saving of 180 GWhrs a year (the threshold set for the small-scale methodology applied), in order that emission reduction claims may be made under on all stoves in operation. If the stove sales do in practice exceed the desired pattern by a small amount, this will be permitted but the emission reduction claim will be capped to the number of operational stoves representing an 180 GWhr annual saving.

PO. Physical maintenance of the ICS will be provided by the PO and its associated technicians at a small fee.

The PO will follow the monitoring plan and procedures - developed by the coordinating/managing entity - for identifying each stove sold during the course of the project, as follow. A serial number is assigned to the ICS during its construction. Once the construction of the ICS is finalized, the PO technician, collects the name, location, serial number, date of start use, phone number and address of the user. The user also signs a contract containing the terms of transfer of ownership of the future ERs to the PO.

The information collected by the PO is transferred to the coordinating/managing entity through an electronic file (the Data Base). All PO records are screened by the managing/coordinating entity which carries out independent spot-visits, together with cross-checks on the PO materials and logistics records in order to confirm that the installation record is authentic and that no double-counting occurs.

The electronic files holding each installation record are duplicated by paper documents signed by individual householders; these are designed to have the same format so that comparison with the spreadsheet count and actual signed papers is straightforward.

The PO and the coordinating/managing entity shall have signed an agreement including specific provisions and declarations that confirms the SSC-CPA project proponents agree that their activity is being subscribed under the PoA. Suitable training will be conducted for the PO to make its staff aware of the rules of the CDM and PoA.

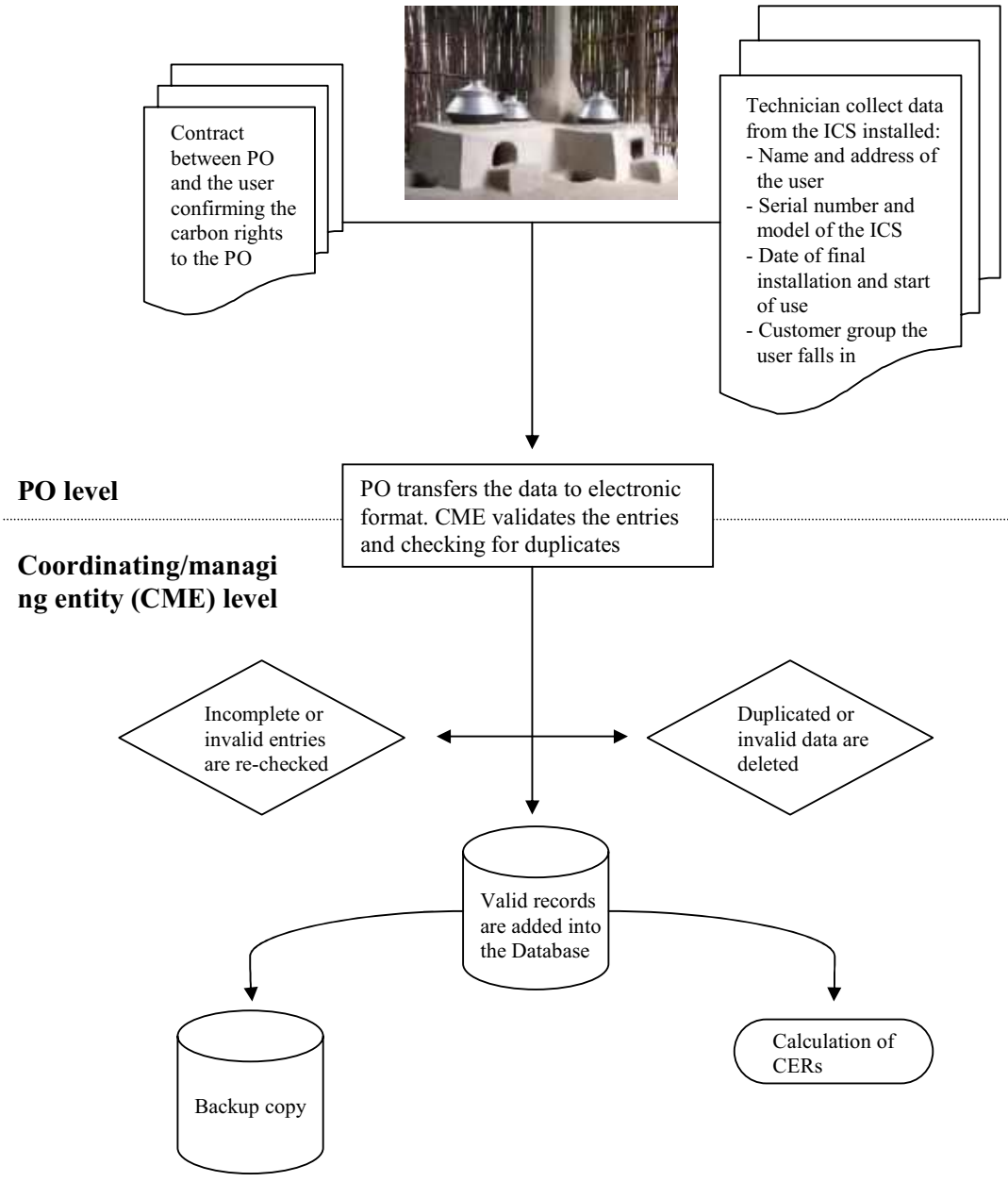


Figure 1. Schematics of the data collection and database system

A.4.1. Identification of the small-scale CPA:

Improved Cooking Stoves in Bangladesh – CPA No. 001 – Grameen Shakti

A.4.1.1. Host Party:

People's Republic of Bangladesh

A.4.1.2. Geographic reference or other means of identification allowing the unique identification of the small-scale CPA (maximum one page):

The boundary of the proposed SSC-CPA is determined by the location of the households where the ICSs are installed, but is limited to the area of The People's Republic of Bangladesh. The identification of each ICS installed and in use is possible through the information compiled in the Data Base. This information is constantly validated by the coordinating/managing through spot-checks and will be available at DOE validation and verification.

The contact detail of the PO responsible for the SSC-CPA is:

Name of entity/individual	Dr. Islam – Grameen Shakti
Address	Grameen Bank Bhaban, Mirpur-2, 1216, Dhaka, Bangladesh
Phone number	+88-29004081 Ext.123
Mobile number	
Alternative contact	

Grameen Shakti is a Project Participant to the SSC-POA.

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

01/08/2009

A.4.2.2. Expected operational lifetime of the small-scale CPA:

Minimum of 3 years

A.4.3. Choice of the crediting period and related information:

A.4.3.1. Starting date of the crediting period:

01/02/2010 or as soon as Registered under the UNFCCC.

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

7 years renewable twice

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Table A.4.4.1 Annual Estimation of ERs

Project Year	Annual estimation of Emission Reductions in tonnes CO2e
1	23,166
2	46,332
3	46,332
4	46,332
5	46,332
6	46,332
7	46,332
Total Emission Reductions (tonnes of CO2e)	**301,158**
Total Number of crediting years	7
Annual average over the crediting period of estimated reductions	**43,022**

Table A.4.4.2 Estimated Domestic Stoves Combined Hilly and Lowland Areas

Calendar Year	Year	Sales	Expiries	Number of users by year end	Projected operational stove years	Emission Reductions tonnes CO2
2010	Year 1	9,067	0	9,067	4,533	4,697
2011	Year 2	0	0	9,067	9,067	9,395
2012	Year 3	0	0	9,067	9,067	9,395
2013	Year 4	9,067	-9,067	9,067	9,067	9,395
2014	Year 5	0	0	9,067	9,067	9,395
2015	Year 6	0	0	9,067	9,067	9,395
2016	Year 7	9,067	-9,067	9,067	9,067	9,395
Totals		**27,200**			**58,933**	**61,065**

Table 4.4.3 Estimated Non-Domestic Stoves

Calendar Year	Year	Sales	Expiries	Number of users by year end	Projected operational stove years	Emission Reductions tonnes CO2
2010	Year 1	2,267	0	2,267	1,133	18,469
2011	Year 2	0	0	2,267	2,267	36,937
2012	Year 3	0	0	2,267	2,267	36,937
2013	Year 4	2,267	-2,267	2,267	2,267	36,937
2014	Year 5	0	0	2,267	2,267	36,937
2015	Year 6	0	0	2,267	2,267	36,937
2016	Year 7	2,267	-2,267	2,267	2,267	36,937
Totals		**6,800**			**14,733**	**240,093**

A.4.5. Public funding of the CPA:

No public funding was diverted for the implementation of the SSC-CPA.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

In accordance with paragraph 9 of Annex 32 to the EB47 Report, "Guidance for determining the occurrence of de-bundling under a Programme of Activities (PoA)", if each independent subsystem/measures included in the CPA of a PoA is no greater than 1% of the small scale threshold defined by the methodology applied, than that CPA of PoA is exempted from performing de-bundling check, i.e. considered as being not a de-bundled component of a large scale activity.

The small scale threshold defined by AMS II.G. is a maximum energy saving of 180 GWhr/year. The calculation in the table below shows that neither the non-domestic nor the domestic stoves individually exceed 1% of the SSC threshold, and that therefore the program is exempted from the de-bundling check.

NCV wood	15.6	GJ/t	
Energy units	3600	GJ/GWhr	
SSc Type II limit	180	GWhrs	
Energy saved per twood	0.004	GWhr/tonne	
	INDS	**DS**	
Wood saved by each stove (national averages)	14.61	0.93	tonnes/year
Energy saved by each stove	0.063	0.004	GWhr/year
Percentage of the SSC Type II limit	**0.04%**	**0.002%**	

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

The SSC-CPA is neither registered as an individual CDM project activity nor is part of another Registered PoA. All ICS under this SSC-CPA are uniquely identified by its serial number on the Data Base as well as by paper documents signed by the users. These documents assert the rights of the carbon credits to the project implementer of this SSC-CPA only.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which small-scale CPA is added:

Improved Cooking Stoves in Bangladesh

Version 01
17/08/2009

B.2. Justification of the why the small-scale CPA is eligible to be included in the Registered PoA:

The SSC-CPA meets all the eligibility criteria for inclusion as outlined in Section A.4.2.2. of the SSC-PoA. This is demonstrated below:

- The SSC-CPA involves the distribution of ICS within the territory of Bangladesh.
- The SSC-CPA will have a maximum energy saving of 180 GWhr/year. Any additional energy saving will not be counted towards ERs.
- The SSC-CPA will be developed and implemented by a PO which has signed the standard contractual agreement with the coordinating/managing entity to participate in the PoA;
- The SSC-CPA is approved by the coordinating entity and DOE prior to its incorporation into the PoA.
- Measures will be taken to ensure that users do not revert to traditional stoves or use them together with ICS (eg. propose the destruction of traditional stove).

B.3. Assessment and demonstration of additionality of the small-scale CPA, as per eligibility criteria listed in the Registered PoA:

The SSC-CPA is additional as it meets the following criteria as per Section E.5.2. of the SSC-PoA "Key criteria and data for assessing additionality of a SSC-CPA":

1. It meets the eligibility criteria for inclusion of a SSC-CPA in the PoA as set in section A.4.2.2. of the PoA and demonstrated on Section B.2. of this SSC-CPA-DD.
2. It is consistent with the current mandatory laws and regulations in the People's Republic of Bangladesh in the time of inclusion.
3. No public funding or ODA was or will be diverted for the implementation of the SSC-CPA

B.4. Description of the sources and gases included in the project boundary and proof that the small-scale CPA is located within the geographical boundary of the registered PoA.

The proposed SSC-CPA applies the approved methodology AMS II.G./Version 01 (EB37). The methodology defines "the project boundary is the physical, geographical area of the use of non-renewable biomass". Therefore, the project boundary is the geographical area where the ICS are installed and in use and this is restricted to the territory of the People's Republic of Bangladesh. The table below illustrates the GHG emissions sources included:

Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Burn of fire wood for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.
		N_2O	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.
Project activity	Burn of fire wood for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.
		N_2O	No	Minor source of emissions and limited data available. Exclusion is conservative assumption.

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Data / Parameter:	By,savings/stove
Data unit:	Tonnes/stove-year
Description:	Quantity of biomass that is saved in tonnes by each stove each year
Source of data used:	JPMCC Baseline Study 2008
Value applied:	0.895 for Lowland domestic kitchens 1.036 for Hilly Area domestic kitchens 14.61 for non-domestic kitchens
Justification of the choice of data or description of measurement methods and procedures actually applied :	In mid 2008 JPMorganClimateCare commissioned a thorough field study of cooking behaviour and fuel consumption in domestic kitchens, in addition to a field study of fuel use in non-domestic kitchens and commercial premises. The studies took the form of weighing fuel use in random samples of kitchens using traditional stoves in addition to kitchens using improved stoves. The studies also gathered data on seasonal variation in stove usage, variation due to socio-economic status, and typical patterns of secondary fuel use leading to an assessment of annual fuel savings introduced by the improved stoves.
Any comment:	

Data / Parameter:	$f_{NRB,y}$
Data unit:	Fraction
Description:	Fraction of biomass saved by the project activity in year y that can be established as non renewable biomass using survey methods
Source of data used:	JPMCC Baseline Study 2008
Value applied:	1
Justification of the choice of data or description of measurement methods and procedures actually applied :	JPMorgan Climate Care commissioned in mid 2008 a thorough survey of forest and wooded land status in Bangladesh as a component of the Baseline Study for the project. The survey analysis applied the methodology which required investigation of the fraction of wood-fuel obtained from sustainably managed sources.
Any comment:	

Data / Parameter:	NCVbiomass
Data unit:	TJ/tonne
Description:	Net Calorific Value of the wood used as cooking fuel
Source of data used:	JPMCC Baseline Study 2008
Value applied:	0.015
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default for wood fuel
Any comment:	

Data / Parameter:	EFprojected_fossilfuel
Data unit:	tCO2/TJ
Description:	Emission factor for the substitution of non-renewable biomass by similar consumers. The substitution fuel likely to be used by similar consumers is taken: 71.5 tCO_2/TJ for Kerosene, 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG) or the IPCC default value of other relevant fuel
Source of data used:	IPCC default
Value applied:	71.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Investigations in Bangladesh in late 2008 showed that kerosene and LPG are both in common use, though the use of kerosene is much more wide spread, especially in rural areas. It was decided therefore to use the emission factor of kerosene for the calculation of emission reductions.
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

The SSC-CPAs will calculate emission reductions through application of the following equations:

$$ERy = By,savings \cdot f_{NRB,y} \cdot NCVbiomass \cdot EFprojected\_fossilfuel$$

where:

ERy	Emission reductions during the year y in tCO_2e
By,savings	Quantity of biomass that is saved in tonnes
$f_{NRB,y}$	Fraction of biomass saved by the project activity in year y that can be established as non renewable biomass using survey methods
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable biomass by similar consumers. The substitution fuel likely to be used by similar consumers is taken: 71.5 tCO_2/TJ for Kerosene, 63.0 tCO_2/TJ for Liquefied Petroleum Gas (LPG) or the IPCC default value of other relevant fuel

By,savings = N . By,savings/stove

Where

N	Number of appliances
By,savings/stove	The savings made by each appliance each year

All the parameter values except N are fixed for all CPAs, such that the equations resolve to the following:

ERy = N . ER/stove-year

Where

ER/stove-year	CO2 emissions saved by each stove each year in units of CO2/stove-year which is the product of the fixed parameter values. According to Section B 5.1, By,savings/stove vary slightly between domestic stoves in Hilly and Low land areas, resulting in the following emission reductions per stove:

Lowland domestic kitchens	1.00 tCO2/stove-year
Hilly areas domestic kitchens	1.16 tCO2/stove-year
Non-domestic kitchens	16.30 tCO2/stove-year

As the geographical barrier of the SSC-CPA is the nation of Bangladesh, it is appropriate to have an aggregate ER/stove-year for domestic stoves. This can be conservatively calculated by correlating the ER/stove-year with the percentage of population in low land areas (74%) as per the Bangladesh Bureau of Statistics, 2008.

ER/stove-year for domestic kitchens: 74% x 1.00 (lowland domestic kitchen) + 26% x 1.16 (hilly areas domestic kitchens) = 1.04 tCO2/stove-year.

The methodology presents the further possibility of calculating By, savings from a combination of field data on fuel-wood consumption (By) and laboratory tests of new stove efficiency and old stove efficiency (the latter may be replaced by a default of 10%), as follows:

$$\mathbf{By,savings = By \cdot (1 - \eta_{old} / \eta_{new})}$$

where:

$\mathbf{B_y}$	Quantity of biomass used in the absence of the project activity in tonnes. B_y is calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of biomass per appliance (tonnes/year).
η_{old}	Efficiency of the system being replaced, use 0.10 (i.e. 10%) as default value or local data if available (fraction)
η_{new}	Efficiency of the system being deployed as part of the project activity (fraction)

In practice the parameter value By, savings is known more accurately for domestic stoves by direct measurement of fuel consumption in field studies and therefore this option of laboratory testing of efficiency is unnecessary and the errors[5] it introduces can be avoided. For the non-domestic stoves laboratory testing of efficiencies of either inefficient or efficient versions is not practically feasible due to the range of values which can better be estimated by random sampling in the field and comparisons of measured fuel consumptions. Fuel consumption measurement is in any case a first step in measuring efficiency and the above equation is tautologous[6].

[5] The likely errors of a laboratory approach are mostly to do with the common pattern of fuel mixing in Bangladesh, where domestic cooks typically use secondary fuels after wood such as dung, leaves, and crop residue. While a random sample captures the fuel saving of the ICS in these conditions, a lab test cannot do so. There are also considerations as to seasonal variation, and as to regional variations or variations due to socio-economic differences.

[6] By,savings is Bold-Bnew, exactly as is the right hand side of the equation, since η_{old} is Energy into the food divided by (Bold. NCV) and η_{new} is Energy into the food divided by (Bnew. NCV); resolving the right hand side therefore gives Bold-Bnew.

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
Year 1	0	23,166	0	23,166
Year 2	0	46,332	0	46,332
Year 3	0	46,332	0	46,332
Year 4	0	46,332	0	46,332
Year 5	0	46,332	0	46,332
Year 6	0	46,332	0	46,332
Year 7	0	46,332	0	46,332
Total Emission Reductions				**301,158**
Annual average over the crediting period of estimated reductions				**43,022**

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

See Annex 4 for a description of the monitoring plan. This describes how the monitoring requirements of the methodology are met by application of the following equations:

ER date x = Sum (ER date x) Age z

Where
Sum (ER date x) Age z is the sum of ERs accumulated by stoves of Age 1, Age2, and Age 3. Replaced stoves count as Age 1 stoves and repaired stoves accumulate further ageing – therefore it is permissible to add Age 4, Age 5, etc as required.

(ER date x) Age z = Qx . Dx . ER/stove-year (Age z) . 1/365 . L . U (Age z)

Qx	Quantity of Age z stoves sold on Date x
Dx	Number of days between Datex and end of the year reported
ER/stove-year (Age z)	CO2 emissions saved by Age z stoves (including their repaired versions) in units of CO2/stove-year as found from monitoring tests described above[7]
L	Leakage adjustment factor
U (Age z)	Utilization adjustment factor (the fraction of Age z stoves still in use)

ER/stove-year (Age z) = By,savings/stove (Age z) . $f_{NRB,y}$. NCVbiomass . EFprojected_fossilfuel

[7] Tests of stoves of intermediate age may or may not be undertaken at the discretion of the project participants; if they are not undertaken test results on older vintages are applied pro-rata to intermediate vintages.

Where parameters are defined as above. Only the single parameter By,savings/stove (Age z) is specific to the age of the stove. This and NRBy are monitored parameters, as listed in the table below.

Data and parameters to be monitored by the SSC-CPA

Data / Parameter:	Qx
Data unit:	
Description:	Quantity of stove installations on date x
Source of data to be used:	Records of date of each installation kept by each PO.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Derived from stove installation records.
Description of measurement methods and procedures to be applied:	The PO keeps a paper and electronic record
QA/QC procedures to be applied:	The Co-ordinating entity supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate record keeping.
Any comment:	

Data / Parameter:	Dx
Data unit:	Days
Description:	Number of days the stoves installed on date x have been operating
Source of data to be used:	Records of date of each installation kept by each PO
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Derived from stove installation records.
Description of measurement methods and procedures to be applied:	The PO keeps a paper and electronic record
QA/QC procedures to be applied:	The Co-ordinating entity supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate record keeping.
Any comment:	

Data / Parameter:	L
Data unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an assessment adjusted for leakage risks
Source of data to be	Random samples of ICS customers and non-ICS users of matching socio-

used:	economic status
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Derived from monitoring tests
Description of measurement methods and procedures to be applied:	See Annex 4
QA/QC procedures to be applied:	The Co-ordinating entity supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate testing and record keeping.
Any comment:	

Data / Parameter:	U(Age z)
Data unit:	Fraction
Description:	The fraction by which emission reductions are multiplied to obtain an assessment adjusted for utilization rates of stoves of Age z
Source of data to be used:	Random samples of ICS customers using stoves of age z
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Derived from monitoring tests
Description of measurement methods and procedures to be applied:	See Annex 4
QA/QC procedures to be applied:	The Co-ordinating entity supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate testing and record keeping.
Any comment:	

Data / Parameter:	By,savings/stove (Age z)
Data unit:	Tonnes/stove-year
Description:	Biomass saved by each stove of Age z
Source of data to be used:	Random samples of ICS customers using stoves of age z
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Derived from monitoring tests
Description of	See Annex 4

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	The Co-ordinating entity supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate testing and record keeping.
Any comment:	

Data / Parameter:	$f_{NRB,y}$
Data unit:	fraction
Description:	
Source of data to be used:	Annual survey of NRB status
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Derived from surveys as above
Description of measurement methods and procedures to be applied:	The surveys establish data required to resolve NRB defined as (1- extent of collection area for project kitchens where wood-fuel is demonstrably harvested in a managed and sustainable manner, compared to collection area for all wood fuel used in project kitchens)
QA/QC procedures to be applied:	The Co-ordinating entity supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate testing and record keeping.
Any comment:	

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

☐ Please tick if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

This information is provided at the PoA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Not applicable

C.3. Please state whether an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA), in accordance with the host Party laws/regulations:

Not applicable

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

This information is provided at the PoA level.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

Not applicable

D.3. Summary of the comments received:

Not applicable

D.4. Report on how due account was taken of any comments received:

Not applicable

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	Grameen Shakti
Street/P.O.Box:	Mirpur-2
Building:	Grameen Bank Bhaban
City:	Dhaka
State/Region:	Dhaka
Postfix/ZIP:	1216
Country:	Bangladesh
Telephone:	+880 – 29004081
FAX:	+880 – 29004314
E-Mail:	g_shakti@grameen.net
URL:	http://www.gshakti.org/
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Barua
Middle Name:	C
First Name:	Dipal
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	J.P. Morgan Ventures Energy Corporation
Street/P.O.Box:	168, Robinson Road
Building:	Capital Tower
City:	Singapore
State/Region:	Singapore
Postfix/ZIP:	068912
Country:	Singapore
Telephone:	+65-6882-2888
FAX:	+65-6882-1536
E-Mail:	eduardo.c.ferreira@jpmorgan.com
URL:	http://www.jpmorgan.com
Represented by:	
Title:	Associate
Salutation:	Mr.
Last Name:	Ferreira
Middle Name:	C
First Name:	Eduardo
Department:	Environmental Markets – Global Commodities
Mobile:	
Direct FAX:	+65-6882-1536
Direct tel:	+65-6882-1853
Personal E-Mail:	eduardo.c.ferreira@jpmorgan.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Not applicable

Annex 3

BASELINE INFORMATION

A Baseline study was conducted in Bangladesh from June to September 2008. It comprised four major elements:

1. A survey of biomass in Bangladesh in the areas where it is collected as cooking fuel in order to ascertain the Non-Renewable Biomass (NRB) fraction
2. A survey of seasonal, regional, and socio-economic variations in domestic and commercial cooking patterns, in order to ascertain what factors influenced emission reductions arising from adoption of improved cooking stoves (ICS), and thus what categories of ICS customers should be distinguished and recorded for installation monitoring purposes.
3. A set of tests of domestic wood fuel consumption savings resulting from adoption of the ICS, for each of the categories distinguished.
4. A set of tests of wood fuel consumption savings introduced by non-domestic improved stoves

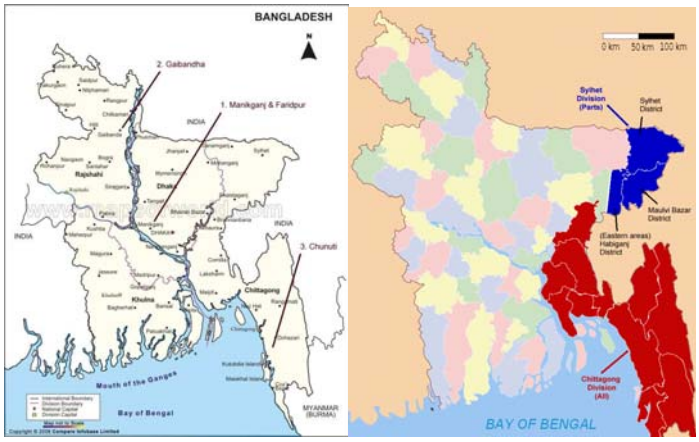
Taking each of these elements in turn:

1. **A survey of biomass in Bangladesh in the areas where it is collected as cooking fuel in order to ascertain the Non-Renewable Biomass (NRB) fraction.** The NRB study made use of a range of different methods of data collection with regard to wood growth and wood harvest in Bangladesh, focusing on populated areas where wood is collected for sale or direct use as cooking fuel. The study found unanimous agreement from a range of experts in the country, that despite the existence formally of Protected Areas, there are no examples of sustainably managed forest areas. It estimated that 70% of areas designated officially as forested are in fact severely denuded and used for non-forest purposes, and that official data such as that reported to the FAO, is unreliable. The methodology requires that renewable biomass is identified on the basis of sustainable management of resources, while non-renewable biomass is identified on the basis of deforestation in collection areas evidenced by increasing collection distances. The study found clear evidence of this sort for deforestation in collection areas, mainly in the dramatic transition in recent years from almost universal “free” collection to a situation where 50% of wood fuel is now purchased. Interviews with wood sellers indicated that collection distances have been increasing radically, with many trucks nowadays travelling more than 100km with wood fuel cargoes. The study also found that wood fuel prices have been rising sharply in recent years, and that the mixing in of secondary fuels (dung, leaves, crop residue) is partly a result of difficulties in procuring wood. With regard to assessment of a fraction for NRB, the absence any evidence for renewable resources sustainably managed, together with strong evidence that land across the country is deforesting rapidly, indicates that the NRB fraction, which is (1- fraction of renewable wood within total amount), is 100%.

2. **A survey of seasonal, regional, and socio-economic variations in domestic cooking patterns, in order to ascertain what factors influenced emission reductions arising from adoptions of the ICS, and thus what categories of ICS customers should be distinguished and recorded for installation monitoring purposes.** The maps of Bangladesh presented here show the locations of the three areas where detailed survey work was conducted, and also the split

between lowland and hilly areas. The three locations were chosen carefully to represent the full range of household types purchasing the ICS. In each case the families interviewed were a mix of provincial urban and rural homes. Two of the locations were in the lowland areas of Bangladesh and the third was in the area designated as "hilly". 24% of the population live in the hilly areas of Bangladesh and it was found that family size and wealth is in general greater in this portion of the country. Since these areas are important marketing grounds for the stoves and factors influencing fuel consumption savings were different here compared to lowland areas, the study concluded that the project should apply separate parameter values in hilly areas as opposed to lowland areas. It was found that there were many common characteristics in the two lowland areas such as weekly cooking patterns, fuel consumption, diet, family size. Two clear sub-clusters were identified: peri-urban (wealthier households burning mainly purchased wood) and remote households (poorer, burning more dung and other fuels). The study concluded that Kitchen Tests should be undertaken with regard to both these sub-clusters, and since it was clear that it would not be practicable to distinguish between remote and peri-urban households at point of sale a common parameter value for ICS savings should be derived in lowland areas, based on market share. Kitchen Tests should also be undertaken in hilly areas separately and a specific parameter value for savings derived.

Legend:
The three kitchen survey locations were Gaibanda (including Gobindaganj), Manikganj & Faridpur, and Chunuti. The other map shows the 64 divisions of Bangladesh with the hilly areas marked out in red and dark blue.



3. **A set of tests of domestic wood fuel consumption savings introduced by the ICS.** Tests were carried out on random samples in two of the locations covered by the kitchen survey (Chunuti and Gobindaganj - one of towns surveyed in Gaibandha), as well as in a newly-identified area, Munshiganj, shown on the map below. Munshiganj was chosen because it differed from Gobindaganj; it is predominantly low-income and characterized by relatively high use of dung as a primary fuel, while Gobindaganj is peri-urban and thus wealthier or more middle-class.

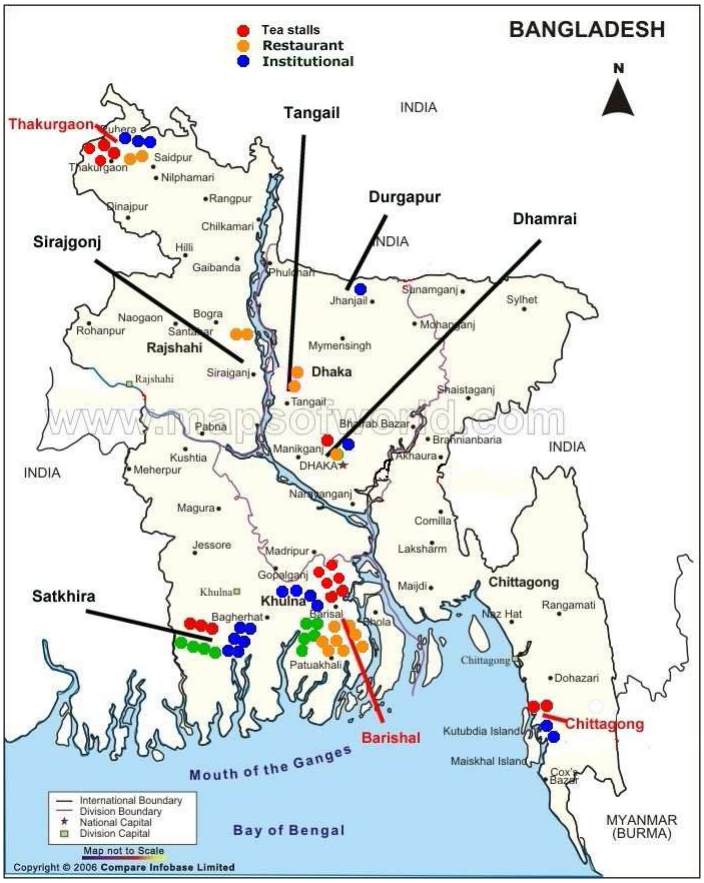
In practice this meant that each of the categories identified as significant by the survey were subject to practical measurement of fuel consumption. Cooking fuel consumption was measured by trained experts over a period of 7 consecutive days in 118 homes. Half of these tests took place in kitchens with traditional stoves, and half in kitchens with the ICS installed. The non-ICS-using homes were matched according to similarity in socio-economic status to ICS-using homes to establish pairs. 24 pairs were tested in the "normal lowland" area, 20 pairs in the "high dung lowland" area, and 15 pairs in the hilly areas, so allowing mean fuel savings to be calculated for each group. Since it was known from pilot ICS sales that in lowland areas wealthier households would comprise in excess of 70% of the market, the study recommended a conservative aggregation of fuel consumption test results in a 70:30 Gobindaganj: Munshiganj weighting ratio. The kitchen test results and concurrent discussions in Munshiganj also indicated the need for an adjustment to account for seasonal variations in dung and wood use in lowland high-dung areas only. In conclusion the mean fuel savings derived for each group were found to have the values tabulated here.

Sales Record Data	Fuel saving Kg / year/ stove	
	Wood	Dung
Lowland Areas	895.1	404.1
Hilly Areas	1036.2	n/a

4. **Tests on non-domestic wood fuel consumption saving**

Eight locations were chosen in which to conduct tests on non-domestic wood-fuel savings, representing the range of locations within which commercial and institutional stoves have been promoted. These included remote rural areas (e.g. Durgapur, Tangail), as well as more urbanized areas closer to the capital city Dhaka, such as Dhamrai. The map here indicates the spread of tests. The number of improved non-domestic stoves (INDS) in the pilot sales phase in use is very small relative to the market to be developed by the project, but nevertheless it was possible in most study

areas to make a random selection of INDS for testing purposes. The test result is conservative, as the stoves tested are mostly in small premises, while the project will promote sales in increasingly larger premises. Once the identity of each individual INDS was established, the procedure was to survey equivalent commercial stove users in the nearby area and select the first one with matching characteristics, so as to create a pair for fuel consumption comparison.



The results are shown in the table below. A generic INDS saving is derived by attributing sales of equal volume to three categories of customer listed, and by assuming the stoves are used 300 days a year (as a conservative estimate).

	Fuel savings (tonnes/year)
Tea stalls	5.62
Restaurants	22.65
Institutional	15.56
Average	**14.61**

Annex 4

MONITORING INFORMATION

The requirements as stated in the methodology document are provided in italics in the following text, accompanied with details as to how these requirements will be addressed:

1. Performance and number of stoves eligible for calculation of emission reduction

Methodology document: Monitoring shall consist of an annual check of efficiency of all appliances or a representative sample thereof to ensure that they are still operating at the specified efficiency (η_{new}) or replaced by an equivalent in service appliance.

To satisfy this requirement, the POs will take a random sample of the appliances installed which have been operational for three years, and another random sample for appliances which have been operational for two years, and again one year. This we refer to as Age3, Age2, Age1 stoves respectively.

Stoves which are more than 3 years old may or may or may not be included in calculations of emission reduction. The decision as to cut-off Age will depend on the repair and replacement policy adopted in practice by the POs.

It will be permissible to reduce the number of tests by first testing the oldest Age, then deciding whether or not a test of younger stoves is necessary. If stoves of a certain age are found to achieve a certain performance level, a pro-rata level may be applied to younger stoves if this is preferred to conducting further tests.

The emission reduction calculation will follow this equation:

ERy = sum (ER date x)

Where

ERy	Emission reductions submitted for verification in the year reported
ER date x	ERs accumulated in that year by stoves installed on Date x, which is the range of dates starting on first day of project operation to end of year reported

ER date x = Sum (ER date x) Age z

Where
Sum (ER date x) Age z is the sum of ERs accumulated by stoves of Age 1, Age2, and Age 3

(ER date x) Age z = Qx . Dx . ER/stove-year . 1/365 . L . U

Qx	Quantity of Age z stoves sold on Date x
Dx	Number of days between Datex and end of the year reported
ER/stove-year	CO2 emissions saved by each stove each year in units of CO2/stove-year
L	Leakage adjustment factor
U	Utilization and performance adjustment factor

ER/stove-year = By,savings/stove . $f_{NRB,y}$. NCVbiomass . EFprojected_fossilfuel

The leakage adjustment factor applies the findings set out below to calculation of emission reductions.

The Utilization and performance adjustment factor is the percentage of stoves in each age group which, subsequent to replacement and repair procedures carried out by the BO, are still in use and still performing to required Benchmark performance Level (BPL). For example, if 20 Age 3 stoves are randomly tested, and 2 are found to be out of use, and an additional 2 are found to be performing at less than BPL, the U factor for Age 3 stoves becomes 80%. If all Age 1 and Age 2 stoves are still at BPL, then the final value of U will be calculated from the portion of Age 3 stove days in the total stove days count.

Further, if a stove has have been out of use for a number of days prior to replacement and repair, this number of days is removed from the calculation.

In practice a new value for Bysavings, for each Age group of stoves, will be found each year from the tests described above,. In the example above, it may be found for example that the sample average for Age3 stoves is 10% less than the BPL. It will be more accurate to take this value of 0.9.BPL as giving the valid value of ER/stove-year for Age 3 stoves. Thus each Age group will have its own specific value of ER/stove-year monitored each year. The emission reductions will therefore be calculated as:

ER date x = Sum (ER date x) Age z

Where:
Sum (ER date x) Age z is the sum of ERs accumulated by stoves of Age 1, Age2, and Age 3. Replaced stoves count as Age 1 stoves and repaired stoves accumulate further ageing – therefore it is permissible to add Age 4, Age 5, etc as required.

(ER date x) Age z = Qx . Dx . ER/stove-year (Age z) . 1/365 . L . U (Age z)

Qx	Quantity of Age z stoves sold on Date x
Dx	Number of days between Datex and end of the year reported
ER/stove-year (Age z)	CO2 emissions saved by each Age z stove (including repaired versions) in units of CO2/stove-year as found from monitoring tests described above
L	Leakage adjustment factor
U (Age z)	Utilization adjustment factor (the fraction of Age z stoves still in use)

2. Performance of replacement or repaired stoves

Methodology document: Where replacements are made, monitoring shall also ensure that the efficiency of the new appliances is similar to the appliances being replaced.

The PO will be responsible to carry out tests on random samples of newly replaced and repaired stoves to ascertain their performance. This process will be associated with quality controls on installation and repair of all stoves and both processes will be supervised by the coordinating/managing entity. Only if the tests confirm that the Benchmark Performance level (BPL) is achieved, will the new or repaired be included in the number of stoves counted as eligible for calculation of emission reductions.

The tests described in monitoring task 1 above will also serve to accomplish this task.

3. Leakage due to reduced consumption of renewable cooking fuels

Methodology document: In order to assess the leakages specified above monitoring shall include data on the amount of biomass saved under the project activity that is used by non-project households/users (who previously used renewable energy sources). Other data on non-renewable biomass use required for leakage assessment shall also be collected.

To address this risk with regard to project kitchens, all performance tests will replicate the procedure adopted in the baseline tests which originally established the Benchmark Performance Level (BPL). This procedure requires that test subjects use renewable sources according to normal patterns during tests, both before and after adoption of the ICS. This ensures that the PBL is calculated net of any usage of renewable fuels and also net of any shift to or from use of renewable fuels stimulated by the ICS.

The outcome of these test is information as to the extent to which the project may be increasing the use of NRB in non-project kitchens. If the tests conclude that there is a risk that this is occurring, a further annual test will be carried out. This will randomly sample non-project households and compare their use of NRB with the baseline data. Should their use of NRB be found to increase as a result of the project, this will result in evaluation of the leakage factor L(nrb) and its application in the above equation.

4. Leakage due to use of displaced traditional stoves

Methodology document: Monitoring shall ensure that the replaced low efficiency appliances are disposed off and not used within the boundary or within the region.

The monitoring procedure addresses this leakage risk in two ways:

- First, it will report on the extent to which the program policy of destruction of traditional stoves in the houses adopting the ICS, as well as the policy of preventing their re-building and re-use, is successful. To do this the BPL random test samples described above will be used to also evaluate how many houses re-build traditional stoves and use these alongside the ICS.
- Second, the test procedures require that householders cook as normal, including use of a secondary inefficient stove. If any house engaged in a test does double up their cooking on a traditional stove, the value of By calculated from the tests will reflect that. If this causes the performance of the kitchen to drop below BPL, then the tests will reveal a reduced U value and the emission reductions will take into account this pattern of behaviour.

5. Leakage due to saving the same NRB twice

Methodology document: Use of non-renewable biomass saved under the project activity to justify the baseline of other CDM project activities can also be potential source of leakage. If this leakage assessment quantifies a portion of non-renewable biomass saved under the project activity that is used as the baseline of other CDM project activity then B_y is adjusted to account for the quantified leakage. .and…Increase in the use of non-renewable biomass outside the project boundary to create nonrenewable biomass baselines can also be potential source of leakage. If this leakage assessment quantifies an increase in use of non-renewable biomass outside the project boundary then B_y is adjusted to account for the quantified leakage.

If one CPA reduces NRB nationally, the next CPA and indeed the same activity, should operate under a reduced NRB fraction. Therefore this risk is addressed by re-appraisal of the NRB fraction each year, and applying it in the equation above (NRBy being the NRB value specific to each year).

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