Component project activity design document form for small-scale CDM component project activities

(Version 04.0)

Complete this form in accordance with the Attachment "Instructions for filling out the component project activity design document form for CDM small-scale component project activities" at the end of this form.

COMPONENT PROJECT DESIGN DOCUMENT (CPA-DD)	
Title of the CPA	Improved Cooking Stoves in Bangladesh – CPA No.18 "SZ Consultancy Services Ltd."
Version number of the CPA-DD	2.2
Completion date of the CPA-DD	08/01/2016
Title of the PoA to which the CPA is included	Improved Cooking Stoves in Bangladesh
Host Party	Bangladesh
Estimated amount of annual average GHG emission reductions	50,131 tCO2

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

>>
4791 - Improved Cooking Stoves in Bangladesh

A.2. Title of the CPA

>>
Improved Cooking Stoves in Bangladesh – CPA No.18 "SZ Consultancy Services Ltd."
08/01/2016
Version 2.2

A.3. Description of the CPA

>>
The small-scale CPA ("SSC-CPA") involves the installation and maintenance of domestic and nondomestic improved cooking stoves ("ICS") by "SZ Consultancy Services Ltd." in Bangladesh.
The current cooking practice in Bangladesh is the use of the "three-stone" cooking stove, popularly known as traditional stoves[1]. The combustion of the non-renewable fraction of woody biomass of the cooking fuel generates a variety of gases including Carbon Dioxide (CO_2), one of the six Greenhouse Gases ("GHG") covered under the Kyoto Protocol ("KP") to the United Nations Framework Convention to Climate Change ("UNFCCC"). The replacement of traditional stoves by ICS improves heat transfer, hence reducing the total amount of fuel required for cooking and reducing amount of GHG emitted into the atmosphere. Further, as per Yale Study in the Proceedings on the National Academy of Sciences, women in rural Bangladesh still prefer inexpensive, traditional stoves for cooking over modern ones. In most rural homes, where there is no electricity, food is cooked over an open fire using wood, agricultural residue, and animal dung, known together as "biomass."[2] 98% of Bangladesh's rural population cooks with biomass using traditional stoves, despite years of efforts by governments and health organizations to promote models that are fuel-efficient and have chimneys[3].

Certified Emission Reductions ("CERs") are calculated following the methodology AMS.II.G on the basis of the mass of non-renewable woody biomass saved by the ICS's.

Table A.2.1 Domestic Stoves Sales

Calendar Year	Sales	Expiries
2013-14	58,448	-
2014-15	-	-
2015-16	-	-
2016-17	-	-
2017-18	-	-
2018-19	58,448	58,448
2019-20	-	-

Table A.2.2 Non-Domestic Stoves Sales

Calendar Year	Sales	Expiries
2013-14	379	-
2014-15	-	-

[1] http://www.lged-rein.org/ics/ICS_Technical_Manual-14.5.08.pdf

[2] http://news.yale.edu/2012/06/29/despite-efforts-change-bangladeshi-women-prefer-use-pollution-causing-cookstoves

[3] http://www.pnas.org/content/109/27/10815.full

2015-16	-	-
2016-17	-	-
2017-18	-	-
2018-19	379	379
2019-20	-	-

The proposed SSC-CPA is a voluntary initiative taken by the coordinating/managing entity ("CME") of the PoA i.e. JPMVEC, and implemented on a voluntary basis by the Partner Organization i.e. SZ Consultancy Services Ltd.

The SSC-CPA will have a maximum energy saving of less than or equal to 180 GWhr/year, thus, meeting the small-scale eligibility criteria. It will be developed and implemented by the PO which has signed the standard contractual agreement with the CME (JPMVEC) to participate in the PoA, and this agreement guides the transfer of the emission reduction rights to the CME (JPMVEC). It uses the approved small scale methodology - AMS.II.G. version 03 "Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass".

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[4].
- *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. 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 programme as part of its large-scale promotion and advertising has facilitated capacity development among the employed staff through trainings and workshops.
- *Technological self-reliance:* the introduction of a locally manufactured technology with optimized energy efficiency helps to build technological self-reliance.

A.4. Entity/individual responsible for the operation of CPA

>>

The entity responsible for the proposed SSC-CPA is "SZ Consultancy Services Ltd." – a Project Participant to the PoA.

J.P. Morgan Ventures Energy Corporation ("JPMVEC") is a registered Project Participant, Focal Point to all Scopes of Authority and the CME to the SSC-PoA.

A.5. Technical description of the CPA

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

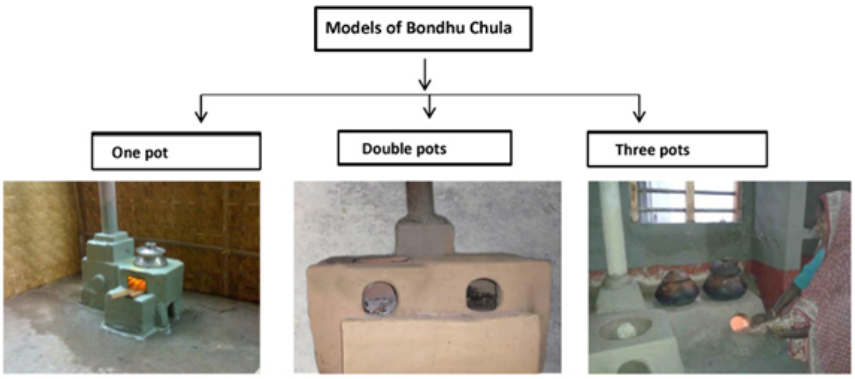
The current cooking practice in Bangladesh is the use of the "three-stone" cooking stove, popularly known as traditional stoves[5]. Biomass serves for 90% of Bangladeshi households' energy needs[6]. As per World Bank Report, some 95 percent of Bangladeshi households collect or purchase biomass energy with which to cook all or part of their meals, mainly using fixed clay stoves. The inherent inefficiency of such stoves, combined with the high moisture content of biomass cooking fuels, results in incomplete combustion, producing IAP[7]. Around 95% of rural population uses biomass fuel for cooking with fuel wood being used in around 85% households[8]. Traditional wood-fired cook stoves and open fires emit small particles, carbon monoxide and other noxious fumes in significant quantities. The amounts of carbon monoxide and other pollutants released from everyday cooking is highly damaging to indoor air quality. 46,000 women and children die each year and millions suffer from respiratory diseases, tuberculosis, asthma, cardiovascular diseases and eye and skin infections.

As per Yale Study in the Proceedings on the National Academy of Sciences, women in rural Bangladesh still prefer inexpensive, traditional stoves for cooking over modern ones. In most rural homes, where there is no electricity, food is cooked over an open fire using wood, agricultural residue, and animal dung, known together as "biomass."[9] 98% of Bangladesh's rural population cooks with biomass using traditional stoves, despite years of efforts by governments and health organizations to promote models that are fuel-efficient and have chimneys[10].

The project will disseminate ICSs that are constructed by local technicians trained and acting under a contractual basis on behalf of the PO. The ICS installations are constructed from mud, brick and/or concrete and have as accessories such as a chimney with a cap and grates. ICSs are designed to increase heat transfer, while also matching traditional utensils and cooking habits of people in Bangladesh. The improvement in efficiency is achieved by properly adjusting the dimensions of the combustion chamber and ensuring effective air flow. The current domestic model gives an average of 50% savings of firewood to cook the same amount of food in comparison to traditional stoves.

Various models of Bondhu Chula that are envisaged for dissemination in this PoA are as follows[11]:

Bondhu Chula



[5] http://www.lged-rein.org/ics/ICS_Technical_Manual-14.5.08.pdf

[6] Assessment of the Improved Stove Market in Bangladesh, Winrock International, January 2012

[7] Special Report Restoring Balance: Bangladesh's Rural Energy Realities, page 20

[8] Country Action Plan for Clean Cook stoves, November 2013, Power Division, Ministry of Power, Government of the People's Republic of Bangladesh

[9] http://news.yale.edu/2012/06/29/despite-efforts-change-bangladeshi-women-prefer-use-pollution-causing-cookstoves

[10] http://www.pnas.org/content/109/27/10815.full

[11] New models of cook stoves may be launched during the course of PoA. They shall be eligible under the PoA provided, the VPA meets the eligibility criteria for inclusion in the PoA

Bondhu Chula (Design specifications)										
	One Pot Stove			Two Pot Stove					Chimney	
	1st Mouth Diameter (inches)	Depth of Grate (inches)	Air Inlet Area (inches^2)	1st Mouth Diameter (inches)	2nd Mouth Diameter (inches)	Fuel wood Inlet Path (inches^2)	Depth of Grate (inches)	Air Inlet Area (inches^2)	Chimney Diameter (inches)	Chimney Length
Domestic ICS	7	8.5	20.25	7	6	4.5x4.5	8.5	20.25	3	6-8 ft
	8	8.5	25	8	7	4.5x4.5	8.5	20.25	3	6-8 ft
	9	9	25	9	8	5x5	9	25	3	6-8 ft
	10	9.5	30.25	10	9	5.5x5.5	9.5	30.25	3	6-8 ft
	12	12	42.25	12	11	6.5x6.5	12	42.25	3	6-8 ft
Non domestic ICS	15	13	81	15	14	9x9	13	81	4	6-8 ft
	18	14	100	18	16	10x10	14	100	4	6-8 ft
	20	16	121	20	18	11x11	16	121	5	6-8 ft

A three pot stove is a combination of a one pot and a two pot stove.

Operational and management plan

SZ Consultancy Services Ltd. and associated technicians/ contractors/ Partner Entrepreneurs (PEs) are responsible for sales and installation of ICSs. Each contractor will be trained to manufacture the stove to an exact specification. A unique serial number is assigned to the ICS. Once the construction of the ICS is finalized and the unit is sold, the PO technician/PE collects contact information of the user, serial number of stove, installation date and the type of stove the ICS is replacing including the fuel it used. PO is responsible for excluding any ICS which is replacing stoves using fossil fuels (such as kerosene and LPG) or other renewable fuel from the installation record – i.e. PO may install such ICS as part of their business, but as these do not qualify under the adopted methodology, it shall not be claimed under the Installation Record. This is in accordance with the approved methodology AMS.II.G which is applicable only to users which were previously using biomass or non-renewable biomass fuels.

The operation of the ICS is carried out by the user, and training of the user on how to operate and maintain the ICS will be provided by the technicians/PEs as well by the promotional volunteers of SZ Consultancy Services Ltd. The user also signs an agreement to transfer the ownership of emission reduction credits to the PO.

The PO will follow the monitoring plan and procedures - developed by the coordinating/managing entity - for the identification of stoves sold during the course of the project. SZ Consultancy Services Ltd. will be responsible for ensuring that data is captured at the manufacturing and selling point to ensure the monitoring of stoves in operation over the CPA crediting period. The contractor /PE/technician will be trained to capture this monitoring data from the installation process, identifying each stove by a unique reference number specifying the location of the stove. Monitoring data collected during the installation and operation of the stoves will be captured in an electronic data management system, or monitoring database. This data shall be transferred to SZ Consultancy Services Ltd where all records are screened, together with cross-checks on the PEs/technicians'/contractors' installation records in order to confirm that the installation record is authentic and that no double counting occurs. From this data, the emissions reductions of the CPA will be determined. This data set is then transferred to the CME on a periodic basis (the Data Base). The electronic files containing each installation record are duplicated by paper documents received from individual householders. This system will be available for review during the validation and verification.

The PEs and the coordinating/managing entity shall have signed an agreement including specific provisions and declarations that confirms that the SSC-CPA project proponents agree that their activity is being subscribed under the PoA.

Physical maintenance of the ICS will be undertaken by the technicians/PEs and its associated technicians at a marginal or no payment fee for the users, depending on the nature of maintenance.

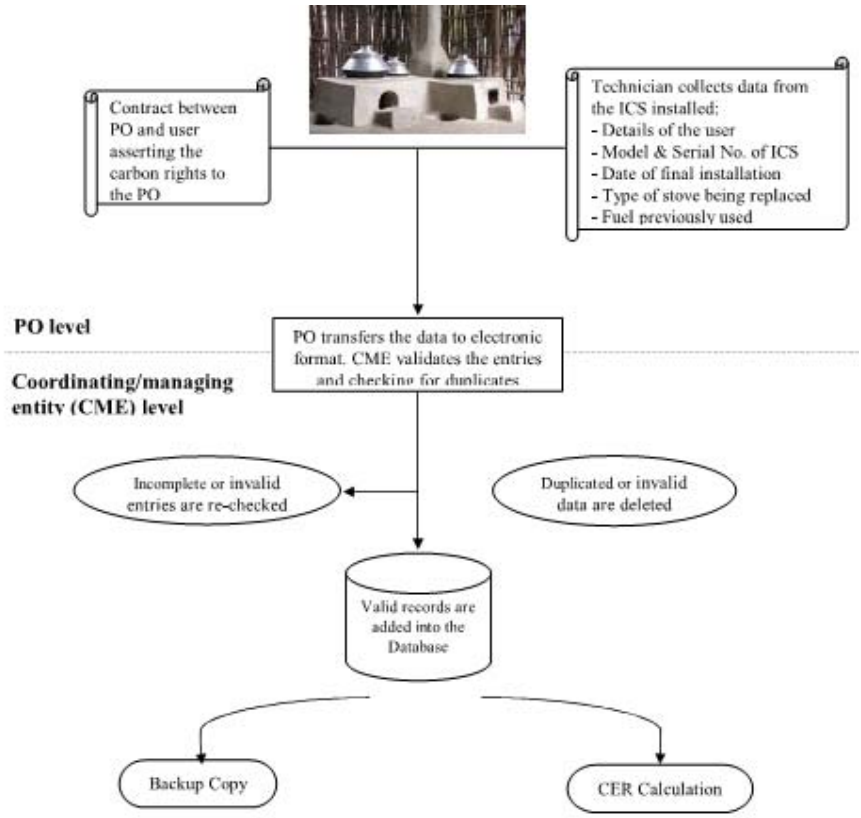


Figure 1 Schematic of the data collection and database system

A.6. Party(ies)

Name of Party involved (host) indicates 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)
Bangladesh (host)	SZ Consultancy Services Ltd. (private entity)	No
United Kingdom of Great Britain and Northern Ireland	J.P. Morgan Ventures Energy Corporation (private entity)	No

A.7. Geographic reference or other means of identification

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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 installation record. 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	Mr. Mohammad (Md.) Khalequzzaman

entity/individual	Managing Director, SZ Consultancy Services Ltd.
Address	House 2/8 – Block D – Lalmantia, Dhaka, Bangladesh
Phone number	+88 –0181 –9499778
Alternative contact	khaleq.zaman@giz.de

SZ Consultancy Services Ltd. is a Project Participant to the SSC-PoA.

A.8. Duration of the CPA

A.8.1. Start date of the CPA

>>
11/12/2013[12]

A.8.2. Expected operational lifetime of the CPA

>>
Over 21 years

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

>>
Renewable

A.9.1. Start date of the crediting period

>>
08/01/2016 or date of inclusion in the PoA, whichever is later.

A.9.2. Length of the crediting period

>>
7 Years with renewable twice

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
Year 1	50,131
Year 2	50,131
Year 3	50,131
Year 4	50,131
Year 5	50,131
Year 6	50,131
Year 7	50,131
Total number of crediting years	7
Annual average GHG emission reductions over the crediting period	50,131
Total estimated reductions (tonnes of CO_2e)	**350,917**

A.11. Public funding of the CPA

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

[12] The start date is marked by the sale of first ICS in the CPA

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

>>

In accordance with paragraph 10 of Annex 13 to EB54, "Guidelines on Assessment of Debundling for SSC Project Activities"[13], 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, then that CPA of PoA is exempted from performing the 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 above 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.

Debundling exemption

Parameter	Value	Unit
NCV biomass	0.015	TJ/tonne
Energy units	3,600	GJ/GWh
SSC Type II limit	180	GWh/year
Energy per tonne	0.004	GWh/tonne

	Domestic ICS	Non-Domestic ICS	
Qbiomass	1.06	27.47	tonnes
n_{old}	0.10	0.10	
n_{new}	0.255	0.210	
Biomass saved by each stove	0.644	14.389	tonnes/year
Energy saved by each stove	0.003	0.060	GWh/year
Percentage of the Type II limit	**0.001%**	**0.033%**	percentage

A.13. Confirmation for CPA

>>

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 received from the users. These documents assert the rights of the carbon credits to the project implementer of this SSC-CPA only. The proposed CPA is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

A.14. Contact information of responsible persons/ entities for completing the CDM-SSC-CPA-DD-FORM

>>

Rohit Lohia
Climate-Secure Services
rohit.lohia@climate-secure.com

The person/entity is not the CPA implementer

SECTION B. Environmental analysis

B.1. Analysis of the environmental impacts

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[13] Formerly the above guidance was mentioned in para 9 of Annex 32 to the EB47 Report, "Guidance for determining the occurrence of de-bundling under a Programme of Activities (PoA)" which was referred in the generic CPA-DD.

This information is provided at the PoA level.

SECTION C. Local stakeholder consultation

C.1. Solicitation of comments from local stakeholders

>>
This information is provided at the PoA level

C.2. Summary of comments received

>>
This information is provided at the PoA level

C.3. Report on consideration of comments received

>>
This information is provided at the PoA level

SECTION D. Eligibility of CPA and estimation of emissions reductions

D.1. Reference of methodology(ies) and standardized baseline(s)

>>
AMS-II.G. ver. 3 - Energy efficiency measures in thermal applications of non-renewable biomass

D.2. Applicability of methodology(ies) and standardized baseline(s)

>>
Applicability Condition 1:
This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency biomass fired cook stoves or ovens or dryers and/or improvement of energy efficiency of existing biomass fired cook stoves or ovens or dryers.

(a) The PoA involves installation of improved cooking stoves (efficient biomass cooking stoves) which leads to efficiency improvements in the thermal applications of the non-renewable biomass. The same is being used in the present CPA. The thermal energy saving in every year of the crediting period shall be limited to 180GWth per year as shown in Section D.5. Thus, the CPA conforms to the criteria of being a Type II project activity.

Applicability Condition 2:

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 applicability to the aforesaid condition has already been discussed at the PoA level as follows. The CPA also adheres to the same.

- Since the 1980's Bangladesh has faced steady population growth, placing pressure on the forest resources. A study made of Bangladesh between 1986 and 1998 published by the Federal Research Division of the Library of Congress, found that deforestation conditions, and thus use of non-renewable biomass, existed in the 1980s[14].

  Quoting from this study:
  "Wood is the main fuel for cooking and other domestic requirements. It is not surprising that population pressure has had an adverse effect on the indigenous forests. By 1980 only about 16 percent of the land was forested, and forests had all but disappeared from the

[14] http://www.countrystudies.us/bangladesh/72.htm

densely populated and intensively cultivated deltaic plain. Aid organizations in the mid-1980s began looking into the possibility of stimulating small-scale forestry to restore a resource for which there was no affordable substitute"

The total forestry area has now decreased to 10% of the land only (FAO, 2007). At the same time, Population has been increasing. Hence, the use of non-renewable biomass in Bangladesh, dates back prior to December 1989.

This conclusion is supported by further evidence, as follows:

- In 1985, the annual deforestation area was 80 km square.[15]
- Since the 1980s Bangladesh has faced steady population growth, placing pressure on forest resources. Population has grown by about 18% since 2000[16].
- Between 1990 and 2005, Bangladesh lost 1.3% of its forest cover, or around 11,000 hectares. Measuring the total rate of habitat conversion (defined as change in forest area plus change in woodland area minus net plantation expansion) for the 1990-2005 intervals, Bangladesh lost 5.4% of its forest and woodland habitat[17].

Besides meeting the applicability criteria of methodology as stated above, the prevalence of non renewable biomass is substantiated below.

A baseline survey was conducted to assess the Non-Renewable Biomass (NRB) fraction in Bangladesh[18].

The 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 results/ conclusion of the study are as follows:

- The study found unanimous agreement from a range of experts in the country, that despite the existence of formally designated 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.

- The study also found that there is a major shift in recent years from almost universal "free" collection of fuelwood to a situation where 50% of wood fuel is now purchased. It also observed that there is a marked increase in the prices of fuelwood in the last decade.

- Also, due to the scarcity and lack of free access to fuelwood, there has been fuel switching from wood to more economic fuels like dung, leaves and crop residues.

- Interviews with wood sellers indicated that collection distances have been increasing radically, with many trucks nowadays travelling more than 100km with wood fuel cargoes.

Therefore, in accordance with AMS-II.G ver 03, all the above supporting indicators signify the prevalent use of Non-Renewable Biomass in Bangladesh.

[15] http://www.un.org/esa/earthsummit/bang-cp.htm#chap11

[16] http://www.indexmundi.com/g/g.aspx?v=21&c=bg&l=en

[17] http://rainforests.mongabay.com/deforestation/2000/Bangladesh.htm

[18] Non Renewable Biomass (NRB) Assessment Report

D.3. Sources and GHGs

>>

The project boundary is the geographical area where the ICS are installed and in use and this is restricted to the geographical boundary 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	Combustion of non renewable biomass 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	Combustion of non renewable biomass for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions and limited data available.
		N_2O	No	Minor source of emissions and limited data available.

D.4. Description of the baseline scenario

>>

According to the applied methodology (AMS II.G. version 03, paragraph 4), in the absence of the programme, the baseline scenario would be the use of fossil fuel for the community to meet its energy need.

Baseline scenario has been described in the Annex 3 of the registered PoA-DD. Please refer PoA-DD for details. The value of parameters $Q_{biomass}$ and f_{NRB} have been defined at PoA level and fixed ex-ante for entire crediting period.

D.5. Demonstration of eligibility for a CPA

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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:

- *Eligibility Criteria 1*: Involve the distribution of ICS within the geographical boundary of Bangladesh.
    - The proposed SSC-CPA involves the distribution of ICS within the geographical boundary of Bangladesh. All ICS included in this CPA are within Bangladesh

- *Eligibility Criteria 2:* Have a maximum energy saving of 180 GWhr/year.
    - The proposed SSC-CPA follows the SSC threshold for Type II projects and has energy savings of less than the maximum threshold of 180 GWhr/year.
      Energy Saving / ICS = $Q_{biomass} * (1-\eta_{old}/\eta_{new}) * NCV_{biomass}$

Parameter	Domestic ICS	Non-Domestic ICS	Unit
Qbiomass	1.06	27.47	tonnes/year
Nold	0.10	0.10	
Nnew	0.255	0.210	
Biomass saved by each stove	0.644	14.389	tonnes/year
Energy saved by each stove	0.003	0.060	GWh/year
Thermal Energy Savings			
Energy saved by each stove per annum	0.003	0.060	GWh/year
Number of ICS units in the CPA	58448	379	
Combined energy saving per ICS	156.912	22.723	GWh/year

Total Savings	179.63	GWh/year

- *Eligibility Criteria 3:* Be developed and implemented by a PO which has signed the standard contractual agreement with the CME to participate in the PoA; such agreement guiding the transfer of the emission reduction rights to the CME.
    - The proposed SSC-CPA is developed and implemented by SZ Consultancy Services Ltd (PO) which has signed the standard contractual agreement with the JPMVEC (CME) to participate in the PoA; the agreement guides the transfer of the emission reduction rights to the CME

- *Eligibility Criteria 4:* Uses the small scale approved methodology AMS.II.G ver 3. The CME will verify that all CPA-DDs employ the aforesaid version of the methodology.
    - The proposed SSC-CPA uses the methodology AMS – II.G. ver.3

- *Eligibility Criteria 5:* The SSC-CPA-DDs to be approved by the CME and submitted to a DOE for its incorporation into the PoA.
    - The proposed SSC-CPA has been approved by JPMVEC (CME) and submitted to a DOE for its incorporation into the PoA.

Demonstration of additionality

- *Additionality Eligibility Criteria 1:* CPA shall meet the eligibility criteria for inclusion of a SSC-CPA in the PoA
    - Refer above, the compliance with eligibility criteria for inclusion has been justified above.
- *Additionality Eligibility Criteria 2:* CPA shall be consistent with the current mandatory laws and regulations in the People's Republic of Bangladesh (PRB) in the time of inclusion.
    - The CPA is not mandated or prohibited by law and is consistent with all regulations in PRB.
- *Additionality Eligibility Criteria 3:* No public funding or ODA was or will be diverted for the implementation of the SSC-CPA
    - Refer section A.11 of CPA-DD above confirming that no public funding or ODA was diverted for the implementation of the SSC-CPA.

D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

>>

1. Governing equation for emission reduction

The equation for calculation of emission reductions is:

$ER_y = B_{y,savings} \cdot f_{NRB,y} \cdot NCV_{biomass} \cdot EF_{projected\_fossilfuel}$

Where:

ER_y	Emission reductions during the year y in tCO2e
$B_{y,savings}$	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. Use a value of 81.6 tCO2 / TJ

$B_{y,savings}$ is estimated using option 2 of the methodology AMS-II.G version 3.
$B_{y,savings} = B_{old.} (1-\eta_{old}/ \eta_{new})$

Following option (a) of the methodology, B_{old} is calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of biomass per appliance (tonnes/year) derived from historical data/ survey of local usage.

$B_{old} = N * Q_{biomass}$

Where,

B_{old}	Quantity of woody biomass used in the absence of project activity (tonnes)
N	Total number of systems (number)
$Q_{biomass}$	Average annual biomass consumption per appliance (tonnes/ year)

Where,

$N = N_{all} * SOF$

N_{all}	Total number of stoves installed
SOF	Stove Operation Fraction (% of stoves operating or replaced by equivalent in-service appliance) – measured ex post using survey/ user feedback

In compliance with the monitoring requirements of the methodology B_{old} is adjusted for Leakage and average stove operation period during monitoring period.

Thus,

$B_{old} = LAF * N_{all} * SOF * Q_{biomass} * Stove_{year}$

Where,

$Stove_{year}$	Calculated average stove operation years in the monitoring period (years)
LAF	Net to gross Adjustment factor (0.95) applied in accordance with paragraph 13 and 23 of AMS-II. G version 03

Cut-Off Age

Each year, the cut-off age is decided at the discretion of the CME, and stoves older than this age will not be included in the sample and will not be included in calculations of emission reduction. This introduces conservativeness to the estimation of emission reductions.

D.6.2. Data and parameters fixed ex-ante

Data / Parameter	$Q_{biomass}$
Unit	Tonnes/ year
Description	Annual average biomass consumption per appliance
Source of data	For domestic kitchens: IBRD 2009 Restoring Balance: Bangladesh's Rural Energy Realities. For non-domestic kitchens: Bangladesh Stoves Kitchen Survey August 2008 HED Consulting, and Bangladesh Stoves Kitchen Tests 2008-9 HED Consulting For details refer Registered PoA-DD

Value(s) applied	1.06 for domestic stoves 27.47 for non-domestic stoves
Choice of data or Measurement methods and procedures	The data derives from historical data surveys of local usage as referenced above, as required by the methodology.
Purpose of data	Baseline calculations
Additional comment	Used for calculation of Bold as per paragraph 7 (a) of methodology

Data / Parameter	fNRB,y
Unit	Fraction
Description	Fraction of biomass in year y that can be established as non renewable using survey methods
Source of data	a) IBRD 2009 Restoring Balance: Bangladesh's Rural Energy Realities. b) HED NRB Study 2008
Value(s) applied	1.00
Choice of data or Measurement methods and procedures	The value is derived from two surveys: a) HED NRB Bangladesh 2008. In mid 2008 JP Morgan Climate Care commissioned from a 3rd party consulting firm (HED) a thorough survey of wooded land in Bangladesh. As required by the methodology, this compared sustainably managed woody biomass with areas showing indicators of deforestation. No sustainably managed land was found, thus in respect of version 3 of the methodology AMS II.G, Demonstrably Renewable Woody Biomass (DRB) = 0. Further, fuel wood sourcing areas showed more than two of the prescribed indicators of deforestation and non-renewability. In respect of version 3 of the methodology AMS II.G, the equation fNRB = NRB/(NRB+DRB) was therefore applicable and resulted in a value of 1. b) IBRD 2009 Restoring Balance: Bangladesh's Rural Energy Realities. This survey concluded that the aggregate annual biomass fuel consumption for Bangladesh as a whole is 2587 kg/year, divided as follows: **Biomass (kg/y)** Fuel Wood 1065 Tree leaves 471 Crop reside 539 Dung cake/stick 504 Sawdust 8 c) Because leaves, crop residue, dung are renewable biomass, and sawdust can be treated as such in order to be conservative, the finding following version 3 of AMS IIG, was that because fNRB = 1 as described above, the product fNRB x woody biomass= 1 x 1065 = 1065. (It may be noted here that following version 1 of AMS IIG, the fraction of total biomass fuel was NRB components/Total components or 1065/2587 = 0.41. This result is multiplied by total biomass such that fNRB x total biomass= (1065/2587) x 2587 = 1065. Both versions of the methodology give the same result).
Purpose of data	Baseline calculations
Additional comment	

Data / Parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net Calorific Value of the wood used as cooking fuel
Source of data	AMS-II. G version 03, page 2
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	Default value as prescribed by methodology applied
Purpose of data	Baseline calculations

Additional comment	

Data / Parameter	$EF_{projected\_fossilfuel}$
Unit	tCO2/TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	AMS-II. G version 03, page 2
Value(s) applied	81.6
Choice of data or Measurement methods and procedures	Default values prescribed by the methodology applied
Purpose of data	Baseline calculations
Additional comment	

Data / Parameter	η_{old}
Unit	Fraction
Description	Efficiency of the system being replaced, use 0.10 (i.e. 10%) as default value or local data if available
Source of data	AMS-II. G version 03
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	The default value taken from the methodology AMS-II.G version 03.
Purpose of data	Baseline calculations
Additional comment	

Data / Parameter	LAF
Unit	Fraction
Description	Net to gross Adjustment Factor
Source of data	AMS-II. G version 03
Value(s) applied	0.95
Choice of data or Measurement methods and procedures	Default value as prescribed by methodology applied
Purpose of data	Baseline calculations
Additional comment	

D.6.3. Ex-ante calculation of emission reductions

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The equation for calculation of emission reductions is:

$ER_y = B_{y,savings} * f_{NRB,y} * NCV_{biomass} * EF_{projected\_fossilfuel}$

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

$B_{old} = LAF * N_{all} * SOF * Q_{biomass} * Stove_{year}$

Domestic:

B_{old}		LAF		N_{all}		SOF		$Q_{biomass}$		$Stove_{year}$
Tonnes/year		--		--		--		Tonnes/year		--
58857.136	=	0.95	*	58448	*	1	*	1.06	*	1

$B_{y, savings}$		B_{old}		$(1- \eta_{old} / \eta_{new})$
Tonnes/year		Tonnes/year		--
35776	=	58857.136	*	(1-0.1/0.255)

ER_y		$B_{y,savings}$		$f_{NRB,y}$		$NCV_{biomass}$		$EF_{projected\_fossilfuel}$
tCO_2e/year		Tonnes/year		--		TJ/Tonne		tCO_2e/TJ
43,790	=	35776	*	1	*	0.015	*	81.6

Non-domestic:

B_{old}		LAF		N_{all}		SOF		$Q_{biomass}$		$Stove_{year}$
Tonnes/year		--		--		--		Tonnes/year		--
9891	=	0.95	*	379	*	1	*	27.47	*	1

$B_{y, savings}$		B_{old}		$(1- \eta_{old} / \eta_{new})$
Tonnes/year		Tonnes/year		--
5181	=	9891	*	(1-0.1/0.21)

ER_y		$B_{y,savings}$		$f_{NRB,y}$		$NCV_{biomass}$		$EF_{projected\_fossilfuel}$
tCO_2e/year		Tonnes/year		--		TJ/Tonne		tCO_2e/TJ
6341	=	5181	*	1	*	0.015	*	81.6

Total emission reduction from domestic and non-domestic ICS = 50,131 tCO2.

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	50,131	0	0	50,131
Year 2	50,131	0	0	50,131
Year 3	50,131	0	0	50,131
Year 4	50,131	0	0	50,131
Year 5	50,131	0	0	50,131
Year 6	50,131	0	0	50,131
Year 7	50,131	0	0	50,131
Total	**350,917**	**0**	**0**	**350,917**
Total number of crediting years	7			
Annual average over the crediting period	50,131	0	0	50,131

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

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D.7.1. Data and parameters to be monitored

Data / Parameter	η_{new}
Unit	Fraction
Description	Efficiency of the system being deployed as part of the project activity
Source of data	Monitoring WBT Records
Value(s) applied	0.255 for domestic stoves 0.21 for non-domestic stoves
Measurement methods and procedures	Water Boiling Test will be carried out for a random sample of installed ICS operation up to Cut Off Age. Efficiency of each type of ICS will be monitored separately as per sampling procedure and applied appropriately in the ER calculations.
Monitoring frequency	Annually / biennially
QA/QC procedures	The CME conducts Water Boiling Tests with expert assistance.
Purpose of data	Baseline calculations
Additional comment	The sample size to be calculated as per the confidence / precision of 90/10 for annual and 95/5 for biennial monitoring

Data / Parameter	N_{all}
Unit	Number
Description	Total number of stoves installed.
Source of data	Record of all installations and date of each installation
Value(s) applied	Domestic ICS – 58448 Non Domestic ICS – 379
Measurement methods and procedures	SZ Consultancy Services Ltd. maintains installation records to calculate this parameter in its data management system
Monitoring frequency	Daily
QA/QC procedures	The CME supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate testing and record keeping.
Purpose of data	To calculate Baseline Emissions
Additional comment	

Data / Parameter	SOF
Unit	Fraction
Description	Stove Operation Fraction - To determine only stoves that are still operating, measured ex-post through survey/ user feedback
Source of data	Monitoring survey Records
Value(s) applied	1.0
Measurement methods and procedures	This is measured by investigation of the number of ICS installations within the sampled ICSs which are found operational. If, for example, 90% of the sampled ICSs are found to be operational during monitoring survey, then SOF is 90% for corresponding population.
Monitoring frequency	Annually / biennially
QA/QC procedures	The CME supervises the activities of each PO, and provides training, guidelines and templates to facilitate accurate testing and record keeping.
Purpose of data	Baseline calculations
Additional comment	The sample size to be calculated as per the confidence / precision of 90/10 for annual and 95/5 for biennial monitoring

Methodology document: Monitoring shall ensure that the replaced low efficiency appliances are disposed off and not used within the boundary or within the region or continued usage of baseline stoves needs to be monitored and taken into consideration for the baseline emission calculations.

The old stoves would be disposed of during installation of ICS and records shall be maintained. Alternatively, the efficiency tests on a sample of ICS will also investigate the extent to which

traditional stoves are destroyed and no longer used, even in a secondary role, in the houses adopting the ICS, following the Disposal Policy. If it is found that a portion of kitchens exists in which a traditional stove is used, even in a secondary role, then the Disposal Policy will be extended to include return visits to the vintages of ICS, including short and long-serving ICS kitchens, and the Policy will be further implemented. Evidence of use of traditional stoves in other kitchen is not possible as the stoves in question are not portable. As a final resort, in cases where the further implementation of the Disposal Policy is shown by the monitoring visits to be ineffective, option (b) in paragraph 20 of the methodology will be applied to ensure that emission reductions are calculated taking into account that only a portion of the wood used in the kitchen overall is subject to the improved efficiency of the ICS.

D.7.2. Description of the monitoring plan

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The PO will maintain a record of the date and location of each ICS installation made. For each SSC_CPA.

1. The PO places a serial number with a unique PO code in the kitchen as well as in its records, in addition to a record of the location of the stove and the kitchen.

2. Other emission reduction parameters required for ex-post measurement by the methodology (numbers of stoves still in operation, efficiency of stoves) are determined by a sampling study as described in SSC-PoA-DD Section E.7.

3. All PO records are screened by the CME 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.

4. The electronic files holding each installation record are duplicated by paper documents received from individual householders.

Parameters such as η_{new} and SOF are based on sampling as described below:

Representative sampling

Wherever reasonably possible, sample sizes will be sufficient to ensure that the precision of the sample means are 90/10 (for annual inspection) or 95/5 (for biennial inspection) to estimate emissions reductions. In case where survey results indicate that desired precision is not achieved, the lower bound of corresponding confidence interval of the parameter value would be used as an alternative to repeating survey. The same is also in accordance with the Representative Sampling Methods provided by the methodology AMS–II.G version 03, paragraph 22.

The required sample size is determined by the following factors: the coefficient of variation (cv) of the quantity being estimated (efficiency η_{new} and Stove Operation Fraction SOF), the expected level of non-compliance in the sample and the desired precision. To achieve 90/10 precision, assuming perfect compliance, the use of simple random sampling, a coefficient of variation *cv* and a population size of *N*, the minimum required sample size will be equal to

$$n = N * (16.7 * cv)^2 / (N + (16.7 * cv)^2)$$

The coefficient of variation and expected rate of non-compliance will be estimated from the most recent previous monitoring data (or 2009 data in the case of the first monitoring period). The final sample size will be at least 10% larger than calculated from the above formula, to allow for error in the estimate of cv and expected levels of non-compliance. For estimates of baseline, the population size will be assumed infinite (this is a conservative adjustment), in which case the above formula simplifies to $n = (16.7*cv)^2$. For the purpose of monitoring project emissions, the population size is equal to the number of ICS's installed.

The sampling procedure may either consist of a single-stage process which randomly samples households across all the CPAs, or it may consist of a two-stage process whereby a sample of CPAs are randomly selected and within these, a random selection is made of installations.

If and when the single-stage approach is adopted, the statistical procedure is as described above. If the two stage process is followed, than the first step is to randomly select a group of CPAs. This approach ensures that every CPA has an equal probability of selection, so the sample is representative of the entire population of CPAs.

The size of the CPA sample is determined by the requirement to achieve 90/10 precision for the estimate of mean value of the parameter investigated or 95/5 in case of biennial surveys. This can be achieved through different combinations of across-CPA sample size and within-CPA household sample sizes; if less CPAs are surveyed, more houses within the CPAs will need to be surveyed to achieve the required precision, and vice versa. The relative costs and practicalities of surveying across several CPAs will be balanced against the relative costs and practicalities of household surveys and a decision taken as to the most efficient balance between across-CPA surveying and within-CPA surveying, always adhering to the equation presented here to ensure statistically valid results.

At the second stage, a representative sample of appliances is sampled from every CPA which was selected in the first stage sample. Every sampled appliance is then checked for the ex-post parameters listed. This sample will also test for false records (non-existence of the installation as opposed to the installation not being operative). Sample size shall be chosen for a 90/10 precision (90% confidence interval and 10% margin of error) or 95/5 in case of biennial surveys wherever reasonably possible. To start the process, the size of the sample of CPAs (labelled m in the equations below) and of the within- CPA samples (ni) will be determined by estimates of the within-CPA and between-CPA variances obtained from the most recent survey undertaken. This is likely to be the survey of the previous year. Once these sample sizes are known, they may be increased by 10% to ensure adequacy and applied to the survey under preparation.

The variance of the estimate of the population mean for each parameter is given by this equation:
Var (Y) =

$$\frac{1}{(N_1+\ldots+N_M)^2}\left(\frac{M^2}{m}(1-\frac{m}{M})S_1^2+\frac{M}{m}\sum_{i\in C_1}\frac{N_i^2}{n_i}(1-\frac{n_i}{N_i})S_i^2\right)$$

Where

Var(Y)	Variance of the estimated mean value of the parameter investigated
M	The population of CPAs within the programme of activities
Ni	The population of ICS users within the *i*-th CPA sampled
m	The number of CPAs in the sample
ni	The number of ICS users in the *i*-th CPA sampled
S1	Between-CPA variance
Si	Within-CPA variance
C1	Set of all CPAs

The precision of the estimated mean is:
α = 1.67 * √var(Y) / Y * 100
Where:

α The precision achieved at 90% confidence as in 90/ α

Y The estimated population mean for the parameter investigated

Alternatively, online sample size calculators may also be used for calculating the sample size. For example:
http://www.raosoft.com/samplesize.html

http://www.macorr.com/ss_calculator.htm etc.

Quality assurance

Otherwise, the sampling approaches may follow the Guideline "Sampling and surveys for CDM project activities and programme of activities" for calculation of sample size[19]. This applies both to single-stage and two-stage approaches.

SECTION E. Approval and authorization

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The Host Country Approval has been obtained at PoA level.

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[19] This was referred as EB50, Annex 30 in generic CPA-DD available at http://cdm.unfccc.int/filestorage/J/B/H/JBHP3XLQDZ6EAV0GO5RIYS894WM172/4791%20Generic%20CPA-DD.pdf?t=WDF8bzBreTZufDBgTGaBGlSJPyFVwCskzb9A

Appendix 1. Contact information of CPA implementer(s) and responsible person(s)/ entity(ies) for completing the CDM-SSC-CPA-DD-FORM

CPA implementer and/or responsible person/ entity	☒ CPA implementer(s) ☐ Responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM
Organization	SZ Consultancy Service Ltd.
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Building	House 2/8
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State/Region	Dhaka
Postcode	1207
Country	Bangladesh
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Fax	
E-mail	
Website	
Contact person	Managing Director
Title	Dr. Engr.
Salutation	Zaman
Last name	Uz
Middle name	Khaleq
First name	
Department	0088-01819-499778
Mobile	
Direct fax	
Direct tel.	khaleq.zaman@giz.de
Personal e-mail	

CPA implementer and/or responsible person/ entity	☒ CPA implementer(s) ☐ Responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM
Organization	J.P. Morgan Ventures Energy Corporation
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State/Region	London
Postcode	EC2R 6DA
Country	United Kingdom
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Fax	
E-mail	envp.trade.support@jpmorgan.com
Website	http://www.jpmorgan.com
Contact person	
Title	Executive Director
Salutation	Mr.

Last name	Amic
Middle name	
First name	Etienne
Department	J.P. Morgan Global Commodities
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

CPA implementer and/or responsible person/ entity	☐ CPA implementer(s) ☒ Responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM
Organization	Climate-Secure Services
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Appendix 2. Affirmation regarding public funding

Provided in section A.11

Appendix 3. Applicability of methodology(ies) and standardized baseline(s)

Detailed in section D.2

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

Detailed in section D.6.3

Appendix 5. Further background information on monitoring plan

The monitoring plan is provided in section D.7.2

Appendix 6. Summary of post registration changes

Not applicable

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Document information

Version	*Date*	*Description*
04.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for small-scale CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document form for small-scale component project activities" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-SSC-CPA-DD-FORM in A.14. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Appendix 6; • Change the reference number from *F-CDM-SSC-CPA-DD* to *CDM-SSC-CPA-DD-FORM*;

Version	Date	Description
		• Editorial improvement.
02.0	13 March 2012	EB 66, Annex 17 Revision required to ensure consistency with the "Guidelines for completing the component project design document form for small-scale component project activities".
01.0	27 July 2007	EB33, Annex44 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: component project activity, project design document, SSC project activities