BANGLADESH APON CHULA IMPROVED COOKSTOVE PROGRAM II

Document Prepared by Guangzhou Iceberg Environmental Consulting Services Co., Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The project involves distribution of portable fuel-efficient Apon Chula improved cookstoves (hereinafter referred to as "ICSs") in Rangpur Division, People's Republic of Bangladesh. The ICSs disseminated through this project will replace the old low efficient baseline cookstoves. The ICSs will be produced by local factories.

Through this project, Guangzhou Iceberg Environmental Consulting Services Co., Ltd. (hereinafter referred to as "Iceberg") will distribute approximately 100,000 ICSs free of charge to households in Bangladesh.

Before the implementation of the project, local people mostly use traditional solid-fuel cooking solutions such as open fire or three-stone fires. They spend plenty of time to collect firewood every day due to low combustion efficiency of baseline cooking devices. The ICSs will burn wood more efficiently thereby improving thermal transfer to pots, hence saving firewood. The project will reduce the GHG emission by less non-renewable firewood combustion as well as slowing the rapidly progressing deforestation in Bangladesh.

The baseline scenario existing prior to the implementation of the project is widely used traditional solid-fuel cooking solutions such as open fire or three-stone fires. Due to low income, people will continue to use them to meet thermal energy needs without project activity.

The average annual GHG emission reduction from the project is expected to be 461,439 tCO_2e, the crediting period is expected to be 10 years. The total GHG emission reduction is 4,614,392tCO_2e.

1.2 Sectoral Scope and Project Type

The project is categorised under type/category as below:

a) Sectoral scope: 03 - Energy demand

b) Type: II – Energy efficiency improvement projects

The project is not a grouped project.

1.3 Project Eligibility

The project involves replacing traditional cooking solutions with fuel-efficient improved cookstoves which falls into the category of efficiency improvements in thermal applications., According to VCS Standard Version 4.2, efficiency improvements in thermal applications (e.g., cook stoves) are not excluded, therefore it is eligible under the scope of VCS Program.

1.4 Project Design

☐ The project includes a single location or installation only

☒ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☐ The project is a grouped project

Eligibility Criteria

Not applicable because the project activity is not a grouped project.

1.5 Project Proponent

Organization name	Guangzhou Iceberg Environmental Consulting Services Co., Ltd.
Contact person	Ji BAO
Title	General Manager
Address	No.106 Fengze East Road, Nansha District, Guangzhou, China
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1.6 Other Entities Involved in the Project

No other entities involved.

1.7 Ownership

The project ownership belongs to Guangzhou Iceberg Environmental Consulting Services Co., Ltd.

The ICSs are distributed to end users (Households) free of charge. The end user will sign an agreement to transfer the ownership right of the carbon assets generated from this project to the project proponent, which is in accord with Paragraph 3.6.1(5) of VCS Standard (Version 4.2)

1.8 Project Start Date

01/06/2022 (expected start date for commissioning of the first batch of ICS).

1.9 Project Crediting Period

10 years fixed crediting period from 01/06/2022 to 31/05/2032.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	X

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 2022	99,805
Year 2023	348,065
Year 2024	529,615
Year 2025	525,569
Year 2026	452,324
Year 2027	434,689
Year 2028	507,877
Year 2029	562,653
Year 2030	525,569
Year 2031	452,324
Year 2032	175,902
Total estimated ERs	4,614,392
Total number of crediting years	10
Average annual ERs	461,439

1.11 Description of the Project Activity

Before the implementation of the project, local people in the project location use non-renewable biomass for cooking with three-stone. The project will distribute 100,000 fuel-efficient improved cookstoves (ICS) in 2 years to replace the baseline cookstoves in households.

The ICS will continue to consume non-renewable biomass for cooking, but the ICS will consume less wood fuel to meet thermal needs as it has higher thermal efficiency and it will result in a reduction of GHG emissions compared to the baseline scenario.

Technology

The type of ICS distributed in the project is Apon Chula improved cookstove. According to independent stove efficiency tests performed by Institute of Fuel Research & Development in Bangladesh on the Apon Chula improved cookstove, the thermal efficiency is 35.5%.

Table 1: Technical Specification of Apon Chula Improved Cookstove

No.	Parameter	Value
1	High power thermal efficiency	35.5%
2	Life span	7 years

All ICSs will be produced in local factory, then they will be distributed to households free of charge.

Figure 1: Photo of ICS

The lifetime of Apon Chula improved cookstove is about 7 years according to manufacturer specifications. In the sixth year after ICSs distribution, the project proponent will provide a new ICS to Households without cost, so that households will have access to them for the full crediting period.

1.12 Project Location

The project location will be in Rangpur Division, People's Republic of Bangladesh.

Table 2: Geographical coordinates of Rangpur Division

Orientation	Latitude/Longitude
East	89°52′48″E
West	88°04′52″E
South	25°02′13″N
North	26°38′04″ N

Figure 2: Map of Rangpur Division, Bangladesh

1.13 Conditions Prior to Project Initiation

The condition prior to project initiation is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

After searching, the project considered The Transfer of Property Act[1], The Boilers Act[2] and The Forest Act[3] of Bangladesh, none that need to be complied with. There are no laws and regulations about the application of improved cookstoves in Bangladesh households. The project is voluntarily implemented by the project proponent.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered, nor is it seeking registration under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project is not included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related credit, including renewable energy certificates.

1.17 Sustainable Development Contributions

Before the implementation of the project, local people in the project location use non-renewable biomass for cooking with open fire or three-stone fire. The project will distribute fuel-

[1] http://bdlaws.minlaw.gov.bd/act-48/section-15976.html

[2] http://bdlaws.minlaw.gov.bd/act-127.html

[3] http://bdlaws.minlaw.gov.bd/act-144.html

efficient ICS to replace the baseline cookstoves in households. The project will enable and enhance households to achieve several sustainable development goals:

Goal 1: No poverty

Improved cookstove is a basic service necessary to lead a healthy and productive life, including saving time and money for wood fuel at the household level. The project proponent will distribute 100,000 ICSs, and the ICSs are produced in local factories. Hence the implementation of the project will result in more job opportunities and higher income for local residents.

Goal 2: Zero hunger

The project will improve food security and nutrition status, particularly for children and women by reducing inadequate cooking, the burden of firewood collection, the time to prepare food, the need to buy firewood.

Goal 3: Good health and well-being

Most of non-renewable biomass local people used for cooking is firewood, which will generate high PM2.5 and high CO biomass smoke when incompletely burnt. By using ICS, it will reduce people's exposure to high PM2.5 and high CO due to higher efficiency of combustion leading to faster cooking and more complete combustion. It will also reduce the burn risk, significant to children and toddlers due to enclosure of the fire in the combustion chamber.

Goal 4: Quality education

The project will reduce the time spend on firewood collection for children, especially for girls, it will increase their time for education. The implementation of project needs plenty local people participate in production, distribution or use steps, they will get relevant skills and sustainable development and global citizenship education through training by project proponent.

Goal 5: Gender equality

The project will reduce women and children's drudgery through time savings in reducing time spent cutting, collecting, and carrying firewood from trees far removed from households and reduce time spent cooking over toxic smoky open fires. These tasks, if being undertaken without relief, are a major cause of gender inequality.

Goal 6: Clean water and sanitation

Clean cooking technology provides an essential tool to addressing energy poverty and ensuring sustainable energy security in approximately 100,000 Bangladesh households during the project lifecycle. It will also reduce the smoke and GHG emissions during water boiling.

Goal 7: Affordable and clean energy

The ICS distributed to Household is a clean cooking technology. The project will increase the proportion of population with primary reliance on clean cooking technology in project area.

Goal 8: Decent work and economic growth

The factories which produce ICS are local enterprises. They will hire more workers to produce ICSs for the project. During the project crediting period, the project proponent and its local partners will in charge of maintenance and monitoring plan, which will create working opportunities for local people.

Goal 9: Industry, Innovation, and Infrastructure

The local factories which produce ICS for project are small-scale industries. They will expand production capacity to satisfy the needs. Thus, the upstream and downstream supply chain will benefit from the project. Many of the workers hired by the factories for the project were peasants before. So the project will increase manufacturing employment.

Goal 10: Reduced inequality

The project will promote the investment in a least developed country-Bangladesh[4] for the manufacturing of ICSs.

Goal 12: Responsible consumption and production

The project provides ICSs with high thermal efficiency to reduce the consumption of firewood. It helps achieve efficient use of nature resources, such as non-renewable biomass.

Goal 13: Climate action

The average annual GHG emission reduction from the project is expected to be 461,439 tCO_2e due to less non-renewable firewood combustion for cooking and heating in the households.

Goal 15: Life on land

The project will help local people consume less firewood as the ICS has higher thermal efficiency and it will result in a reduction of GHG emissions compared to the baseline scenario. It will also help reduce deforestation and protect biodiversity and natural habitats in Bangladesh.

1.18 Additional Information Relevant to the Project

Leakage Management

Not applicable as the project adopts a net gross adjustment factor of 95% to account for

[4] https://unctad.org/topic/least-developed-countries/list[

leakage.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

No further information.

2 SAFEGUARDS

2.1 No Net Harm

2.2 Local Stakeholder Consultation

2.3 Environmental Impact

2.4 Public Comments

2.5 AFOLU-Specific Safeguards

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Methodology:

VMR0006 Methodology for Installation of High Efficiency Firewood Cookstoves, Version: 1.1

AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass, version 11.1

TOOL30: Calculation of the fraction of non-renewable biomass, version 03.0

3.2 Applicability of Methodology

The project activity meets each of the applicability conditions:

No.	Applicability criterion	How the project complies
1	Project activities shall be implemented in domestic premises, or in community-based kitchens.	The project activity will replace traditional wood-based stove (mainly three stone) in individual households only.
2	The project stove shall have specified high-power thermal efficiency of at least 25% per the manufacturer's specifications and shall exclusively use woody biomass and can be single pot or multi-pot; in case of project stove replacing fossil fuel baseline stove, it shall exclusively use renewable biomass.	The Apon Chula improved cookstove has a specified high-power thermal efficiency of 35.5% as per the manufacturer's specifications. It uses non-renewable biomass only.
3	Both 'Projects' and 'Large Projects' can use this methodology.	Since the average annual GHG emission reduction from the project is expected to be 461,439 tCO_2e, it is a large project as per Paragraph 3.9.1 of VCS Standard (Version 4.2).
4	Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	According to Global Forest Resources Assessment 2015 Report of Bangladesh by Food and Agriculture Organization of the United Nations[5], the area of forests of Bangladesh in 1990, 2000, 2005, 2010 and 2015 respectively is $1494*10^3$, $1468*10^3$, $1455*10^3$, $1442*10^3$ and $1429*10^3$ hectares, it has decreased 4.4% from 1990 to 2015. Since Bangladesh is a least developed country till now[6], it is highly possible that non-renewable biomass has been used before 1990 across Bangladesh.
5	For the specific case of biomass residues processed as a fuel (e.g. briquettes, wood chips), it shall be demonstrated that: (a) It is produced using exclusively renewable biomass (more than one type of biomass	The ICS is introduced as energy efficiency measure to replace baseline stoves and reduce the use of non-renewable biomass for combustion.

[5] https://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/country-reports/en/

[6] https://www.un.org/development/desa/dpad/least-developed-country-category/ldcs-at-a-glance.html

	may be used). (b) The consumption of the fuel should be monitored during the crediting period and (c) Energy use for renewable biomass processing (e.g. shredding and compacting in the case of briquetting) may be considered as equivalent to the upstream emissions associated with the processing of the displaced fossil fuel and hence disregarded.	The consumption of the fuel used in the project activity will be monitored. If briquettes utilization in project case the energy consumption for manufacturing of briquettes and transportation of briquette will be monitored to calculate project emissions.
6	The project description shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).	The project proponent uses online database to record the name, telephone number, location, ID number of end users and distribution date. Every ICS has a programme logo on it.
7	The project description shall explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The end users, stove manufacturers, local partners will sign an agreement clearly declare that the project proponent has sole owner of the carbon credits from the project devices.
8	Tool 30: This tool may be used by: (a) DNAs to submit region- or country-specific default f_{NRB} values, following the procedures for development, revision, clarification and update of standardized baselines (SB procedures); or (b) project participants1 to calculate project- or PoA-specific f_{NRB} values.	For this project, project developer use this tool to calculate project-specific f_{NRB} value. It complies with option b.

3.3 Project Boundary

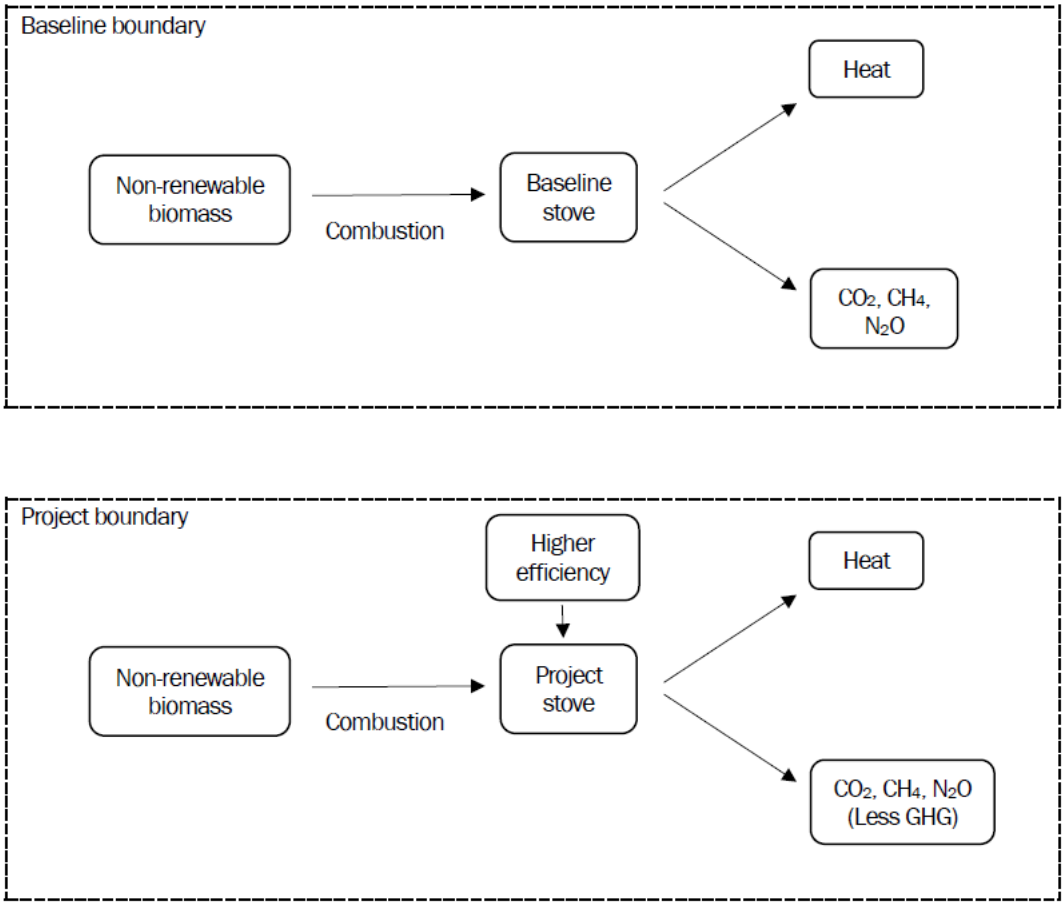
Source	Gas	Included?	Justification/Explanation
Baseline	CO_2	Yes	Major source

Source		Gas	Included?	Justification/Explanation
	Emission from use of non-renewable biomass/Fossil fuel	CH_4	Yes	Major source
		N_2O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of Fuel	CO_2	Yes	Can be a major source
		CH_4	Yes	Can be a major source
		N_2O	Yes	Can be a major source
		Other	No	No other source identified
Project	Emission from use of nonrenewable biomass/Fossil fuel	CO_2	Yes	Major source
		CH_4	Yes	Major source
		N_2O	Yes	Major source
		Other	No	No other source identified
	Production & Transport of Fuel	CO_2	Yes	Can be a major source
		CH_4	Yes	Can be a major source
		N_2O	Yes	Can be a major source
		Other	No	No other source identified

The project boundary is shown below:

Figure 3: Project boundary is within Rangpur Division, Bangladesh

A diagram of the energy flow in baseline boundary and project boundary is shown below：



3.4 Baseline Scenario

The baseline scenario is the continued use of non-renewable wood fuel (firewood) by the target population to meet similar thermal energy needs as provided by project cookstoves in absence of project activity.

3.5 Additionality

The methodology uses activity method for the demonstration of additionality.

Step 1: Regulatory Surplus

The project is not mandated by any law, statute or other regulatory framework in the host country, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework.

The project is implemented by Iceberg as well as its local partners and participated by local households voluntarily.

Step 2: Positive List

As per Section 3.2 of the PD, the project meets all the applicability conditions of the methodology which represent the positive list.

The ICSs are distributed at zero cost to local households. The project is not implemented as part of government schemes or supported by multilateral funds. Iceberg undertakes all the expenditures for project implementation and has no other source of revenue other than the sale of GHG credits.

Conclusion: As the project meets the conditions above, it is deemed additional as per the applied methodology.

3.6 Methodology Deviations

The project did not apply any methodology deviations.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The applied methodology does not account for baseline emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 4.4 of the PD.

4.2 Project Emissions

The applied methodology does not account for project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non- renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. Please refer to Section 4.4 of the PD.

4.3 Leakage

Leakage shall be considered as default 0.95 in accordance with the applied methodology.

4.4 Net GHG Emission Reductions and Removals

The project activity will replace traditional wood-based stove with ICS, therefore net GHG emission reductions are calculated by applying Equations 1 and 2.

$$ER_y = \sum_i \sum_j ER_{y,i,j}$$ Equation (1)

Where:

i	=	Indices for the situation where more than one type/model of improved cook stove is introduced to replace three-stone fire
j	=	Indices for the situation where there is more than one batch of improved cook stove of type i
ER_y	=	Emission reductions during year y in t CO_2e
$ER_{y,i,j}$	=	Emission reductions by improved cook stove of type i and batch j during year y in t CO_2e

$$ER_{y,i,j} = B_{y,saving,i,j} \times f_{NRB,y} \times NCV_{wood\ fuel} \times \left(EF_{wf,CO2} + EF_{wf,non\ CO2}\right) \times N_{y,i,j} \times 0.95$$ Equation (2)

Where:

$B_{y,saving,i,j}$	=	Quantity of woody biomass that is saved in tonnes per improved cook stove of type i and batch j during year y
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB}). The value is calculated to be 0.9576.
$NCV_{wood\ fuel}$	=	Net calorific value of the non-renewable woody biomass that is substituted or reduced (IPCC default for wood fuel, 0.0156 TJ/tonne)[7]
$EF_{wf,CO2}$	=	CO_2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 112 tCO_2/TJ)[8]
$EF_{wf,non\ CO2}$	=	Non-CO_2 emission factor for the use of wood fuel in baseline scenario (IPCC default for wood fuel, 26.23 tCO_2/TJ)[9]
$N_{y,i,j}$	=	Number of improved cook stoves of type i and batch j operating during year y
0.95	=	Discount factor to account for leakage

The quantify of woody biomass saved due to implementation of improved cook stoves can be estimated by one of the following options[10] set out in Equations 3 and 4:

[7] AMS II.G. Version 11

[8] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Chapter 2 Stationary Combustion

[9] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Chapter 2 Stationary Combustion

[10] The option to determine the $B_{y,savings,i,j}$ shall be decided prior to validation of the project.

$$B_{y,savings,i,j} = B_{old} \times \left(1 - \frac{\eta_{old}}{\eta_{new,i,j}}\right)$$ Equation (3)

$$B_{y,savings,i,j} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,y,i,j}}{\eta_{old}} - 1\right)$$ Equation (4)

Where:

B_{old}	=	Annual quantity of woody biomass that would have been used in the absence of the project activity (in tonnes per device) to generate useful thermal energy equivalent to that provided by the improved cook stove. The value of Bold can be sourced from historical data or baseline surveys. Alternatively, a default value of 0.5t/capita/year may be used.
η_{old}	=	Efficiency of baseline cookstove. The value is assumed to be 11%.
$\eta_{new,y,i,j}$	=	Efficiency of the improved cook stove type i and batch j determined through water boiling test (WBT). Alternatively, efficiency may be determined using Equation 5.
$B_{y=1,new,i,survey}$	=	Annual quantity of woody biomass used by improved cook stoves in tonnes per device of type i and batch j, determined in the first year of the implementation of the project through a sample survey. The value is assumed to be 4.7 kg/device/day or equal to 1.72 tonnes/device/year.

We choose equation 4 to estimate the quantify of woody biomass saved due to implementation of improved cook stoves.

$$\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94$$ Equation (5)

Where:

η_p	=	Efficiency of project stove (fraction) at the start of project activity; the value is 35.5% as per the specifications provided by manufacturer
$(DF_n)^{y-1}$	=	Discount factor to account for efficiency loss of project cookstove per year of operation (fraction). This value may be based on actual monitoring or based on manufacturer's declaration on expected loss in efficiency or through publicly available literature on relevant industry standards. Alternatively default value of 0.99 efficiency loss per year can be considered.
0.94	=	Adjustment factor to account for uncertainty related to project cookstove efficiency test

The Equation 6 in the applied methodology is used when the project households continue to use baseline cookstoves along with improved cookstoves. Since only the firewood used in the ICSs implemented by the project will be taken into account for calculation of emission reductions, the Equation 6 is not applicable in PD for ex-ante estimation.

The Equation 7 and 8 in the applied methodology is used for project stoves replacing fossil fuel with renewable biomass. The project involves replacing low thermal efficient wood fuel combusted cookstoves with high thermal efficient wood fuel combusted cookstoves only. Relatively rich households who can afford fossil fuel will not be involved in the donation project. Thus Equation 7 and 8 are not applicable.

For ex−ante calculation purpose, the assumption below is applied.

η_p=35.5%;

DF_n=0.99;

Therefore, $\eta_{nwe,y,i,j}$ is calculated as below:

Age(y)	$\eta_{nwe,y,i,j}$
1	33.37%
2	33.04%
3	32.71%
4	32.38%
5	32.06%
6	31.73%
7	31.42%

The project will install up to 100,000 ICSs in 2 years, hence 50,000 ICSs each year. The life span of ICS is 7 years. In the sixth year of the ICSs installed, the project proponent will provide a new ICS to Households or repair existing ICS without cost, so that households will have access to them for the full crediting period. The annual loss rate is assumed to be 10%.

Therefore, the $N_{y,i,j}$ and $\eta_{nwe,y,i,j}$ are estimated as below:

First-time Distribution

	ICSs installed in year 1		ICSs installed in year 2	
Year(y)	$N_{y,i,j}$	$\eta_{new,y,i,j}$	$N_{y,i,j}$	$\eta_{new,y,i,j}$
1	50000	33.37%		
2	45000	33.04%	50000	33.37%
3	40000	32.71%	45000	33.04%
4	35000	32.38%	40000	32.71%

	5	30000	32.06%	35000	32.38%
	6	25000	31.73%	30000	32.06%
	7	0	31.42%	25000	31.73%
Second-time Distribution	6	50000	33.37%	0	0.00%
	7	45000	33.04%	50000	33.37%
	8	40000	32.71%	45000	33.04%
	9	35000	32.38%	40000	32.71%
	10	30000	32.06%	35000	32.38%

$B_{y=1,new,i,survey}$= 4.7*365/1000=1.72 tonnes/device/year according to ex-ante estimation.

The expected emission reduction is as below:

Year(y)	ICSs installed in year 1	ICSs installed in year 2	Total
1	171,096	0	171,096
2	303,377	171,096	474,473
3	265,626	303,377	569,003
4	228,920	265,626	494,546
5	193,246	228,920	422,166
6	250,388	193,246	443,634
7	303,377	250,388	553,765
8	265,626	303,377	569,003
9	228,920	265,626	494,546
10	193,246	228,920	422,166

The applied methodology does not account for baseline and project emissions separately, but instead quantifies emission reductions as a function of the reduction in the amount of non-renewable biomass fuel consumption in the efficient project stoves as compared to baseline stoves. The ex-ante calculation in the table below.

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 2022	N.A.	N.A.	0	99,805

Year 2023	N.A.	N.A.	0	348,065
Year 2024	N.A.	N.A.	0	529,615
Year 2025	N.A.	N.A.	0	525,569
Year 2026	N.A.	N.A.	0	452,324
Year 2027	N.A.	N.A.	0	434,689
Year 2028	N.A.	N.A.	0	507,877
Year 2029	N.A.	N.A.	0	562,653
Year 2030	N.A.	N.A.	0	525,569
Year 2031	N.A.	N.A.	0	452,324
Year 2032	N.A.	N.A.	0	175,902
Total	**N.A.**	**N.A.**	**0**	4,614,392

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$f_{NRB,y}$
Data unit	Fraction
Description	Fraction of woody biomass saved by the project activity during year y that can be established as non-renewable biomass
Source of data	Calculated
Value applied	0.9576
Justification of choice of data or description of measurement methods and procedures applied	As per the "TOOL30: Calculation of the fraction of non-renewable biomass, version 3.0". Please refer to Bangladesh f_{NRB} calculation sheet.
Purpose of Data	Calculation of emission reductions
Comments	.

Data / Parameter	$NCV_{wood\ fuel}$

Data unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted or reduced
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 1 Introduction: Table 1.2 Default net calorific values (NCVs) and lower and upper limits of the 95 percent confidence intervals.
Value applied	0.0156
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	

Data / Parameter	$EF_{wf,CO2}$
Data unit	tCO_2 /TJ
Description	CO_2 emission factor for the use of wood fuel in baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion: Table 2.5 Default emission factors for stationary combustion in the residential and agriculture/forestry/fishing/fishing farms categories.
Value applied	112
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	

Data / Parameter	$EF_{wf,\text{non } CO2}$
Data unit	tCO_2 /TJ

Description	Non-CO_2 emission factor for the use of wood fuel in baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Volume 2 Energy, Chapter 2 Stationary Combustion
Value applied	26.23
Justification of choice of data or description of measurement methods and procedures applied	IPCC default value
Purpose of Data	Calculation of emission reductions
Comments	

Data / Parameter	η_{old}
Data unit	Fraction
Description	Efficiency of baseline cookstove
Source of data	• Default value: 0.1 or 0.2; or • Surveyed prior to implementation of project activity
Value applied	0.11 for ex-ante estimate, it will be fixed after baseline survey
Justification of choice of data or description of measurement methods and procedures applied	(a) A default value of 0.1 shall be used if baseline device is a three-stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney. (b) A default value of 0.2 shall be used for other types of devices. (c) If more than one type of baseline device is being replaced in the project region, weighted average values (taking the amount of woody biomass consumed by each device as the weighting factor) shall be used. (d) If this parameter is surveyed, project promoters may use simplified guidelines stated under Option (b) in Section 8.4 above for arriving at the minimum sample size.
Purpose of Data	Calculation of emission reductions
Comments	

Data / Parameter	η_p

Data unit	Fraction
Description	Efficiency of project stove at the start of project activity.
Source of data	Manufacturer's specification
Value applied	35.5%
Justification of choice of data or description of measurement methods and procedures applied	This parameter shall be determined ex-ante
Purpose of Data	Calculation of emission reductions
Comments	

Data / Parameter	$\eta_{new,y,i,j}$
Data unit	Fraction
Description	Efficiency of the improved cookstove type i and batch j implemented as part of the project activity
Source of data	Calculation
Description of measurement methods and procedures to be applied	To adopt Option V given in the methodology: Efficiency of the improved cookstoves to be estimated using equation 4 above where loss in efficiency per year is calculated, and therefore this parameter does not need to be monitored
Frequency of monitoring/recording	Annually
Value applied	

Age(y)	$\eta_{nwe,y,i,j}$
1	33.37%
2	33.04%
3	32.71%
4	32.38%
5	32.06%
6	31.73%

		7	31.42%
Monitoring equipment			
QA/QC procedures to be applied			
Purpose of data	Calculation of emission reductions		
Calculation method	Equation 5 above: $\eta_{new,y,i,j} = \eta_p \times (DF_n)^{y-1} \times 0.94$		
Comments			

5.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i,j}$
Data unit	Number
Description	Number of project devices of type i and batch j operating during year y
Source of data	Monitoring
Description of measurement methods and procedures to be applied	Measured directly or based on a representative sample. Sampling standard shall be used for determining the sample size to achieve 90/10 confidence precision according to the latest version of Standard for sampling and surveys for CDM project activities and programme of activities.
Frequency of monitoring/recording	At least once every two years
Value applied	For ex-ante emission reduction calculation, it is assumed that the project will distribute up to 100,000 ICSs and the installation/ distribution of ICSs to be implemented in 2 years with each year comprises of 50,000 ICSs.
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	

Purpose of data	Calculation of emission reductions
Calculation method	Proportion of operational stoves obtained from the survey is multiplied by the total commissioned stoves to arrive at this value
Comments	

Data / Parameter	$B_{y=1,new,i,j,survey}$
Data unit	tonnes
Description	Quantity of woody biomass used by project devices in tonnes per device of type i
Source of data	Survey
Description of measurement methods and procedures to be applied	Minimum sample size of each type i and batch j should be in line with the latest version of Standard for sampling and surveys for project activities and programmes of activities or guidelines provided in section 8.4 option (b). Determined in the first year of the introduction of the devices (e.g., during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied: (a) Baseline cookstoves have been completely decommissioned and only improved cookstoves are exclusively used in the project households; (b) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of firewood being used by each device. In other words, if more than one device, or another device that consumes firewood, are in use in project households, then the sample survey needs to distinguish the quantity of firewood used by the project device and the other devices that use firewood.
Frequency of monitoring/recording	Determined in the first year of project implementation

Value applied	For ex-ante emission reduction calculation, it is assumed as 4.7kg/device/day, equal to 1.72 tonnes/device/year.
Monitoring equipment	Monitoring survey
QA/QC procedures to be applied	
Purpose of data	Calculation of emission reductions
Calculation method	
Comments	

Data / Parameter	Life span
Data unit	Years
Description	Project promoters to state the operating lifetime of project device for projects opting Equation 5 for determining project stove efficiency.
Source of data	Manufacturer's specification
Description of measurement methods and procedures to be applied	
Frequency of monitoring/recording	Once at the time of Project stove installation
Value applied	7
Monitoring equipment	
QA/QC procedures to be applied	
Purpose of data	Calculation of emission reductions
Calculation method	

Comments	

5.3 Monitoring Plan

The local partners of Iceberg (i.e. project proponent) are in charge of the implementation of the monitoring plan and reporting to the project proponent. The project proponent is in charge of designing the monitoring plan and completing the monitoring report. Sampling survey will be applied for monitoring.

（a）Sampling Plan

As per the Standard for Sampling and Surveys for CDM Project Activities and Programmes of Activities, Version 09.0:

Sampling design

(1) Objectives and reliability requirements

The objective is determining the value of parameter $N_{y,i,j}$ and $B_{y=1,new,i,survey}$ during the crediting period, and with a 90/10 confidence/precision compliance with the applied methodology.

The following parameters may be determined by sampling:

Parameter	Description	Frequency
$N_{y,i,j}$	Number of project devices of type i and batch j operating during year y	Biennial
$B_{y=1,new,i,survey}$	Quantity of woody biomass used by project devices in tonnes per device of type i and batch j	Determined in the first year of project implementation

(2) Target population

The target population will be the complete set of appliances (ICS) deployed under the project.

(3) Sampling method and size

As per the applied methodology, the following guidelines will be applied to calculate the sample size:

- Project target population < 300: Minimum sample size 30
- Project target population 300 1000: Minimum sample size 10% of group size
- Project target population > 1000: Minimum sample size 100

(b) Data to be collected

Besides the above parameters, the following data need to be collected as per the applied methodology:

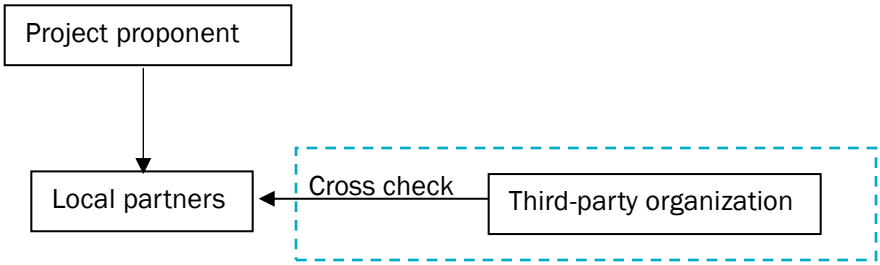
- Date of distribution
- Geographic area of distribution
- Model/type of project technology distributed
- Quantity of project technologies distributed
- Name and telephone number (if available), and address of recipient
- unique identification alpha/numeric ID for each device that is sold/distributed

The information collected will be stored in the electronic database for 2 years after the end of crediting period.

Quality assurance/Quality control

Training about monitoring plan will be provided to local partners, including survey method, data record and analysis. The monitoring plan will be carried out by qualified personnel trained for quality assurance and quality control. The project proponent will inspect local partners to confirm that the personnel are qualified and the monitoring plan has been properly implemented. The data collected may be cross checked by the project proponent or a third-party organization.

The organizational structure for monitoring is shown as the bellow:



(c) Implementation plan

The main survey methods applied in the sampling plan include hardcopy questionnaires, online questionnaires, face to face interview and telephone interview. The potential of refusals and other means of non-responses will be taken into account for calculation of sample size. Meanwhile, in order to minimize the rates of non-response and answer bias, the questionnaires will be designed by professional team and widely tested before use.

Any non-conformances with the validated monitoring plan will be recorded and analysed. If they are in accordance with the applied methodology and other related rules, a change may be conducted in the validated monitoring plan. Otherwise, revision and improvement will be

conducted in the monitoring. The related ERs will not be claimed in the monitoring report until the non-conformance has been corrected in the latter case.