



**Verified Carbon
Standard**

IMPROVED COOK STOVE MARKET DEVELOPMENT IN RURAL NEPAL



Document Prepared by VNV Advisory Services Pte. Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Nepal is a mountainous country challenged by its inherent topography and socio-economic conditions. It ranks 145 on the Human Development Index (HDI) and nearly one-fourth of its population live below poverty line.

Household Air Pollution (HAP) is one of the biggest causes of premature deaths globally killing more people than a combined number of TB, Malaria and Aids. In rural areas, especially remote and poor communities of Nepal, solid biomass fuel burning in the kitchens with inefficient cook stoves has posed threat to not just health but also the atmosphere. In this backdrop, the project has been implemented in ten districts of Nepal since October 2018 to provide easy access of clean cook stoves to people to address the problem.

In the baseline the household users were using traditional inefficient cookstoves for meeting their daily need viz. cooking by burning non-renewable biomass.

In its effort to combat climate change, Nepal has set-up a good policy environment to support the climate change mitigation and adaptation. Nepal's Climate Change Policy (2011) aims, among others, to reduce GHG emissions by promoting the use of clean energy such as hydro-electricity, renewable and alternative energies, and by increasing energy efficiency and encouraging the use of green technology. This policy envisions utilizing the financial resources available from national and international sources for climate adaptation, adverse impacts, mitigation and low carbon development. The policy also targets to mobilize at least 80% of the total funds available for climate change related programmes at the community level. Nepal's Nationally Determined Contribution (NDC) recognizes the "Clean Energy Development Pathways" as a crucial measure to realize the mitigation actions, which, among others, targets to equip every household in rural areas with smokeless (improved) cook stoves by 2030.

In this context, the project aims to:

- i) strengthen private sector led clean cook stove marketing approach.
- ii) strengthen market chain of clean cook stoves; and
- iii) minimise respiratory health problems in rural Nepal caused by open fire cooking.

Learning objectives of the project include:

- I) setting incentives that enable poor users to purchase and benefit push products despite their low financial means; and
- II) innovative financing for clean cook-stoves through preferential loans via cooperatives as an alternative to the current approach of providing substantial subsidies for certain types of clean cookstoves.

The underlying theory of change is that once the clean cook stove and hood-stove entrepreneurs are provided with Results-based Financing (RBF) incentives over a period of five years, they will grow in capacity over the period and will be able to continue to meet the on-going demand on

their own. Through their initially supported activities, they will gradually be able to achieve greater production, quality assurance, and decrease their costs through economies of scale, so that the price of a portable cook stove will reduce over the 5 years by approximately 10 per cent.

The project is being implemented in Baglung, Argakhanchi, Bara, Chitwan, Gulmi Kaski, Makwanpur, Myagdi, Parbat, and Syangja Districts in Nepal. Most of the households from these areas use solid biomass fuel for cooking.

NMB Bank Limited is the RBF fund manager. Likewise, the project has partnership with five local NGOs while the project is working closely with District Cooperative Association, local cooperatives, cook stove manufacturers, importers, distributors and other supply chain actors.

The total estimated ICS to be deployed is 15,315 as per the small scale threshold limit.

HPN JE-01 ND	12,415
Greenway Jumbo	2,900
Total ICS	15,315

The actual total number of ICS disseminated are 15,292 for the project.

Batch	Commissioning Start date	Commissioning End date	HPNJE-01	Greenway Jumbo
Batch 1	01-11-2018	28-02-2019	9,560	2,597
Batch 2	01-03-2019	21-06-2019	2,855	280
		Total	12,415	2,877
		Grand Total	15,292	

Start date of the project activity is the earliest date of installation of ICS i.e., 01/11/2018 which is date of 1st commissioning of ICS with 10 years of fixed crediting period which ends on 31/10/2028. The project activity has resulted in a total emission reduction of 26,404 tonnes of CO₂e for this monitoring period (01/11/2021 to 31/10/2022).

Audit Type	Period	Program	VVB Name	Number of years
Validation and Verification	01-11-2018 to 31-10-2020	VCS	Carbon Check India Pvt. Ltd.	02
Verification	01-11-2020 to 31-10-2021	VCS	VKU Certification Pvt. Ltd	01
Verification	01-11-2021- 31-10-2022	VCS	Eco-Lance	01
Total	01-11-2018 to 31-10-2022			04

1.2 Sectoral Scope and Project Type

Sectoral scope: 3

Type: II

Title: AMS II G, Energy efficiency measures in thermal applications of non-renewable biomass --
- Version 11.1¹

The project is not a grouped project and is non-AFOLU type.

1.3 Project Proponent

Organization name	Practical Action
Contact person	Pooja Sharma
Title	PP
Address	Practical Action South Asia Regional Office Kathmandu, Nepal Phone: 977-1-4423639, 4423640
Telephone	Cell: 91 9844331288 Direct: 91 80 42429933
Email	Pooja.Sharma@practicalaction.org.np

1.4 Other Entities Involved in the Project

Organization name	Value Network Ventures Advisory Services Pte. Ltd
Role in the Project	PP representative and Consultant
Contact person	Mr. Sandeep Roy Choudhury
Title	Director, VNV Advisory
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Telephone	+91 80 42429927
Email	sandeep@vnvadvisory.net
Email for Project updates	priyanka.mhaisne@vnvadvisory.net; manjari@vnvadvisory.net

¹ <https://cdm.unfccc.int/UserManagement/FileStorage/R1YKFOXZNTJQSG53IVCL8BDP2EU904>

1.8 Title and Reference of Methodology

Methodology: AMS II.G - Energy efficiency measures in thermal applications of non-renewable biomass

Version: Version 11.1

Reference:

<https://cdm.unfccc.int/methodologies/DB/10PELMPDW951SVSW1B2NRCQEBAX96C>

Tools:

- Tool 21: Demonstration of additionality of small-scale project activities, Version 13
- Tool 30: Calculation of the fraction of non-renewable biomass, Version 02

1.9 Participation under other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits.

1.11 Sustainable Development Contributions

The contributions of project activity towards sustainable development are explained with indicators viz. social, economic, environmental, technological well-being, legislative and temporal as follows:

Environmental well-being: -The project activity results in the reduction of firewood consumption and emission of greenhouse gases and thus conserve forest and biodiversity.

Social wellbeing: -The project activity paves the way for development and increases the social status and living conditions and the prevailing living standard in the vicinity of the project activity and thus results in empowering the nearby. Also, it contributes to a small increase in the local employment by employing skilled and un-skilled personnel for operation and maintenance of the equipment. The project reduces the drudgery of women, time saving and the use of saved time for other productive activities.

Economic well-being: - The project has created a business opportunity during construction phase for local stakeholders such as suppliers, contractors etc. contributing to economic well-being aspects. Further, the project also influences creation of employment opportunities for local people, which would enhance their social status. Sufficiently enhance indoor air quality thereby

improving health of women and children and reducing incidences of smoke and fire related injuries and therefore result in saving of health-related expenses.

Technological well-being: -The project activity promotes improved cook stoves that result in reduced fuel consumption and emissions due to cooking and heating water in homes.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.0	 Access to affordable and clean energy services	Implemented activities to increase	No further changes this monitoring period.	The project enabled 15,292 low-income rural households to get access to affordable and reliable clean energy.
2)	13.0	 Tonnes of greenhouse gas emissions avoided	Implemented activities to increase	By installing ICS to 15,292 rural households, the project has prevented the release of 26,404 tonnes of CO2 into the atmosphere during this monitoring period.	By installing ICS to the rural households, the project is estimating to prevent the release of 319,830 tonnes of CO2 into the atmosphere over project lifetime.

3)	3.0	 Good Health and well Being	Implemented activities to decrease	100% Smoke reduction has occurred due to the project activity during the current MP. No further changes in the number of households exposed to indoor air pollution in this monitoring period.	The project is estimated to reduce 100% of the smoke due to the project activity in 15,292 low-income rural households.
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2 SAFEGUARDS

2.1 No Net Harm

Since the technology i.e. cook stove under the project is very simple and easy to use and maintain. There is very less chance of the technology failure and equipment damage that may impact the applicability of the methodology. The project activity does not involve any major construction activity. It primarily requires the cookstoves which is either locally built or imported. The stoves are manufactured at the factory with proper due diligence. Thus, there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience that are envisaged due to the project activity. Also, there is no net harm, or any potential negative environmental and socio-economic impacts.

2.2 Local Stakeholder Consultation

The LSC has been conducted during validation phase; since this is MP 03 kindly refer below content for the LSC conducted previously:

A public notice was placed in the local daily newspaper inviting the local stakeholders for consultation process for this project. The advertisement was published on 22/10/2020. Local stakeholder consultation meeting took place on 30/10/2020 at DCRDC office at village, Baglung, Nepal. In the introductory speech, the representatives of Practical Action and DCRDC group, welcomed the gathering and gave a brief about the climate mitigation project activity. The meeting was organized informally in order to encourage participants post their views on the project more openly and without hesitation of protocol. Most of the participants attending the meeting were men & women who were local beneficiaries of the project.

The introductory phase of the meeting included the opening of the meeting, self-introduction by the participants, objectives of the LSC and explanation about the project. Ms. Srijana Tamang opened the meeting and introduced herself as well as about Practical Action and the VNV Advisory. The major activities that the Practical Action has been carrying out, is in its quest to promote clean energy solutions to the disadvantaged communities of the Nepal. The introductory session was conducted in plenary and lasted for around 15 Mins.

Subsequent to the introductory speech, Mr. Sandeep Roy Choudhury from VNV) along with Mr. Min Bikram Malla from Practical Action explained the dependency of household user especially of female members on traditional cookstoves. Mr. Sandeep Roy explain the baseline energy consumption scenario that has been dominated by traditional fuels and more than 75% of total energy consumption is supplied by traditional resources. He further added that per capita consumption of woody biomass for cooking in Nepal accounts around 4200 Kg/year. Highlighting

the socio-economic situation of the project district, Mr. Sandeep further explained the urgency to transform the cooking habit such that the environment remains protected and the households get benefited socially and economically. On the social dimension he added that the ill effects of using traditional biomass based cooking stoves; Mr. Sandeep highlighted that the culprit of major respiratory diseases accountable to women and children in Nepal is the indoor smoke released as a part of cooking activity. In addition, he highlighted comparative advantage of having improved cooking stoves with respect to time, drudgery, dirty pots and level of comfort of being inside kitchen. He added that the project has been initiated to provide those benefits to the users such that they will be able to reduce their cost of living for being healthy.

Apart from the benefits discussed on social front, Mr. Sandeep Choudhury from VNV advisory services informed the participants about contribution of using standalone clean cooking units at a household level to contribute towards global environmental problem called “Climate Change”. Mr. Choudhury proceeded with his introductory session more interactively. He sought out information on the participant’s own experience about climate change and related it to the global phenomena of global warming and climate change. He added that the firewood burnt releases smoke which contains gases that are capable of changing earth’s temperature and with the introduction of clean cooking solutions, the users would be releasing lesser smoke and therefore contributing for global cause. He added, the pollutants thus reduced by the use of clean cooking stoves can be traded internationally and that the revenue collected from such trade will benefit other households who are still using traditional stoves.

He further informed the participants, that the revenue generated shall partly be used to repair and maintenance of Cook stoves.

However, for this, he added the fact that the individual households will have to transfer the entitlement of the emission reductions accrued by their project unit to the project proponent.

After the detailed discussions, the session was open for questions from stakeholders

The question raised by the household users are summarized below -

Q: How Improved Cook stoves help climate change?

Answer: Improved cookstoves not only reduce emissions through better combustion of the fuel, but they also reduce the amount of fuel which is needed for cooking. Since deforestation contributes towards global warming, improved cookstoves help mitigate climate change due to their reduced need for firewood.

Q: We noted that the project is eligible to earn credits for 10 years. As you said earlier you will use the credits to cover project expenses related to stove production and installation. Since ICS will be installed once, is credit from entire five years required to cover the expenses

Answer: The project can earn credits for 10 years and the revenue from the sales of credit shall be largely used to cover the stove production and installation expenses. It is pertinent to clarify that despite the project is eligible to earn credit for 10 years, a stove has a lifetime of 7 years which requires the stoves to be replaced after 7 years of installation which again needs additional cost. Further there are costs involved with monitoring and verification of system. Finally, the proponent indeed intend to save something doing this project.

Q: Do you have any training component included in your project implementation?

Answer: Yes, we have training program included in the project design. The training component is targeted such that there is project representative and master trainer at the local area to troubleshoot the problems encountered in the Cookstove and support the owners in repair and maintenance of the cook stoves. The technical training is provided to them at the local office of DCRDC and also during the installation at the household level.

For continued ongoing communications with stakeholders:

The following inputs/ grievance have been applied for the project:

Continuous Input / Grievance	Method Chosen
Expression Process Book	Comment books are made available on the project site at each NGO office (e.g. DCRDC, etc.) and distributor offices located at districts, as well as Practical Action head office in Kathmandu so that local stakeholders can provide feedback on the project.
Telephone access	The telephone numbers of the project's owner are made available for local stakeholders to provide feedback on the project.
Internet/email access	The email addresses of the PA are made available for local stakeholders to provide feedback on the project.
Nominated Independent Mediator (optional)	Not applied

The continue input/grievance mechanism has been in place for the stakeholders to provide feedback on the project. The HH users have been shared a common customer care number i.e. +9771 4423639/4423640 for logging their complaints.

There was no comment collected on the comment books, via phone calls or emails during the monitoring period.

2.3 AFOLU-Specific Safeguards

This section is not applicable as the project does not fall under AFOLU Category.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project has been implemented in Baglung, Argakhanchi, Bara, Chitwan, Gulmi, Kaski, Makwanpur, Myagdi, Parbat, Tanahu and Syangja Districts in Nepal. Most of the households from these areas use solid biomass fuel for cooking and are in hilly areas. There are no changes reported in the project activity.

The actual total number of ICS disseminated are 15,292 for the project.

Batch	Commissioning Start date	Commissioning End date	HPNJE-01	Greenway Jumbo
Batch 1	01-11-2018	28-02-2019	9560	2597
Batch 2	01-03-2019	21-06-2019	2855	280
		Total	12415	2877
		Grand Total	15,292	

Districts	Number of ICS distributed
Baglung	3432
Argakhanchi	270
Bara	916
Chitwan	1416
Gulmi	1418
Kaski	128
Makwanpur	1405
Myagdi	227
Parbat	2804

Syangja	530
Tanahu	2746

No such events have occurred that may have impacted the GHG emission reductions or removals and monitoring. All the ICS were operational during the current monitoring period.

The operational lifetime of the ICS is 7 years as per the manufacturer specifications. The current monitoring period is MP 3 (Year 4).

3.2 Deviations

3.2.1 Methodology Deviations

Not applicable as there are no methodology deviations.

3.2.2 Project Description Deviations

Not applicable as there are no methodology deviations.

3.3 Grouped Projects

Not applicable as the project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	Bold,HH
Data unit	Tonnes/household/year
Description	Quantity of woody biomass used per ICS in the absence of the project activity
Source of data	Baseline survey

Value applied	3.8
Justification of choice of data or description of measurement methods and procedures applied	The baseline survey estimated the average (mean) biomass usage per annum across relevant districts as a 3.8 tonne/year/HH. The survey was conducted in two ways: perception survey and experimental survey. In the perception survey, the Traditional Cook Stove users were interviewed about their usage pattern of the biomass for the household cooking using the traditional cooking stoves. In the experimental, the interviewer also measured the actual biomass used in the traditional cooking stove for cooking the meals. The baseline survey was conducted following the General Guidelines For Sampling And Surveys For Small-Scale CDM Project Activities.
Purpose of Data	Calculation of Quantity of woody biomass that is saved in tonnes per device
Comments	N/A

Data / Parameter	η_{old}
Data unit	Percentage
Description	Efficiency of the system being replaced (Traditional Cooking Stoves)
Source of data	approved methodology AMS II.G/v11.1
Value applied	10%
Justification of choice of data or description of measurement methods and procedures applied	The default value of 0.10 is used as the replaced system is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, i.e. without a grate or a chimney.
Purpose of Data	Calculation of share of non-renewable biomass
Comments	N/A

Data / Parameter	$f_{NRB,y}$
Data unit	Percentage
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass

Source of data	The value is calculated as per the tool referred in AMS-II.G version 11.1 which is duly approved by Ministry of Forest and Environment, Nepal.
Value applied	86.1%
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Baseline Emission calculation
Comments	N/A

Data / Parameter	EFprojected_fossilfuel
Data unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers.
Source of data	approved methodology AMS II.G/v11.1
Value applied	64.40
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Baseline Emission calculation
Comments	N/A

Data / Parameter	LEy
Data unit	Fraction
Description	Net to Gross adjustment factor
Source of data	approved methodology AMS II.G/v10:
Value applied	0.95
Justification of choice of data or description of measurement methods and procedures applied	Default value as prescribed by methodology applied

Purpose of Data	Baseline Emission calculation
Comments	N/A

4.2 Data and Parameters Monitored

Data / Parameter	$N_{y,i,a}$
Data unit	Number
Description	Number of project devices of type i and age a that are operating in year y
Source of data	Annual ICS users' survey
Description of measurement methods and procedures to be applied	The information on the number of devices operational is determined by the ICS users' survey through monitoring of the user households drawn as random sample.
Frequency of monitoring/recording	Annually
Value applied	MP-03, 01/11/2021 to 31/10/2022 (Year 4):- Total - 15,292 a) 12,415 (100%) HPNJE-01 ND stove b) 2,877 (100%) Greenway Jumbo stoves
Monitoring equipment	NA
QA/QC procedures to be applied	During the annual users' survey, survey team inspected representative sample households to check if the devices are operating or not. Sample for this survey is drawn as per the "Guidelines for sampling and surveys for CDM project activities and programme of activities, version 3 (EB 75, annex 8)". During the survey, the respective field person checks the ICS whether it is operational or not.
Purpose of data	Emission reduction calculation
Calculation method	N/A
Comments	N/A

Data / Parameter	$\eta_{new,i,j}$
Data unit	Fraction
Description	Efficiency of the device (Stove) of each type i and batch j implemented as part of the project activity
Source of data	Default schedule of linear decrease in efficiency up to the terminal efficiency of 20% per para 32(a) of AMS II G ver 11.1
Description of measurement methods and procedures to be applied	As per AMS II G ver 11.1 para 37, (a), A default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent shall be applied through the life span of the project device. I.e. the life span of project device HPNJE-01ND is seven (7) years and project device has an efficiency of 30.29 per cent at commissioning then a 1.47 per cent decrease in efficiency every year shall be applied. Similarly, the life span of project device Greenway Jumbo is seven (7) years and project device has an efficiency of 29.79 per cent at commissioning then a 1.39 per cent decrease in efficiency every year shall be applied.
Frequency of monitoring/recording	Annual
Value applied	For MP 03 - 01/11/2021 to 31/10/2022 (Year 4) a) 25.88 % (for HPNJE-01 ND stove) b) 25.62 % (For Greenway Jumbo stoves)
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	The monitored value of this parameter will be used in the determination of the ex-post emission reduction.
Calculation method	N/A
Comments	N/A

Data / Parameter	NCVbiomass
Data unit	TJ/tonne

Description	Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in project devices
Source of data	approved methodology AMS II.G/v11.1
Description of measurement methods and procedures to be applied	As per approved methodology AMS II.G/v11.1
Frequency of monitoring/recording	Yearly
Value applied	0.0156
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Emission reduction calculation
Calculation method	N/A
Comments	N/A

Data / Parameter	μ_y
Data unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Source of data	When applying equations 6 and 8, it is a fraction based on monitoring results. In other cases (i.e. applying equations 3, 5 and 7), use 1.0
Description of measurement methods and procedures to be applied	Surveys has been conducted in September 2022 since the use of data loggers to record the continued operation of baseline devices is not practical, because the baseline device is the three-stone fire. During the annual users' survey, survey team inspected representative sample households. Sample for this survey is drawn as per the "Guidelines for sampling and surveys for CDM project activities and programme of activities, version 3 (EB 75, annex 8)". The survey is designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidence to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 pre-project devices per household and it was determined during the

	survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. Another example would be the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor will be 0.75.
Frequency of monitoring/recording	At least once every two years (biennial)
Value applied	MP-03, 01/11/2021 to 31/10/2022 (Year 4) HPNJE-01ND – 0.903 Greenway Jumbo – 0.900
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Emission reduction calculation
Calculation method	N/A
Comments	The value is less than 1 since still few households' use their old traditional cook stoves, due to more food quantity and numbers of family members and sometimes due to guest visiting their house. However, they told during the survey, the easiness they felt in using the project cook stoves, since it is light and mobile i.e. they can cook their meal at any place in their home e.g. while watching TV programs i.e. due to light weight and portable nature of ICS, it can be shifted anywhere from kitchen to other places e.g. In their TV rooms etc. and also it produces very less smoke due to which the soot problems is very minimum.

Data / Parameter	Life Span
Data unit	Number of years
Description	The operating lifetime of the project device. The life span should be reported in case where the PP are opting to account the efficiency loss as per paragraph 32.
Source of data	Manufacturer (certified by a national standards body or an appropriate certifying agent recognized by that body)
Description of measurement methods	N/A

and procedures to be applied	
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution
Value applied	7
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Emission reduction calculation if using efficiency loss as per paragraph 32.
Calculation method	N/A
Comments	N/A

Data / Parameter	Date of commissioning of batch j		
Data unit	Date		
Description	To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch		
Source of data	Internal records		
Description of measurement methods and procedures to be applied	N/A		
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution of the last project device in the batch		
Value applied	Batch	Start date	End date
	Batch 1	01-11-2018	28-02-2019
	Batch 2	01-03-2019	21-06-2019
Monitoring equipment	N/A		
QA/QC procedures to be applied	N/A		
Purpose of data	Emission reduction calculation		

Calculation method	N/A
Comments	N/A

Data / Parameter	Date of commissioning of project device i
Data unit	Date
Description	Actual date of commissioning of the project device
Source of data	Internal records
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Fixed and recorded at the time of commissioning/distribution
Value applied	From 01 November 2018 to 21 June 2019
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Emission reduction calculation
Calculation method	N/A
Comments	N/A

Data / Parameter	$N_{d,HH}$
Data unit	Number
Description	Number of project devices distributed per household
Source of data	Internal records
Description of measurement methods and procedures to be applied	N/A

Frequency of monitoring/recording	Recorded at the time of commissioning/distribution of project devices
Value applied	15,292 ICS distributed in 15,292 households i.e. one ICS per household
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Emission reduction calculation
Calculation method	N/A
Comments	N/A

4.3 Monitoring Plan

The monitoring plan is designed to monitor the parameters listed in Section 4.2 above, which are required for calculation of the actual GHG emission reduction achieved by the project activity instances using ex post sampling survey. The share of operating stoves and the continued use of pre-project devices is determined based on sampling procedures as outlined below. The project proponent is responsible for conducting the sampling surveys and maintaining a database with all operating stoves.

No monitoring for leakage through competitive uses of biomass is required, as the parameter *Bold,i,j* is multiplied by 95% to account for leakage.

As per the Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 04, the sampling plan is the following:

(a) Sampling Approach:

- i. **Objectives and reliability requirements:** The objective of the sampling plan is to achieve unbiased and reliable estimates of the proportion or the mean value of the key variables over the crediting period. As per the sampling and survey standard (EB 94 annex 2, version 7, para 10) in case “where there is no specific guidance in the applicable methodology, project proponents shall use 90/10 confidence/precision as the criteria for reliability of sampling efforts for small-scale project activities and 95/10 for large scale project activities.” The methodology applied for the project (AMS.II.G version 11.1/para 41 requires the project proponent achieving 95 percent confidence interval and a 10 percent margin of error while for annual inspection 90 per cent confidence interval and a 10 per cent margin of error shall be achieved for the sampled parameters. Since it is small scale project and PP has opted for the annual inspection, the survey is conducted to achieve the confidence/precision of 90/10 and this is in accordance with the

requirements set out as per methodology and sampling standard. The table below provides the monitoring parameters that is monitored annually:

1)

Parameter	Type	Description
$N_{y,i}$	Proportional parameter	Number of project devices ICS (cookstoves) of type i and operating in year y (this also accounts the baseline stoves that are still in use)
$\mu_{y,i,j}$	Proportional parameter	Adjustment to account for any continued use of pre-pre-project devices during the year y

- ii. **Target Population:** The target population for different parameters discussed in the table above are given below:
 - a. For the proportional parameter; the target population is the ICS users listed in the project database.
 - b. For the mean value parameter; the target population is the total number of operational ICS for which the emission reductions is accounted for the monitoring period. The mean value parameter, unless and otherwise required by the estimated number of samples (if it is greater than the sample estimate for the proportional parameter) is the subset of the operational ICS as identified during the annual monitoring surveys.
- iii. **Sampling frame:** All the households availed with the improved cooking stoves by the project is the sampling frame.
- iv. **Sampling Method:** A simple random sampling is adopted for estimating the sample size for the monitoring surveys. Simple random sampling is suited to populations that are homogenous (EB 94 annex 02). Most of the districts are located in the hilly regions of Nepal. Hence, the population is homogenous. From the population of ICS, the random numbers is assigned for each ICS using excel function and the sample ICS is extracted accordingly. The schema of the sampling method is given below:

In the project, two ICS types are identified and based on this simple random sampling will be applied on both the type of stoves. Since the two batches are homogeneous, no separate sampling has been done i.e. district wise. There will be two set of samples derived from this method. Further, most of the districts are located in the hilly regions of Nepal. Hence, the population is homogenous as well.
- v. **Sample Size:** The calculation of the required sample size for each parameter is calculated at 90/10 confidence/precision as required for the annual monitoring. The sample size is determined using the Guidelines for Sampling and Surveys for CDM Project activities and Programme of Activities Ver. 4.0 (EB86, Annex 4)². As required by AMS II.G Ver 11.1, for annual surveys, the level of precision of 10% and a confidence level of 90% is assessed for the

²Guidelines for Sampling and Surveys for CDM Project activities and Programme of Activities Ver. 4.0 (EB 86, Annex 4)

monitoring parameters; efficiency of ICS, number of ICS in operation and displacement of traditional stoves.

The minimum sample size to determine number of ICS in operation and displacement of tradition stoves using the procedure outlined in para 12 of appendix 1, EB 86 Annex 4, Guidelines for Sampling and Surveys for CDM Project activities and Programme of Activities Ver. 4.0.

$$n \geq \frac{1.645^2 N \times p(1 - p)}{(N - 1) \times 0.1^2 \times p^2 + 1.645^2 p(1 - p)}$$

Where:

n= Sample size

N = Total number of ICS of type i installed under the project

p = expected proportion (0.9)³

1.645 = represents the 90% confidence required

0.1 = represents the 10% relative precision (0.1x0.5=0.05 = 5% points either side of p)

During the last MP, the monitored operating fractions were 93-95%. Hence, to be conservative, PP has used 90% expected proportion during the current MP which is found to be in line with the registered PD.

Substituting the values of “N” in equation above, the sample size is calculated. The sample size has been calculated as 31 for each type of ICS. However, PP has selected 35 samples for greenway jumbo stove and 35 samples for HPN JE-01ND stoves.

The samples are selected by using excel random number generator function i.e. RAND function. As soon as the random numbers are generated for the users, they are sorted in ascending order and the first 35 samples in the ascending order are selected for the survey. The screenshots of the same are provided below:

Screenshot of random number selection:

³ The expected proportion has been taken as 0.9 for the second monitoring period.

Sl no	Name of the beneficiary	ID no	Address	District	Region	Date of Sales	Make / Model of Stove	Serial no of Cookstoves	Random Number	
1030	Gitadevi Gaudel	511020	Phalewas Parbat	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01030	0.000213608	Sample selected	
1031	Yamu Thapa Chettri	41306	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00006	0.000230287	Sample selected	
151	Narayan Prasad Bhusal	517396	Phalewas Parbat	Western	04.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00151	0.000868453	Sample selected	
1025	Tuli Tiwari	2146	Phalewas Parbat	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01025	0.001475033	Sample selected	
1437	Budha Kumari Sharma	20102	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01437	0.001560188	Sample selected	
10	Tej Bdr Thapa	3346	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00010	0.001856964	Sample selected	
7997	Bishnu Mati Rana	9207/82	Katheshola Baglung	Western	13.04.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/07997	0.001857811	Sample selected	
1028	Rita Paudel	53327	Phalewas Parbat	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01028	0.002303463	Sample selected	
129	Kul Prasad Sharma	1869	Phalewas Parbat	Western	03.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00129	0.00286027	Sample selected	
7998	Bhimsara Thapa	208035	Katheshola Baglung	Western	13.04.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/07998	0.002898888	Sample selected	
1444	Kalpana Rijal Bastola	511008/5	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01444	0.003179637	Sample selected	
11	Trak Bdr Thapa	1516	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00011	0.003818376	Sample selected	
1443	Hari Krishna Paudel	46746	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01443	0.003997542	Sample selected	
1448	Durga pd Sharma	51-01-74	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01448	0.004086232	Sample selected	
2562	Gita Karki	200614	Baglung N Baglung	Western	30.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/02562	0.004109303	Sample selected	
1445	Sabitri Kumari subedi	5413	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01445	0.004314831	Sample selected	
5	Eka Narayan Sapkota	431	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00005	0.004755055	Sample selected	
1091	Daumaya Sunar	241	Kushma N Parbat	Western	23.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01091	0.005027236	Sample selected	
7	Jayashwar Dhungana	6273	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00007	0.005212168	Sample selected	
9	Krishna Prasad Sapkota	3602	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00009	0.006372879	Sample selected	
1026	Madav Prasad Gaudel	17	Phalewas Parbat	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01026	0.00640356	Sample selected	
1441	Laxmi Rijal Bastola	511008/6	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01441	0.007320891	Sample selected	
138	Chabilal Dhungana	2686	Phalewas Parbat	Western	03.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00128	0.007827859	Sample selected	
5830	Sangita Kumari Sharma	1001/636	Kushma N Parbat	Western	12.02.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/05830	0.008386161	Sample selected	
54	Kamala Devi Dhungana	20260	Phalewas Parbat	Western	02.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00054	0.010517702	Sample selected	
7999	Sushmita Chantyal	503008/3	Katheshola Baglung	Western	13.04.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/07999	0.010670836	Sample selected	
1438	Janak Kumari Sharma	2799	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01438	0.010780629	Sample selected	
1447	Guma Kumari Sharma	51298	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01447	0.011222768	Sample selected	
8444	Uma Karki	2219/557	Baglung N Baglung	Western	16.05.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/08444	0.011763121	Sample selected	

Sl no	Name of the beneficiary	ID no	Address	District	Region	Date of Sales	Make / Model of Stove	Serial no of Cookstoves	Random Number	
1447	Guma Kumari Sharma	51298	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01447	0.011222768	Sample selected	
8444	Uma Karki	2219/557	Baglung N Baglung	Western	16.05.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/08444	0.011763121	Sample selected	
8	Ram Giri Shanyasi	24	Phalewas Parbat	Western	01.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00008	0.01209255	Sample selected	
1446	Sumitra Sharma	8067	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01446	0.012147834	Sample selected	
3585	Paramananda upadhyay	266	Baglung Baglung	Western	15.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/03585	0.013023258	Sample selected	
1031	Tila Kumari Paudel	157	Phalewas Parbat	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01031	0.013069201	Sample selected	
6899	Chandu davi Jamichan	1026/605	Kushma N Parbat	Western	07.03.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/06899	0.013624038	Sample selected	
1090	Subas Subedi	50824	Kushma N Parbat	Western	23.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01090	0.013667976	Sample selected	
1439	Nilkantha Bastola	511008/2	Kusma m Parbat	Western	04.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01439	0.013845796	Sample selected	
1089	Tara Kumari	513027/3	Kushma N Parbat	Western	23.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01089	0.013933588	Sample selected	
1027	Uma Devi Paudel Gaud	2034/105	Phalewas Parbat	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01027	0.013944466	Sample selected	
6017	Bindu Thapa	463025/3	Annapurna Kaski	Western	13.02.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/06017	0.013976378		
3975	Uma kala Pun	413071/3	Dharkot Gulmi	Western	22.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/03975	0.01420044		
2220	Dil Prasad Gurung	337	Putalibaz Syangja	Western	22.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/02220	0.014717139		
6731	Lok Bahadur Parrayar	423048/6	Arjunchaur Syangja	Western	27.02.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/06731	0.014867379		
2066	Om kumari Gharti Mag	403014/6	Malarani Argakhani	Western	18.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/02066	0.015048931		
3201	Soniya Thapa	41-01-73	Malika Ga Gulmi	Western	09.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/03201	0.015329842		
6733	Drupati Khatri Khadka	423048/2	Arjunchaur Syangja	Western	27.02.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/06733	0.015790806		
3471	Mina khatri	51697	Gulmidar Gulmi	Western	13.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/03471	0.016003992		
2973	Bhim Bdr. Gharti Mag	51230	Gulmidar Gulmi	Western	02.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/02973	0.016547092		
4814	Hari Bdr. Gurung	41-01-72	Musikot Gulmi	Western	03.02.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/04814	0.016567413		
2886	Gaumat Budhathokli	5591	Gulmidar Gulmi	Western	02.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/02886	0.017167075		
1042	Yam Bahadur khadka	11353/37	Sandhikh Argakhani	Western	21.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01042	0.017193383		
4807	Moti Prasad Sharma	2297	Phalewas Parbat	Western	03.02.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/04807	0.017605744		
332	Tek Kumari Shershta	1757/205	Sandhikh Argakhani	Western	08.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/00332	0.017922236		
2355	Chandrakala pandey	1917	Satyawati Gulmi	Western	26.12.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/02355	0.018374995		
4347	Rumaya Rana	3950	Harinas Ri Syangja	Western	28.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/04347	0.018529354		
3968	Dhachi Nanda Sharma	564	Chandrika Gulmi	Western	22.01.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/03968	0.019362126		
7473	Shiri data poudel	29	Beni Myagdi	Western	24.03.2019	Greenway Jumbo	PA/NP/WR/ICS/VCS/07473	0.01940471		
1241	Tuk Bahadur Rana	28725	Kaliganda Syangja	Western	29.11.2018	Greenway Jumbo	PA/NP/WR/ICS/VCS/01241	0.019885667		

Greenway Jumbo Samples

HPNJE-01ND										
Sl no	Name of the beneficiary	ID no/I	Address	District	Region	Date of Sales	Make / Model of Stove	Serial no of Cookstoves	Random Numbers	
1	5645	3528	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05645	0.000107445	Samples Selected
2	6422	1545	Kusma municipality	Parbat	Western	21.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/06422	0.00017442	Samples Selected
3	4778	54626	Kusma municipality	Parbat	Western	03.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04778	0.000191654	Samples Selected
4	5551	954	1Baglung municipality	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05551	0.000272342	Samples Selected
5	5770	2024	Katkekhola RM	Baglung	Western	12.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05770	0.000301078	Samples Selected
6	776	2219	Ba. N. pa	Baglung	Western	16.11.2018	HPNJE-01ND	PA/NP/WR/ICS/VCS/00776	0.000321316	Samples Selected
7	4693	1006/241	Kusma Municipality	Parbat	Western	01.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04693	0.000401206	Samples Selected
8	773	1639	B. N. P.	Baglung	Western	16.11.2018	HPNJE-01ND	PA/NP/WR/ICS/VCS/00773	0.00045602	Samples Selected
9	5613	17632/242	Baglung municipality	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05613	0.000630205	Samples Selected
10	5323	50017400	Katkekhola RM	Baglung	Western	08.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05323	0.000676573	Samples Selected
11	6545	501003/15	Baglung	Baglung	Western	25.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/06545	0.000687708	Samples Selected
12	4495	501001/35	Baglung Municipality	Baglung	Western	30.01.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04495	0.000980908	Samples Selected
13	774	6886	B. N. P.	Baglung	Western	16.11.2018	HPNJE-01ND	PA/NP/WR/ICS/VCS/00774	0.000966526	Samples Selected
14	5648	712	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05648	0.001005656	Samples Selected
15	5572	2823	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05572	0.001165619	Samples Selected
16	5280	41890	Baglung municipality	Baglung	Western	08.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05280	0.001214738	Samples Selected
17	4997	501003/15	Katkekhola RM	Baglung	Western	06.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04997	0.001246835	Samples Selected
18	4687	5	Kusma Municipality	Parbat	Western	01.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04687	0.001325134	Samples Selected
19	5544	6429/400	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05544	0.001406308	Samples Selected
20	5594	503001/81	1Baglung municipality	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05594	0.001511027	Samples Selected
21	5574	2901	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05574	0.00153716	Samples Selected
22	5639	501003/34	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05639	0.001560278	Samples Selected
23	5558	1523/2071	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05558	0.001649427	Samples Selected
24	5765	1527	Baglung municipality	Baglung	Western	12.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05765	0.001719587	Samples Selected
25	5683	6173	Katkekhola RM	Baglung	Western	11.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05683	0.00188982	Samples Selected
26	4861	2434	Baglung Municipality	Baglung	Western	04.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04861	0.001895271	Samples Selected
27	4779	2825	Kusma municipality	Parbat	Western	03.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04779	0.001963143	Samples Selected

HPNJE-01ND										
Sl no	Name of the beneficiary	ID no/I	Address	District	Region	Date of Sales	Make / Model of Stove	Serial no of Cookstoves	Random Numbers	
29	3212	205686	Baglung Municipality	Baglung	Western	10.01.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/03212	0.00199744	Samples Selected
30	4782	5168	Kusma Municipality	Parbat	Western	03.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04782	0.001999068	Samples Selected
31	4777	181	Kusma Municipality	Parbat	Western	03.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04777	0.002076103	Samples Selected
32	4173	1118/642	Baglung Municipality	Baglung	Western	28.01.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04173	0.002147203	Samples Selected
33	4684	55	Kusma municipality	Parbat	Western	01.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04684	0.002161855	Samples Selected
34	6371	206448	Katkekhola RM	Baglung	Western	21.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/06371	0.002186912	Samples Selected
35	4686	513003/11	Kusma municipality	Parbat	Western	01.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04686	0.002206492	Samples Selected
36	4981	503003/15	Katkekhola RM	Baglung	Western	06.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04981	0.00223497	Samples Selected
37	4639	3703	Katkekhola RM	Baglung	Western	01.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04639	0.002243782	
38	7600	129	Galkot municipality	Baglung	Western	27.03.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/07600	0.002269482	
39	8121	513055/18	Paiyu	Parbat	Western	19.04.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/08121	0.002429516	
40	1797	32862	Phalewash Municipality	Parbat	Western	11.12.2018	HPNJE-01ND	PA/NP/WR/ICS/VCS/01797	0.002529913	
41	9389	1614/044	Jardi-9 (Bharatpur MNP-9)	Chitwan	Eastern	17.11.2018	HPNJE-01ND	PA/NP/ER/ICS/VCS/09389	0.002599748	
42	13111	54/3	(Kohalbi-8)	Bara	Eastern	26.01.2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/13111	0.002804828	
43	6762	3535	Katkekhola RM	Baglung	Western	28.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/06762	0.002806621	
44	9011	351022/21	Gitanagar-9 (Bharatpur MNP-9)	Chitwan	Eastern	13.11.2018	HPNJE-01ND	PA/NP/ER/ICS/VCS/09011	0.002894634	
45	12794	2602	Hatiya-1 (Hetauda Sub MNP-1)	Makwanpur	Eastern	26.01.2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/12794	0.002929219	
46	4284	53382	Basantapur-3, Bhanu NP-13	Tanahu	Western	15.11.2018	HPNJE-01ND	PA/NP/WR/ICS/VCS/09284	0.00298218	
47	5192	51	Kusma municipality	Parbat	Western	07.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/05192	0.002996182	
48	11289	4779	Mirlung-4 (Bhanu NP-13)	Tanahu	Eastern	11-01-2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/11289	0.0031961	
49	4400	11156/114	Katkekhola RM	Baglung	Western	29.01.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04400	0.003223952	
50	11179	3	Bhanu NP-6	Tanahu	Eastern	11-01-2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/11179	0.003347487	
51	6655	503001/83	Baglung municipality	Baglung	Western	27.02.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/06655	0.003421133	
52	14899	2884	Bhimphedi-9	Makwanpur	Eastern	23.04.2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/14899	0.003567392	
53	9425	68731	Purkot-5 (Bhanu NP-9)	Tanahu	Eastern	17-11-2018	HPNJE-01ND	PA/NP/ER/ICS/VCS/09425	0.003663954	
54	4568	513035/72	Paiyu	Parbat	Western	31.01.2019	HPNJE-01ND	PA/NP/WR/ICS/VCS/04568	0.003958059	
55	13147	3	Bara-17 (Jitpur, Simra Suki Bara)	Bara	Eastern	26-01-2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/13147	0.003962691	
56	11761	2051/342	Chhatiwani-2 (Bakalya-3)	Makwanpur	Eastern	15.01.2019	HPN JE-01 ND	PA/NP/ER/ICS/VCS/11761	0.004021637	

HPNJE-01ND Samples

(b) Data:

(i) Field Measurements:

1. Checking of a representative sample of each type of ICS installed every year to ensure that they are still operating (Ny,i,a).
2. The survey is conducted annually with the objective to target 10 percent precision and to achieve 90 percent confidence.

(ii) Quality Assurance/Quality Control:

A survey questionnaire is prepared to seek responses of operating status (yes or no) of ICS units by ICS using households. The survey is performed by the project developer. During the survey, in order to anticipate any low response rate and answers bias, 10% oversampling is applied.

(iii) Analysis:

1. Checking of a representative sample of ICS installed every year to ensure that they are still operating (Ny,i)
- 2) The project developer collects, compiles and analyzes the data to derive the number of ICS disseminated, the percentage of ICS in operation, displacement of traditional cooking stove by ICS users. The developer prepared “monitoring report” based on the survey records. The analysis of the data is done by the field person and then reviewed by the senior management team of Practical action.
- 3) The data collected is compiled in Excel sheets and/or other software and analyzed to derive the percentage of ICS in operation. The values are used for emission reductions calculation.

(c) Implementation:

- 4) The survey questionnaire is prepared, pre-tested and field personnel is trained in conducting the survey to ensure the quality of data collected and the survey is carried out once a year. The schedule for implementing the sampling effort is defined prior to the field activity.

Parameter	Objective	Timeframe/ Frequency	Method of Data Collection	Use of Data	Target Population	Sampling Frame
Ny,i,a	Total number of ICS that are operational	Measurement taken every year	Semi Structured questionnaire survey conducted among the user households	Monitoring will ensure that the ICS implemented through the project is operational and has displaced low efficiency appliances from the	ICS user households	List of households having ICS installed/purchased.

				project boundary.		
py,i,j	To account any continued use of pre-project devices	Measurement taken every year	Semi Structured questionnaire survey conducted among the user households	Monitoring will ensure that the ICS implemented through the project is operational and has displaced low efficiency appliances from the project boundary.	ICS user households	List of households having ICS installed/purchased.

Organization	Summary Record Keeping Roles
Practical Action	Direct collection of all sales and monitoring data. Management of partner organizations data collection and analysis. Reviews and cleans all datasets. Stores and maintains database records provided by project partners electronically. Calculates Emission Reductions and writes all reports for carbon crediting purposes.
Stove Manufacturing	Collection and entry of bulk sales records used to populate TSR (total sales record) via sales invoices. Collection and compilation of end-user data collected by partner resellers used to populate daily sales data. All monitoring for stove sales is completed by Paradigm.
Evidence Action	Collection and entry of all distribution and monitoring records. Paradigm and its alliance handle all distribution, community meetings, training, monitoring and basic data analysis. Paradigm uses raw data to analyse and quantify carbon outcomes.

Training and capacity Development and repair and maintenance of ICS

Project developer (PA) maintain all records as per monitoring plan. In addition, a continuous complaint mechanism system is in place for the project to records any complaint whenever received and its status.

In villages/districts where the ICS are disseminated, technicians from the ICS distributor are appointed, who take any complain related to usage & operation of ICS. Also each district has DCRDC (District

Community Resource Development Center), CCND, MRC etc. member which includes mostly the village SHG (women self-help group) who were having a very good understanding and relations with all the women's in their respective villages. They know each and every villages women personally and women HH user (ICS are primarily used by women user since it involves an ICS) share their operational & usages related issues with the SHG members easily and thus this has help maintaining a continuous grievance mechanism in place. The SHG member note down the any issues related to ICS usages & operation & maintenance and convey the information to the respective technicians deputed for respective villages. Every month, the technicians provide a monthly report on their activities related to the repairing, maintenance, etc. to the PA team based in Kathmandu, where PA, is having a regional office. Ms. Pooja Sharma, Mr. Min Bikram & Mr. Upendra Shrestha who is the in charge and look after these monthly reports provided by the technicians. The trainings were imparted to the personnel's/technicians responsible for monitoring and maintenance during the monitoring period Mr. Min Bikram from PA, is the trainers for the trainings conducted during the monitoring period.

The organizational structure, responsibilities and competencies of the personnel that will be carrying out monitoring activities:

DCRDC (District Community Resource Development Center) is the onsite community engagement entity for the project which takes care of collection and entry of all distribution and monitoring records. Mr. Gyanendra prasad Gautam and Mrs. Srijana Thapa are the surveyor of the project, and they were trained on the survey by the management team of both DRCDC and Practical Action. They are familiar with the region of the project. Training was provided on operation, working, usage, interview from the user and filling of survey format. The PP has ensured that DRCDC surveyors received relevant training and has all necessary competencies to accurately assess and oversee the survey, including the following:

- Knowledgeable on issues relating to Usage, working, Perception of incidence of disease and firewood consumption
- Adept at ensuring protocol is followed to prevent double counting

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to methodology AMS II.G/v11.1, emission reductions is calculated as:

$$ER_y = \sum_i \sum_j ER_{y,i,j} - LE_y$$

Equation (1)

Where:

i	=	Indices for the situation where more than one type of project device is introduced to replace the pre-project devices ⁴
j	=	Indices for the situation where there is more than one batch of project device
ER_y	=	Emission reductions during year y in t CO ₂ e
$ER_{y,i,j}$	=	Emission reductions by project device of type i and batch j during year y in t CO ₂ e
LE_y	=	Leakage emissions in the year y

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil\ fuel} \quad \text{Equation (2)}$$

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per cookstove device of type i and batch j during year y
$f_{NRB,y}$	=	Fraction of woody biomass that can be established as non-renewable biomass (fNRB) ⁵
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
$EF_{projected_fossilfuel}$	=	Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 64.4 t CO ₂ /TJ ⁶
$N_{y,i,j}$	=	Number of project devices of type i and batch j operating during year y
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year y when applying equations 6 and 8 (fraction). Use 1.0 in other cases

⁴ For example, in some instances, full replacement of the pre-project device would require the implementation of more than one project device (e.g. one stove suitable for cooking and the other stove suitable for cooking/boiling water).

⁵ Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/methodologies/standard_base/index.html>.

⁶ This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. The value is calculated, based on the global average ratio of cooking fuels (the normalized ratio of kerosene and liquefied petroleum gas (LPG) excluding coal), i.e. 9 per cent for kerosene (71.5 t CO₂/TJ) and 91 per cent for LPG (63.0 t CO₂/TJ).

Quantity of woody biomass that is saved in tonnes per cookstove device of type i and batch j during year y is calculated using the following equation:

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

Where:

$B_{old,i,j}$ = Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type i and batch j

$\eta_{old,,}$ = Efficiency of the old devices being replaced by project devices of type i and batch j

$\eta_{new,,}$ = Efficiency of the project device i and batch j

For efficiency loss: As per AMS II G ver 11.1 para 37, (a), A default schedule of linear decrease in efficiency up to the terminal efficiency assumed as 20 per cent has been applied through the life span of the project device. I.e. the life span of project device HPNJE-01ND is seven (7) years and project device has an efficiency of 30.29 per cent at commissioning then a 1.47 per cent decrease in efficiency every year is applied. Similarly, the life span of project device Greenway Jumbo is seven (7) years and project device has an efficiency of 29.79 per cent at commissioning then a 1.39 per cent decrease in efficiency every year is applied.

For monitoring period between 01/11/2021 to 31/10/2022 (MP-03):

MP03 - Batch 1		ICS commissioned in batch 1			
		HPNJE-01ND		9560	days fraction
Monitoring period start		1-Nov-21		1	
Monitoring period end		31-Oct-22		1	
		Stove Model			
		HPN JE-01 ND	Greenway Jumbo		
Parameter	Data ID	Value	Value	Units	Source
Quantity of woody biomass used in the	B_{old}	3.80	3.80	Tonnes/year	Baseline survey

absence of the project activity					
Efficiency of the system being replaced	η_{old}	10%	10%	Percentage	approved methodology AMS II.G/v11.1
Efficiency of the system being deployed as part of the project activity (fraction)	η_{new}	25.88%	25.62%	Percentage	Calculated, As per para 37 of AMS II G, option (a)
Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass	$f_{NRB,y}$	86.10%	86.10%	Percentage	The value is calculated as per the tool referred in AMS-II.G version 11.1 which is duly approved by Ministry of Forest and Environment, Nepal.
Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)	$NCV_{biomass}$	0.0156	0.0156	TJ/tonne	approved methodology AMS II.G/v11.1
Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO ₂ /TJ	$EF_{projected_fossilfuel}$	64.40	64.40	tCO ₂ /TJ	approved methodology AMS II.G/v11.1
Quantity of woody biomass that is saved in tonnes	By,savings	2.33	2.32	Tonnes/year	Calculated
Number of Improved Cooking stoves operational during year y	$N_{i,y}$	100.00%	100.00%	Percentage	Monitoring survey
Adjustment to account for any continued use of pre-project devices during year "y"	μ_y	0.903	0.900	Fraction	Monitoring survey
Net to gross adjustment factor	LEy	0.95	0.95	Fraction	approved methodology AMS II.G/v11.1
Baseline Emissions per ICS		1.73	1.71	tCO ₂	Calculated
Number of ICS disseminated	N	9560	2597	nos	Assumed based on threshold limit
Total Emission reduction	ER	16538	4449	tCO ₂	Calculated

Total Emission Reduction	ER	20987	tCO2
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MP03 - Batch 2		ICS commissioned in batch 2			days fraction
Monitoring period start		1-Nov-21	HPNJE-01ND	2855	1
Monitoring period end		31-Oct-22	Greenway Jumbo	280	1
		Stove Model			
		HPN JE-01 ND	Greenway Jumbo		
Parameter	Data ID	Value	Value	Units	Source
Quantity of woody biomass used in the absence of the project activity	B_{old}	3.80	3.80	Tonnes/year	Baseline survey
Efficiency of the system being replaced	η_{old}	10%	10%	Percentage	approved methodology AMS II.G/v11.1
Efficiency of the system being deployed as part of the project activity (fraction)	η_{new}	25.88%	25.62%	Percentage	Calculated, As per para 37 of AMS II G, option (a)
Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass	$f_{NRB,y}$	86.10%	86.10%	Percentage	The value is calculated as per the tool referred in AMS-II.G version 11.1 which is duly approved by Ministry of Forest and Environment, Nepal.
Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne)	$NCV_{biomass}$	0.0156	0.0156	TJ/tonne	approved methodology AMS II.G/v11.1
Emission factor for the substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 tCO ₂ /TJ	$EF_{projected_fossilfuel}$	64.40	64.40	tCO ₂ /TJ	approved methodology AMS II.G/v11.1
Quantity of woody biomass that is saved in tonnes	$B_{y,savings}$	2.33	2.32	Tonnes/year	Calculated
Number of Improved Cooking stoves operational during year y	$N_{i,y}$	100.00%	100.00%	Percentage	Monitoring survey
Adjustment to account for any continued use of pre-project devices during year "y"	μ_y	0.903	0.900	Fraction	Monitoring survey
Net to gross adjustment factor	LE_y	0.95	0.95	Fraction	approved methodology AMS II.G/v11.1
Baseline Emissions per ICS		1.73	1.71	tCO ₂	Calculated
Number of ICS disseminated	N	2855.00	280	nos	Assumed based on threshold limit

Total Emission reduction	ER	4938	479	tCO ₂	Calculated
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Total Emission Reduction	ER	5417	tCO₂
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Therefore, baseline emissions for ICS for the MP 03 (01/11/2021 till 31/10/2022) for (HPNJE-01ND & Greenway Jumbo stoves)

= 26,404 tCO₂

Thus, total emission reduction for the period 01/11/2021 till 31/10/2022 is

=26,404 tCO₂

5.2 Project Emissions

As per the applied methodology AMS II G version 11.1, there are no project emission accounted.

Thus, project emission is zero (0).

5.3 Leakage

As per the applied methodology AMS II G version 11.1, Bold is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, so no separate leakage is to be reported and thus, its value is zero. Thus, leakage emission is zero (0).

5.4 Net GHG Emission Reductions and Removals

In line with the applied methodology and PDD, Project emission & Leakage emission are 0. Therefore, the emission reductions from the project for the MP 03 01/11/2021 to 31/10/2022 are:

= Baseline emission – Project emission - Leakage emission

=26404 – 0 – 0

=26404 tCO₂/y

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/11/2021 to 31/12/2021	4413	0	0	4413

01/01/2022 to 31/10/2022	21991	0	0	21991
Total	26404	0	0	26404

For AFOLU projects, use the following table: Not applicable as this is not an AFOLU project

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)	Buffer pool allocation	VCUs eligible for issuance
Year A	N/A	N/A	N/A	N/A	N/A	N/A
Year...	N/A	N/A	N/A	N/A	N/A	N/A
Total	N/A	N/A	N/A	N/A	N/A	N/A

<u>Ex-ante emissions reductions /removals</u>	<u>Achieved emissions reductions /removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
31,983	26,404	17.443%	The difference between achieved and estimated credits is there because of decrease in efficiency as well as usage rate of cookstoves