



DISTRIBUTION OF IMPROVED COOK STOVE - PHASE 22



Document Prepared by EKI Energy Services Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity (usage of improved cook stoves) has been deployed to facilitate clean cooking practice and reduce health risk due to indoor air pollution¹ along with reduction of drudgery amongst the tribal households (Schedule Tribe) and families living below the poverty level (BPL category²) across Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts which lies in Aurangabad, Amravati and Nagpur Divisions of Maharashtra. The usage of improved cook stoves through replacement of inefficient traditional cook stove contributes towards reduction of greenhouse gas emission, reduction of by-products of incomplete combustion like black carbon and conservation of fuel wood resulting in prevention of forest degradation. The higher efficient portable, single pot improved cook stoves distributed under the project activity has changed the prevailing practice of usage of traditional cook stoves across selected households in rural areas of Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts of Maharashtra who are provisioned with improved cookstoves under the project activity.

It is worthwhile to note that firewood and wood chips contributes as major cooking fuel amongst rural households in India. According to the NSSO³ 61st round survey, a considerable percentage of rural population of Maharashtra relies upon fire wood for cooking and the percentage is substantially much higher amongst the lower MPCE (Monthly Per Capita Expenditure) group. Since, the beneficiary selected under the project belongs to BPL and ST category of population in terms of capacity of expenditure therefore; improved cook stove use results in substantial fuel wood saving as this section is the major consumer of fuel wood.

The improved cook stoves distributed under the project activity are more efficient with thermal efficiency of 29.88%⁴ as compared to traditional stoves with thermal efficiency of around 10%⁵. Owing to higher efficiency, use of efficient improved cook stove results in reduced consumption of non-renewable biomass in compared to baseline by minimizing thermal energy losses and facilitating complete combustion. Reduced consumption/combustion of non-renewable biomass results in reduction of GHG emission.

¹ Household Cook stoves, Environment, Health and Climate Change – World Bank (Executive summary, page 9-11)

² As per the article in The Hindu (<http://www.thehindu.com/news/national/article3013870.ece>) dated March 20, 2012 anyone with daily consumption expenditure below Rs. 22.42 is categorised under BPL. The article depicts of 24.5% of the total population in Maharashtra under BPL in 2009-10.

³National Sample Survey Office

⁴ Thermal Efficiency Test Report of Improved Cook stove tested at Biomass Cook stove Testing Centre, Dept. of Renewable Energy Sources, Udaipur

⁵ Paragraph 6 (Option 2) of approved applicable methodology AMS –II.G., Version 04

Technology Employed

The cook stove deployed under the project activity⁶ is single pot, portable, metallic, improved biomass cook stoves⁷ made of cast iron for combustion of solid biomass. The improved cook stoves are manufactured in accordance to IS 13152, Part-1: 1991, CPRI Design Type I⁸ standard. The design ensures complete combustion of biomass. The cook stove is tested for thermal efficiency (29.88%) as per water boiling test protocol specified in IS 13152, Part 1: 1991.

Measures undertaken

The Rural Development and Water Conservation (RDWC) Department, Government of Maharashtra is involved in promoting betterment of living standard for the tribal household (ST) and families living Below Poverty Line (BPL) in villages of Maharashtra. The department as a part of its aforesaid programme selects households from amongst the ST and BPL category depending upon level of vulnerability (assessed on basis of 13 parameters: Category and size of usable land, Type of house, Availability of regular usable clothes, Protection of food or food security, Cleanliness, Ownership of required goods, Heights /Level of literacy, Family working capacity, Source of livelihood goods, Number of children in age group (5 to 14), Type of bankruptcy, reason for staying away from family of Earning member, Choice of help /Yojana)⁹ and provide financial assistance to facilitate better and hygienic living standard. The household selected for financial assistance under the programme is provided with an improved cook stove system. The household considered as end users of cook stoves under the project activity are poor enough to afford for procurement of improved cook stoves and are also least interested towards similar investment as wood is available for free. So, in absence of the improved cook stove disseminated under the project activity the household would have continued with use of traditional cook stoves. Since, the project activity is conceived under the program of Govt. of Maharashtra which provides cook stove only to BPL and ST category household so; there is no chance of cook stove to be distributed to non-baseline household. The identification of beneficiaries and distribution of cook stoves comes under the preview of the Rural Development and Water Conservation Department.

The project activity includes dissemination of 14,200 Nos. improved cook stoves¹⁰ amongst Below Poverty Line (BPL) and Scheduled Tribes (ST) households in rural areas of Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts which lies in Aurangabad, Amravati and Nagpur Divisions of Maharashtra upon signing of the end user Tripartite Agreement¹¹. The project through conservation of non-renewable biomass was estimated to result in an greenhouse gas emission reduction of 12,766 tCO₂e annually (ex-ante). The revenue from carbon financing was conceived in deciding upon the capital cost as well as to meet up the cost towards imparting awareness

6 Manufactured by Vikram Stoves and Fabricators (Ministry of New and Renewable Energy) approved manufacturer and distributor of improved cook stoves) selected by RDWC Department, Government of Maharashtra for distribution of improved cook stoves amongst identified beneficiaries.

7 MNRE accredited system -<http://mnre.gov.in/schemes/decentralized-systems/national-biomass-cookstoves-initiative/>

8 The design of the cook stove is certified by Bureau of Indian Standards relating to its appropriateness to, IS 13152 (Part1).

9 Criteria issued by Department of rural Development, Government of Maharashtra

10 Each of the cook stoves is included for the purpose of emission reduction calculation from the day on which it is distributed to the beneficiary and the end user agreement is signed.

11 Tripartite Agreement is for transfer the emission reduction right to the Project Participant by each beneficiaries/end users and is signed amongst end user, GKEMPL and Vikram Stoves. The tripartite agreement authorizes M/s G K Energy Marketers Pvt. Ltd (hereafter referred to as GKEMPL) by Vikram Stoves (manufacturer of improved cook stoves) and the end users for securing of carbon finance

and training, periodic maintenance¹² and post lifetime replacement within the crediting period.

The amount of emission reductions achieved for the current monitoring period is 60,865 tCO₂e.

The start date of the project activity is 08-October-2012. Since the project activity of improved cook stove usage by the end user does not require any construction or significant pre-project implementation, nor financial commitment on the part of end user therefore the real action pertaining to the earliest date of distribution of improved cook stoves under the project activity is considered as the start date as per project start date definition of section 3.7 of the VCS Standard V.4.1.

1.2 Sectoral Scope and Project Type

- Sectoral Scope: 3- Energy demand
- Project Type: Type II.G.

The project activity fulfills the applicability criteria of small- scale project activity, Type II – Energy Efficiency Improvement Projects, Category G –‘Energy efficiency measures in thermal applications of non-renewable biomass’ of the ‘Indicative Simplified Baseline and Monitoring Methodologies for Selected Small-scale Project Activity Categories’.

This is non-AFLOU type of project

1.3 Project Proponent

Organization name	M/s G K Energy Marketers Pvt. Ltd
Contact person	Mr. Gopal Kabra
Title	Authorized Signatory
Address	Lokmanya Nagar, LBS Road, Flat No.- 350, Building No.- 25,Ground Floor, Pune, Maharashtra – 411030 India
Telephone	+91-997045
Email	gopal@energymarketers.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Pankaj Rajpoot
Title	Assistant Manager- Operations
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India

¹² “The Indian stove programme: an insider's view – the role of society, politics, economics and education” by Bhaskar Sinha, National Institute of Science, Technology & Development Studies (NISTADS), CSIR, New Delhi outlines that the woman are least interested for maintenance as they do not perceive the usefulness of the stove and revert back to traditional practice when the cook stove becomes non-functional therefore timely operation and maintenance are vital.

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1.5 Project Start Date

The start date of the project activity is 08-October-2012.

The project activity relating to improved cook stove usage by the end user does not require any construction or significant pre-project implementation, nor financial commitment on the part of end user. The real action pertaining to the earliest date of handover of improved cook stoves to beneficiary (also considered as date of onset of GHG emission reductions) under the project activity is considered as the start date as per project start date definition under paragraph 3.7 of the VCS Standard.

The date of supply/ receipt of first lot of improved cookstoves from manufacturer to the regional office of the line department was considered as start date under the CDM registered PDD (evidenced through acknowledgement of the delivery receipt of the line department) as per CDM definition of Start Date. The start date referred to in the registered CDM-PDD was mirrored in the VCS PD(listed). Since the date does not resembles to handover of the cookstoves to beneficiary and does not result in onset of actual emission reduction therefore the same was not considered as start date under VCS mechanism and therefore revised with date of distribution/ handover of improved cookstoves to beneficiary.

1.6 Project Crediting Period

The crediting period of the project activity is for 10 years (Fixed).

The length of the first crediting period is 08-October-2012 to 07-October-2022 (both dates inclusive).

The improved cookstoves distributions were carried out between 08-October-2012 to 17-December- 2012 amongst 14,200 beneficiaries.

As per errata and clarification, a project is deemed to have met the timelines where Verra confirmed (in writing, to the project proponent or an authorized representative) the project's eligibility on or before 4-February-2021. The listing process has been completed before 04-February-2021 and hence the errata and clarifications are not applicable

1.7 Project Location

The project is located in state Maharashtra, India.

Division: Aurangabad,

Districts: Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur

Division: Amravati and

Districts: Buldhana, Akola, Washim, Amravati, Yavatmal, Division: Nagpur

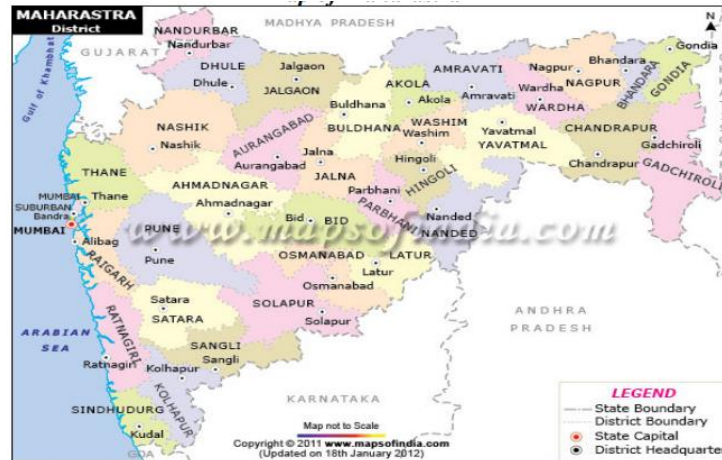
Districts: Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia

Division	District	Latitude	Longitude
Aurangabad	Aurangabad	19.00 – 20.00 °N	74.00 – 76.00 °E
	Jalna	19.10 - 21.30 °N	75.40 - 76.40 °E
	Parbhani	18.45 - 20.10 °N	76.13 - 77.39 °E
	Hingoli	19.43 °N	77.11 °E
	Beed	18.30 - 19.30 °N	74.50 - 76.60 °E
	Nanded	18.25 - 19.91 °N	77.00 - 78.41 °E
	Osmanabad	17.35 - 18.40 °N	75.16 - 76.40 °E
	Latur ²⁸	17.75 - 18.75 °N	76.25 - 77.25 °E
Amravati	Buldhana ²⁹	19.85 - 21.28 °N	75.95 - 76.81 °E
	Akola ³⁰	19.85 - 21.26 °N	76.63 - 77.73 °E
	Washim ³¹	19.61 - 21.16 °N	76.70 - 77.40 °E
	Amravati	20.53 - 21.76 °N	76.61 - 78.45 °E
	Yavatmal	19.26 - 20.42 °N	77.18 - 79.98 °E
Nagpur	Wardha	20.30 - 21.35 °N	78.06 - 79.25 °E
	Nagpur	20.35 - 21.44 °N	75.15 - 79.40 °E
	Bhandara	20.65 - 21.63 °N	79.45 - 80.70 °E
	Chandrapur	18.40 - 20.50 °N	78.50 - 80.60 °E
	Gadchiroli	18.43 - 21.50 °N	79.45 - 80.53 °E
	Gondia	20.39 - 21.38 °N	79.27 - 80.42 °E

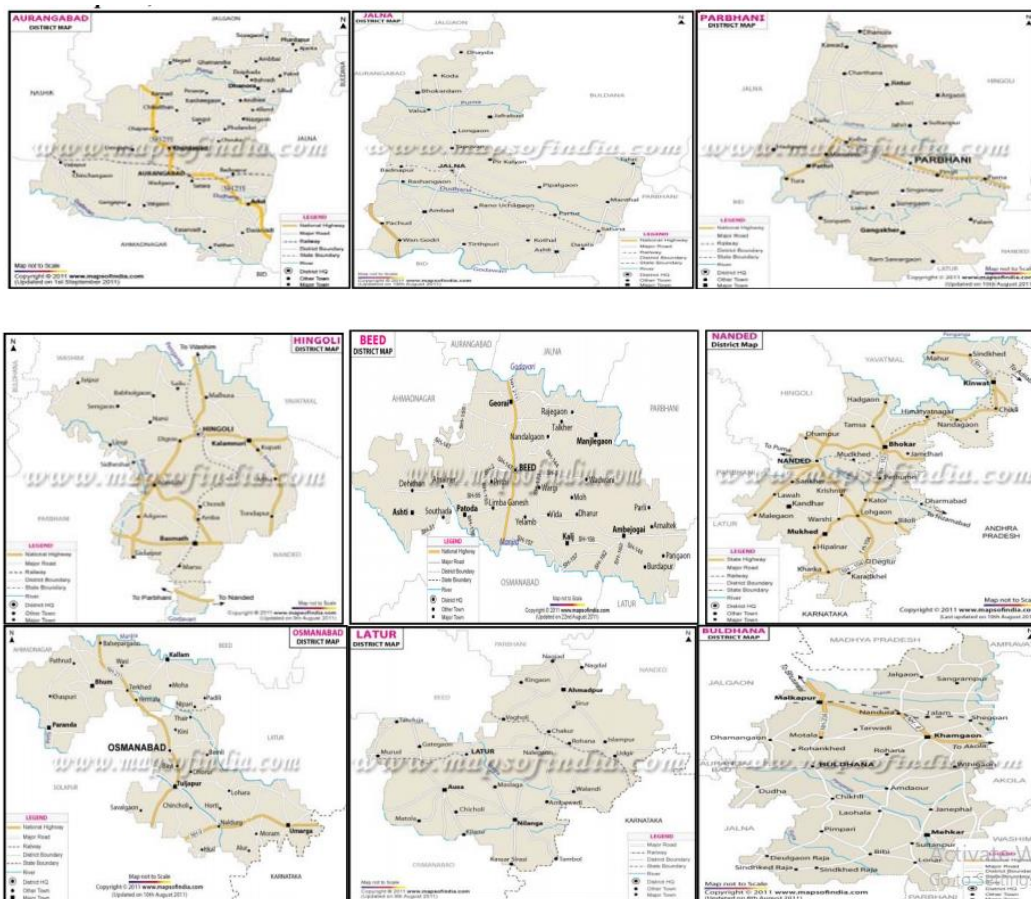
Map of India

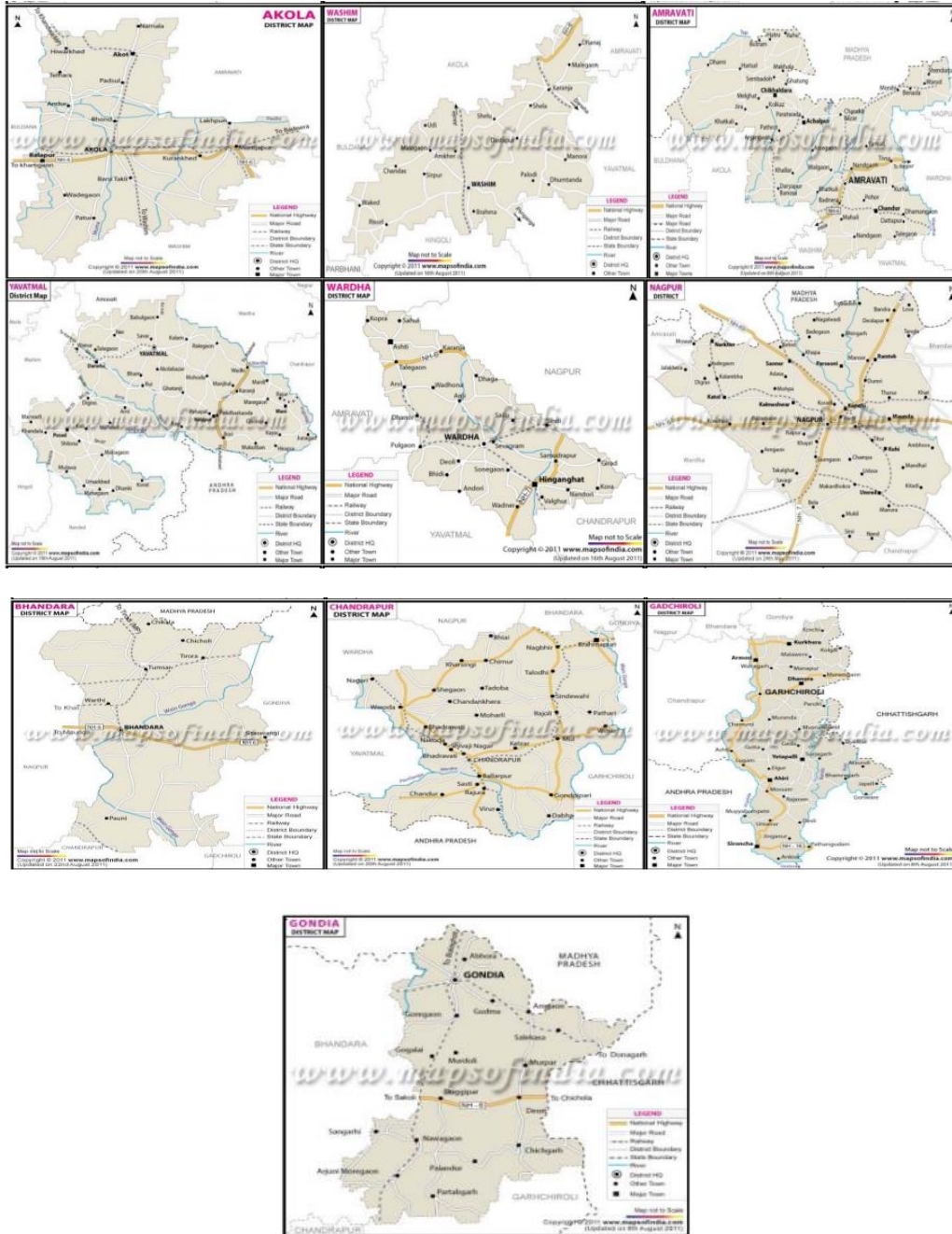


Map of Maharashtra



Map of Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana , Akola , Washim , Amravati , Yavatmal , Wardha , Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia





Aurangabad			Jalna		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Kachner	Aurangabad	1	Wadiwadi	Jalna
2	Kachner Tanda	Aurangabad	2	Waghrul	Jalna
3	Kadrabad	Aurangabad	3	Wakhari	Jalna
4	Kankora	Aurangabad	4	Wanadgaon	Jalna
5	Karajgaon	Aurangabad	5	Wanjar Umrad	Jalna

Aurangabad			Jalna		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
6	Karhol	Aurangabad	6	Warkheda	Jalna
7	Karmad	Aurangabad	7	Warkheda	Jalna
8	Karodi	Aurangabad	8	Warud	Jalna
9	Kesapuri	Aurangabad	9	Wazar	Jalna
10	Kesapuri Tanda	Aurangabad	10	Talegaon	Bhokardan
11	Khamkheda	Aurangabad	11	Talni	Bhokardan
12	Khodegaon	Aurangabad	12	Tandulwadi	Bhokardan
13	Kodgaon Ambad	Aurangabad	13	Tapovan	Bhokardan
14	Kodgaon Jalna	Aurangabad	14	Thigalkheda	Bhokardan
15	Kolghar	Aurangabad	15	Umarkheda	Bhokardan
16	Kolthan	Aurangabad	16	Vazirkheda	Bhokardan
17	Konewadi	Aurangabad	17	Viregaon	Bhokardan
18	Krishnapurwadi	Aurangabad	18	Vizora	Bhokardan
19	Kubhephal	Aurangabad	19	Wadhod tangda	Bhokardan
			20	Wadhona	Bhokardan
			21	Wadi Bk.	Bhokardan
			22	Wadi Kh	Bhokardan
			23	Wadshed	Bhokardan
			24	Wakdi	Bhokardan
			25	Walsa dawargaon	Bhokardan
			26	Walsa wadala	Bhokardan
			27	Walsakhalsa	Bhokardan
			28	Walsawangi	Bhokardan
			29	Warud bk	Bhokardan

Parbhani			Hingoli		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Bhendewadi	Gangakhed	1	Chincholi	Hingoli
2	Borda	Gangakhed	2	Chinchpuri	Hingoli
3	Bothi	Gangakhed	3	Chorjawala	Hingoli
4	Bothi Tanda	Gangakhed	4	Dategaon	Hingoli
5	Brahmanathwadi	Gangakhed	5	Deulgaon Rama	Hingoli
6	Chilgarwadi	Gangakhed	6	Devthana	Hingoli
7	Chinchtakli	Gangakhed	7	Dhanapur	Hingoli
8	Dagadwadi	Gangakhed	8	Dhotarwadi	Hingoli
9	Dampuri	Gangakhed	9	Dhotra	Hingoli
10	Devkatwadi	Gangakhed	10	Digras K.	Hingoli
11	Dhangar Moha	Gangakhed	11	Digraswani	Hingoli
12	Dharasur	Gangakhed	12	Durgasawangi	Hingoli
13	Dharkhed	Gangakhed	13	Durgdhamni	Hingoli
14	Dhavlkewadi	Gangakhed	14	Ekamba	Hingoli
15	Dhebewadi	Gangakhed	15	Gadibori	Hingoli

Parbhani			Hingoli		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
16	Dongargaon Shelgaon	Gangakhed	16	Ghota	Hingoli
			17	Giroli	Hingoli
			18	Hanwatkhed	Hingoli
			19	Hingni	Hingoli
			20	Hiradi	Hingoli
			21	Hiwara Bel	Hingoli
			22	Idoli	Hingoli
			23	Incha	Hingoli
			24	Isapur	Hingoli
			25	Jaipurwadi	Hingoli
			26	Jambharun Andhwadi	Hingoli
			27	Jamrun andh	Hingoli
			28	Jamrun jahagir	Hingoli
			29	Jamthi Kh.	Hingoli
			30	Jamwadi	Hingoli
			31	Jodtala	Hingoli
			32	Kadti	Hingoli
			33	Kalamkonda Bk.	Hingoli
			34	Kalburga	Hingoli
			35	Kalgaon	Hingoli

Beed			Nanded		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Anandwadi	Parli	1	Hipparga	Mukhed
2	Aswalamba	Parli	2	Hiranagar	Mukhed
3	Aurangapur	Parli	3	Hokarna	Mukhed
4	Belamba	Parli	4	Hondala	Mukhed
5	Bhadurwadi	Parli	5	Honwadaj	Mukhed
6	Bhilegaon	Parli	6	Indiranagar	Mukhed
7	Bhopla	Parli	7	Itgyal P.D.	Mukhed
8	Bodhegaon	Parli	8	Itgyal P.Mu.	Mukhed
9	Borkhed	Parli	9	Jahur	Mukhed
10	Bramhawadi	Parli	10	Jamb Bk.	Mukhed
11	Chandapur	Parli	11	Jamb Kh.	Mukhed
12	Dabi	Parli	12	Jambhali	Mukhed
13	Dabi Tanda	Parli	13	Jirga	Mukhed
14	Dagadwadi	Parli	14	Junna	Mukhed
15	Daithana Ghat	Parli	15	Kabnur	Mukhed
16	Darawati Tanda	Parli	16	Kalambar	Mukhed
17	Daunapur	Parli	17	Kamjalga	Mukhed
18	Dautpur	Parli	18	Kamlewadi	Mukhed

Beed			Nanded		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
19	Halamb	Parli	19	Kaparwadi	Mukhed
20	Dharmapuri	Parli	20	Karna	Mukhed
21	Digras	Parli	21	Kerur	Mukhed
22	Doundwadi	Parli	22	Khairka	Mukhed
23	Gardewadi	Parli	23	Khapral	Mukhed
24	Gopalpur	Parli	24	Kharab Khandgaon	Mukhed
25	Govardhan	Parli			

Osmanabad			Latur		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Gopalwadi	Osmanabad	1	Kanadi Borgaon	Latur
2	Gorewadi	Osmanabad	2	Karkatta	Latur
3	Govardhanwadi	Osmanabad	3	Karsa	Latur
4	Hinglajwadi	Osmanabad	4	Kasar Jawala	Latur
5	Irla	Osmanabad	5	Kasargaon	Latur
6	Jagji	Osmanabad	6	Kasarkheda	Latur
7	Jahagirdarwadi	Osmanabad	7	Katgaon	Latur
8	Jawale Dumala	Osmanabad	8	Katpur	Latur
9	Junoni	Osmanabad	9	Kavha	Latur
10	Kajala	Osmanabad	10	Khadgaon	Latur
11	Kakaspur	Osmanabad	11	Khandala	Latur
12	Kamegaon	Osmanabad	12	Khandapur	Latur
13	Kanagara	Osmanabad	13	Khopegaon	Latur
14	Karajkheda	Osmanabad	14	Khulgapur	Latur
15	Kaudgaon	Osmanabad	15	Khuntephal	Latur
			16	Kolpa	Latur

Buldhana			Akola		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Borgaonwasu	Chikhli	1	Kasod Shivpur	Akot
2	Bramhapuri	Chikhli	2	Katkhed	Akot
3	Chandanpur	Chikhli	3	Kautha Bk.	Akot
4	Chandhai	Chikhli	4	Kavtha Kh.	Akot
5	Chandhai Pr.chikhali	Chikhli	5	Kawasa Bk.	Akot
6	Chikhali	Chikhli	6	Kawasa Kh	Akot
7	Dahigaon	Chikhli	7	Keliweli	Akot
8	Dasala	Chikhli	8	Khairkhed	Akot
9	Deulgaon Dhangar	Chikhli	9	Khaparwadi Bk.	Akot
10	Dewadari	Chikhli	10	Khaparwadi Kh.	Akot
11	Dhanori	Chikhli	11	Kherda	Akot

Buldhana			Akola		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
12	Dhodap	Chikhli	12	Khirkund Bk.	Akot
13	Dhotra Bhangoji	Chikhli	13	Khirkund Kh.	Akot
14	Dhotra Naik	Chikhli	14	Kinkhed	Akot
15	Dhuma	Chikhli	15	Koha	Akot
16	Diwathana	Chikhli	16	Kolwihir	Akot
17	Dongar Shewali	Chikhli	17	Kund	Akot
18	Dongargaon	Chikhli	18	Kutasa	Akot
19	Eklara	Chikhli	19	Ladegaon	Akot
20	Gangalgaon	Chikhli	20	Lamkani	Akot
21	Ghanmod	Chikhli	21	Lohari Bk.	Akot
22	Girola	Chikhli	22	Lohari Kh.	Akot
23	Godri	Chikhli	23	Lotkhed	Akot

Washim			Amravati		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Agarwadi	Risod	1	Gondwagholi	Achalpur
2	Anchal	Risod	2	Hanawatkheda	Achalpur
3	Asegaon Pen	Risod	3	Haram	Achalpur
4	Asola	Risod	4	Hiwara	Achalpur
5	Balkhed	Risod	5	Isapur	Achalpur
6	Belkheda	Risod	6	Isegaon	Achalpur
7	Bhapur	Risod	7	Jalapur	Achalpur
8	Bhar Jahagir	Risod	8	Jambhala	Achalpur
9	Bhokarkhed	Risod	9	Janori	Achalpur
10	Bibkhed	Risod	10	Januna	Achalpur
11	Borkhedi	Risod	11	Jawalapur	Achalpur
12	Chakoli	Risod	12	Jawardi	Achalpur
13	Chichamba Pen	Risod	13	Kakda	Achalpur
14	ChichambaBhar	Risod	14	Kalwit	Achalpur
15	Chikhali	Risod	15	Kandali	Achalpur
16	Dapuri Kh	Risod	16	Kasampur	Achalpur
			17	Kawitha Bk.	Achalpur

Yavatmal			Wardha		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Pimpalapur	Ralegaon	1	Chichala	Deoli
2	Pimpalgaon	Ralegaon	2	Chikhali	Deoli
3	Pimpalkhuti	Ralegaon	3	Chitaki	Deoli
4	Pimpri	Ralegaon	4	Chondhi	Deoli
5	Pimpri Durg	Ralegaon	5	Dahegaon	Deoli

Yavatmal			Wardha		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
6	Ralegaon	Ralegaon	6	Dapori	Deoli
7	Ramtirth	Ralegaon	7	Giroli	Deoli
8	Ranod	Ralegaon	8	Gunjkhedha	Deoli
9	Raveri	Ralegaon	9	Hiwara	Deoli
10	Ridhora	Ralegaon	10	Kavtha	Deoli
11	Rohini	Ralegaon	11	Kavtha	Deoli
12	Sakhi-Kh	Ralegaon	12	Kharda	Deoli
13	Sangam	Ralegaon	13	Khatkheda	Deoli
14	Sarai	Ralegaon	14	Kolhapur	Deoli
15	Sarati	Ralegaon	15	Kolhapur	Deoli
16	Savitri	Ralegaon	16	Kolona	Deoli
17	Sawangi	Ralegaon	17	Kolona	Deoli
18	Sawarkhed	Ralegaon			
19	Sawner	Ralegaon			
20	Sheli	Ralegaon			
21	Shrirampur	Ralegaon			

Nagpur			Bhandara		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Kondhali	Katol	1	Kharbi	Bhandara
2	Kondhasaoli	Katol	2	Khokurala	Bhandara
3	Kotwalbardi	Katol	3	Koka	Bhandara
4	Kundi	Katol	4	Koknagad	Bhandara
5	Ladgaon	Katol	5	Kondhi	Bhandara
6	Lakholi	Katol	6	Korambhi	Bhandara
7	Linga	Katol	7	Kothurna	Bhandara
8	Malegaon	Katol	8	Laweshwar	Bhandara
9	Masli	Katol	9	Mandwi	Bhandara
10	Masod	Katol	10	Manegaon	Bhandara
11	Mendhepathar	Katol	11	Mohadura	Bhandara
12	Mendhepathar	Katol	12	Mujabi	Bhandara
13	Mendki	Katol	13	Nandora	Bhandara
14	Metpanjara	Katol	14	Navegaon	Bhandara
15	Mhasala	Katol	15	Nawargaon	Bhandara
16	Mhaskhapra	Katol	16	Pahela	Bhandara
17	Miniwada	Katol	17	Paladi	Bhandara
18	Ridhora	Katol	18	Palgaon	Bhandara
19	Ringanabodi	Katol	19	Pandrabodi	Bhandara
			20	Parsodi	Bhandara

Chandrapur			Gadchiroli		
Sr.	Name of the Village	Taluka	Sr.	Name of the Village	Taluka
1	Motegaon	Chimur	1	Adapalli	Gadchiroli
2	Murpar Tukum	Chimur	2	Ambeshivani	Gadchiroli
3	Nandara	Chimur	3	Ambetola	Gadchiroli
4	Navatala	Chimur	4	Amirza	Gadchiroli
5	Navegaon Brahman	Chimur	5	Bamhani	Gadchiroli
6	Navegaon Peth	Chimur	6	Belgaon	Gadchiroli
7	Neri	Chimur	7	Benoli	Gadchiroli
8	Pachgaon	Chimur	8	Bhagwanpur	Gadchiroli
9	Palasgaon	Chimur	9	Bhikar Maushi	Gadchiroli
10	Pethbhansuli	Chimur	10	Bodali Tukum	Gadchiroli
11	Pimpalgaon	Chimur	11	Chambharda	Gadchiroli
12	Pimpalneri	Chimur	12	Chandala	Gadchiroli
13	Piparda	Chimur	13	Dhunde Shivni	Gadchiroli
14	Pitichua	Chimur	14	Dibhana Mal	Gadchiroli
15	Puyardand	Chimur	15	Dongargaon Bk	Gadchiroli
16	Ramdegi	Chimur	16	Gilgaon	Gadchiroli
17	Rampur R	Chimur	17	Gogaon	Gadchiroli
18	Rengabodi R	Chimur	18	Govindpur	Gadchiroli
19	Saradpar	Chimur	19	Gurwada	Gadchiroli
20	Satara	Chimur	20	Hirapur	Gadchiroli
21	Sathgaon	Chimur	21	Indala	Gadchiroli
22	Sawargaon	Chimur			
23	Sawari	Chimur			
24	Sawarla	Chimur			
25	Shankarpur	Chimur			
26	Shedegaon	Chimur			
27	Shirpur	Chimur			

Gondia		
Sr.	Name of the Village	Taluka
1	Katang Tola	Gondiya
2	Kati	Gondiya
3	Khalbanda	Gondiya
4	Khatiya	Gondiya
5	Kidangipar	Gondiya
6	Kinhi	Gondiya
7	Kochewahi	Gondiya
8	Kohka	Gondiya
9	Korani	Gondiya
10	Lahitola	Gondiya
11	Lamba Tola	Gondiya

Gondia		
Sr.	Name of the Village	Taluka
12	Lodhi Tola	Gondiya
13	Lodhi Tola	Gondiya
14	Lodhi Tola	Gondiya
15	Lodhitola	Gondiya
16	Lohara	Gondiya
17	Mahalgaon	Gondiya
18	Majitpur	Gondiya
19	Makadi	Gondiya
20	Marartola	Gondiya
21	Marartola	Gondiya
22	Mogarra	Gondiya
23	Morwahi	Gondiya
24	Mundipar	Gondiya
25	Mundipar	Gondiya
26	Murdada	Gondiya
27	Murpar	Gondiya
28	Nagara	Gondiya

1.8 Title and Reference of Methodology

Consolidated baseline methodology for “Energy efficiency measures in thermal applications of non-renewable biomass”; AMS II-G, Version 04.0.0 Sectoral Scope: 03, EB 68.

1.9 Participation under other GHG Programs

Project has been registered with UNFCCC under Clean Development Mechanism program with Registration reference number 9443 through the web link:

<https://cdm.unfccc.int/Projects/DB/RWTUV1356887276.2/view>

The Project is not rejected by any other GHG programs.

1.10 Other Forms of Credit

India is non-annex1 country and there is no compliance with an emission trading program or to meet binding limits on GHG emissions for this project activity. The project is registered under CDM with registration ID 9443. Project Proponent has submitted undertaking that they will not claim same GHG emission reductions of the project from CDM and VCS. Project Proponent would not use net GHG emission reductions by the projects for compliance with emission trading program to meet binding limits on GHG emissions. Project Proponent has also submitted an undertaking stating that they will not take REC benefits for the same Emission Reductions. Project Proponent has submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration. Project Participant is not taking REC benefits for the same emission reductions.

1.11 Sustainable Development

The project contribution towards sustainable development is established in line with the sustainable development indicator framed by the host country DNA:

Social benefits:

1. Reduces drudgery of women and children of rural areas (due to reduced fuel wood use) by reducing time spent and distance travelled for fuel wood collection. Reduction in firewood requirement helps in spending more time in productive activities such as education, employment etc.
2. Improves overall health (particularly diseases related to respiratory system) of women and children by reducing smoke in the kitchen.

Environmental benefits:

1. Improves the local environment by reducing rate of forest degradation /deforestation in the project area. Conservation of forest is not only reduce non-renewable biomass demand and also reduce soil erosion and loss of biodiversity as a consequence of deforestation.
2. Reduces emission of black carbon to the atmosphere.
3. Reduces Green-house gas emissions.

Economic benefits:

1. Employment opportunities for local communities involved in monitoring, training of users, undertaking periodic maintenance and post life time replacement.
2. Reduces the expenditure involved in the pre project scenario for purchase of fuel wood.

Technological benefits:

1. Introduction of new technology to the rural communities.
2. Knowledge transfer to trainers including technicians for pertaining training to users, maintenance of system.
3. Demonstration of a successful project at household level creates replication potential in other states and countries.

In view of the above, the project proponent considers that, the project activity profoundly contributes towards sustainable development of the region as well as of the nation.

2 SAFEGUARDS

2.1 No Net Harm

According to the Ministry of Environment and Forests (MoEF), Government of India, under the Environment Impact Assessment Notification vide S .O.1533(E), dated 14-September-2006; the project activity of utilization of Improved Cook stove for cooking in rural households does not require environmental impact assessment study to be carried out.

2.2 Local Stakeholder Consultation

The project proponent has opted to develop CDM project for distribution of cook stoves in and across the different location in the state across different time frame. Based on the number of cook stoves aimed to be distributed under the planned program 30 phases are planned. Since the household to be covered in each phase are homogeneous owing to the household being identified by the Rural Development Department, Government of Maharashtra based on the level of poverty judged on the basis of the thirteen point criteria figured out by the Ministry and the total budgetary provision across the year. Because of the limited budgetary provision across a financial year a fixed number of populations can only be covered amongst the group leaving the others to be covered in subsequent time frame. Because of the similar category of population, the project proponent decided to carry out the stake holder's consultation for all the planned phases in a single go, so that the people from different geographical locations could able to respond to such meeting. The location for the consultation program is so selected that the particular location of the consultation represents the particular division or region of Maharashtra under whose jurisdiction several districts come into. As such the locations for the consultation program are selected and newspaper advertisements are published both in English and regional daily about the program so that the peoples from the particular region can attend the consultation program which they feel nearby. Local stakeholders' meetings were conducted to take public comments. Six stakeholder meetings were conducted at Nasik, Pune, Nagpur, Latur, Sangli and Washim districts of Maharashtra. The details of meetings are –

Date of Meeting	District	Meeting Venue
2nd February 2012	Nasik	Siamam Indrayani Housing Society, Takli Rd, Nasik – 06
2nd February 2012	Pune	G K Energy Marketers Pvt Ltd. Lokmanya Nagar, LBS Rd, Pune
2nd February 2012	Nagpur	246 KumbharPura, Jagnath Rd Gandhi Bag, Nagpur
2nd February 2012	Latur	Sut Mil Rd, Pushkar Residency, Latur
3rd February 2012	Sangli	Khan Bag, Jai Bhavani Chowk, Sangli
3rd February 2012	Washim	Dr. Jirvankar Bhar Jahangir Resod, Washim

Along with public notices published in newspapers namely The Free Press Journal, Mumbai and Navshakti, Mumbai on 26th January 2012, notification of the meetings was sent through invitations, letters and personally to various categories of stakeholders to attend the stakeholder meeting. The meeting was conducted in regional language –Marathi and English. The discussion points of the meeting included purpose of the consultation, background and role of bundling agency and manufacturer under this project, description of the project, demonstration of improved cook stove, about climate change and CDM, impact of climate change, global environment scenario, contribution of the project towards sustainable development of the country by the representative from bundling agency and Improved Cook stove manufacturer. After a detailed elaborative discussion on the project, the stakeholders were asked to provide their comments /feedbacks /suggestions on the project.

The cook stoves in this project activity (twenty second Phase) are distributed in Aurangabad, Jalna, Parbhani, Hingoli, Beed, Nanded, Osmanabad, Latur, Buldhana, Akola, Washim, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli and Gondia districts of Maharashtra which lies in the Aurangabad, Amravati and Nagpur division jurisdiction. The stakeholders consultation conducted on 2nd and 3rd February 2012 at Nagpur, Latur and Washim district in Aurangabad, Amravati and Nagpur covered this project location and the consultation was also conducted before webhosting of the PDD. The meetings were attended by members from various backgrounds as listed below –

Participant of Nagpur meeting –

Sl. No.	Name of Person	Designation
1	Gopal R Kabra	CEO, GKEMPL

2	Raju Babasaheb Kadam	Farmer
3	Sopan Sham Kale	Student
4	Jitesh Gawale	Working professional
5	Kartik Kumar	Student
6	Imran Munjaver	Businessman
7	Makrand Mane	Working professional
8	Rahul Awtade	Businessman
9	Raju Namdev Pagar	Working professional
10	Sanjay Shinde	Businessman

Participant of Latur meeting –

Sl. No.	Name of Person	Designation
1	Vikram Kale	Sr. Operator
2	Namdev Kale	Student
3	Ramesh Padval	Farmer
4	Apparao Gonje	Working professional
5	Dinesh Kamble	Farmer
6	Goremama	Working professional
7	Pritesh Choudhury	Working professional
8	Vayjanath Navgire	Working professional
9	Papu Jagdale	Working professional
10	Somnath Lohar	Working professional
11	Shivaji Karad	Working professional
12	Somanath Chandane	Farmer
13	Kondeba Manere	Working professional
14	Rajkumar Shinde Working	Working professional
15	Vishal Pandit	Farmer

Participant of Washim meeting –

Sl. No.	Name of Person	Designation
1	Chandrakant Jaising Bhadre	Farmer
2	Jaganath Kadam	Working professional
3	Anand Bhanudass Pawar	Working professional
4	Appa Navgire	Working professional
5	Gautam Suryavanshi	Working professional
6	Rangarao Suryavanshi	Farmer
7	Dhanjay Suryavanshi	Farmer
8	Bhaskar Bhadre	Farmer
9	Satish Jagtap	Student
10	Ganesh Bhosale	Working professional
11	Sachin Jagdale	Working professional
12	Ashok Ghorpade	Working professional
13	Dhanjay Sanjekar	Working professional

14	Padmakar Meshram	Farmer
15	Vijay Navalkar	Farmer
16	Amol Barkue	Farmer
17	Prakash Subash Jhande	Working professional
18	Shaji Rathod	Working professional
19	Madhular Rathod	Local representative
20	Milind Bondge	Local representative
21	Mustaffa Mukadam Shekh	Local representative
22	Prithviraj Suryavanshi	Marketing Executive, Vikram Stoves

The overall response from the local stakeholders on the project was encouraging and positive. No adverse or negative comments or response received in the meeting. The participants of the meeting had not raised any significant concerns nor seek any clarification related to potential impacts of the project activity or any other issue. The project as a whole gives positive impression towards the issue of sustainable development of the country.

The stakeholder's comments sought during the meeting in following manners –

- The stakeholders were invited to ask any clarification or information on the project activity during the meeting.
- Evaluation form / questionnaire were asked to fill in by the stakeholders interested to give their inputs on the project activity.

The evaluation forms were analyzed for the comments and no negative comments is being found.

The summary of stakeholders comment received during stakeholders meeting of Nagpur, Latur and Washim are summarised as below –

Queries	Reply
• The benefits that, users of Improved Cook stove will receive from the project activity? • Whether the users have to file an application to any office to consider their system under the project activity?	Mr. Kabra of GKEMPL explained that, use of improved cook stoves for household cooking will reduce indoor air pollution, cooking time and also fuel-wood consumption due to higher efficiency. Moreover, the users of improved cook stoves will get free maintenance service and free of cost replacement of the system at the end of its lifetime with new improved cook stove. In reply to the next query, he clarified that, users need not to apply to anywhere to be considered under the project. The representative of GKEMPL will contact to every users for necessary due diligence
Time required for the CDM project development.	Responding to the query Mr. Kabra replied that, time line for CDM project development and registration is around one year but, the revenue inflow will take at least another one year.
Quantum of CER to be generated from each Improved Cook stove system?	Addressing to the query Mr. Kabra, GKEMPL replied that, approximately about 1.10 CER will be generated in every year by use of each Improved Cook stove

Queries	Reply
Tasks to be undertaken by the users of Improved	Addressing to the query Mr. Kale representative of Vikram stoves described the monitoring plan, the parameters to be monitored and

Cook stove for successful receipt of CDM revenue and benefit to be received by them in return.	steps to undertake by the user. Further, he continue with clarification that, Improved cook stove users will get free maintenance service and free of cost replacement of the Improved Cook stove system will be given at the end of lifetime during the crediting period.
How long can the user obtain the CDM benefit	Responding to the query Mr. Vikram Kale representative of Vikram stoves mentioned that, improved cook stove systems considered under the project will receive free of cost maintenance service for 10 years from date of registration.

Queries	Reply
Whether there is any possibility of negative impact to the health of the user or to the local environment?	The representative from Vikram Stoves explained that, there will be no detrimental effect on user's health due to the project activity as it is contributing in pollution reduction. Rather, the project is reducing fire-wood consumption through improved combustion technology and thereby reducing deforestation and green-house gases emission. Apart from this, the project is reducing indoor air pollution by means of smoke reduction.
The benefits that users of Improved Cook stove will receive from the project activity?	Mr. Suryavanshi representative from Vikram Stoves replied that, use of improved cook stoves for household cooking will reduce the indoor air pollution, cooking time and also fuel-wood consumption due to higher efficiency. Moreover, the users of improved cook stoves will get free maintenance service and free of cost replacement of the system at the end of its lifetime.
Clarification whether the plants to be installed in future will get this benefit?	Addressing to the query Mr. Suryavanshi, representative from Vikram Stoves replied that, all the improved cook stoves distributed after a particular date will be considered for carbon credit benefit under these projects. But, the no. of systems to be considered under the projects depends upon the threshold limit as given by the UNFCCC. Therefore, may be all stoves cannot be considered.
How long the user will get this benefit?	Responding to the query Mr. Suryavanshi representative from Vikram Stoves replied that, ICS systems considered under the project will receive free of cost maintenance service for 10 years post registration.

The grievance registers have been placed at each district office for the stakeholders and the end users. There have been no grievances received during the current monitoring period.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The improved cook stove conceived under the project activity is MNRE and BIS (Bureau of Indian Standard) approved state of art and environmentally sound technology. The

improved cook stove is manufactured in accordance to IS13152 (Part 1): 1991 (Solid Biomass – Chulha Part 1(Metallic))¹³. The standard has been prepared in line with the national approach towards fuel conservation, better environment, mitigating health hazards and loss of forest cover caused by burning of wood as cooking fuel and therefore, can be conceived as an environmentally sound technology for combustion of solid biomass for the purpose of cooking. Moreover, the materials used in manufacturing of the cook stove are of iron and steel which is recyclable after end use and hence, considered to be environmentally safe after lifetime also. Although the ICS distributed under the current phase pertains to different batch of manufacturing, but since the products are being manufactured complying to a particular performance standard (IS13152 (Part 1):1991) the quality output for each unit of products complies to a minimum level.

The cook stove distributed under the project activity is a portable, single-pot stove without chimney, natural draft and metal made stove specifically suitable for combustion of solid biomass. The cook stove broadly comprises of a combustion chamber, top plate for holding the utensils, grate for holding fuel during combustion and bottom plate that facilitates ventilation of air. The combustion chamber is cylindrical shaped and made up of mild steel. One side of the chamber of improved cook stove is opened for feeding of fuel. The chamber top plate is die cast and made up of cast iron.

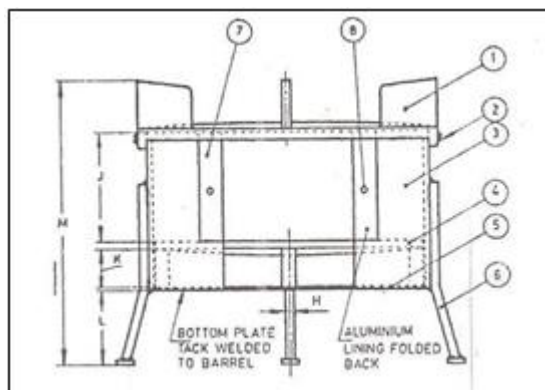
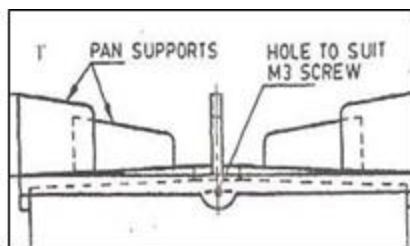


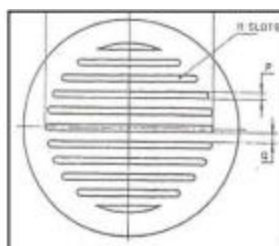
Diagram of Improved Cook Stove

1. Top plate,
2. Screw,
3. Barrel,
4. Grate,
5. Bottom Plate,
6. Legs,
7. Aluminium Lining and
8. Rivet

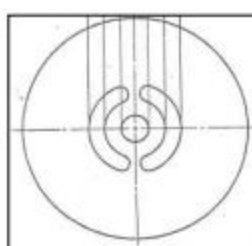
¹³ The Standard has been prepared by Indian Standard body in line with the national approach towards fuel conservation and better environment, mitigating Health hazards and drudgery and loss of forest cover caused by burning of wood as cooking fuel (Forward: Indian Standard Solid Bio-Mass, Chulha – Specification Part 1 Portable (Metallic))



Top Plate



Grate



Bottom Plate



Material used for manufacturing of each component of the cook stoves are:

Component	Material
Top plate	Cast iron
Grate	Cast iron
Barrel	Mild steel
Bottom Plate	Mild steel
Lining	Aluminum
Perforated Sleeve	Mild steel
Handle	Mild steel
Pan Support	Mild steel sheet-flat-rod
Legs	Mild steel sheet and rod

Life time

The operational lifetime of the cook stove is 5 years 00 months. As per manufacturer authorization the operational life of improved cookstoves is over seven years, however beyond five years the operational efficiency drops below the rated efficiency and hence was considered as operational life time in the registered PDD.

Decline in the cook stove efficiency as assessed through periodic efficiency testing is being reported and considered as part of emission reduction calculation.

Replacement of Improved Cookstoves

Replacement of ICS was scheduled to be carried out

(a) in case of breakage/ dismantle of ICS during the operational period – on receipt of complaint the localised service providers of the project proponent visits the beneficiary with

backup cook stoves (ICS) and provides the beneficiary with backup stoves if the service provider fails to address the issues locally. The malfunctioned ICS post collected from beneficiary is thereafter sent to the company workshop in case of possibility of repair. In case the ICS couldn't be repaired beneficiary are to be provided with new ICS.

(b) Observed requirement of complex repair- In case the maintenance team of the project proponent during scheduled O&M observes requirement of complex repairs the team may on discretion replace the existing cookstoves with a new one or a backup one. In such case the beneficiary is provided with backup new ICS the same are to be replaced with the repaired one operating at the desired satisfaction level of beneficiary.

(c) Post assessment of operational efficiency in the last year after the elapse of scheduled lifetime of ICS from the date of distribution.

During the current monitoring period of 5 years there has been no instances of replacement of improved cook stoves, therefore no such impact on emission reduction calculation due to increase of cook stoves efficiency.

Operation and maintenance

Operation and maintenance of Improved cook stoves are carried out periodically by authorised representative of project proponent (manufacturer of improved cook stoves). The authorized representative of the project proponent during the annual (periodic) maintenance, also motivates and persuades the beneficiaries for continuation of ICS usages for cooking of all meals towards reducing the health impact of the family especially the women and children in case of usage of traditional cook stoves and thereby ensuring the restoration of operation of ICS.

Approach for assessing share of Improved cookstoves users for estimation of emission reduction

1. The number of beneficiaries using Improved cook stoves during a particular monitoring period are assessed based on record of operation and maintenance, maintained by project proponent pertaining to discontinued users.
2. Annual third-party sample survey is being carried out to assess the share of beneficiaries using improved cookstoves. During survey in case beneficiaries were evaluated to be using improved cook stoves for a limited period along with usage of traditional cookstoves the beneficiaries are considered as partial users. Partial users are beneficiaries /household, those who have not discontinued using of ICS but have been using ICS for a limited period and also using traditional cookstoves for the purpose of cooking along with ICS. Since the number of days of operation of partial ICS usage during a particular crediting period is hard to ascertain (uncertainty of estimation), therefore as a conservative approach the beneficiaries /household using ICS partially are considered as discontinued users.

The survey observed/found most of the beneficiaries to have fully discontinued the usage of traditional cookstoves and have even dismantled the traditional cookstoves.

Around 5-10% of beneficiaries during a particular crediting period have been assessed to have partially used traditional cookstoves (as deduced from the beneficiary survey) due to customary practice/festival or to manage guests. Considering the perceptive response of the beneficiaries regarding the number of day of functioning of traditional cookstoves, it is conservatively considered that the number of days of use of improved cookstoves for those particular beneficiaries who have used traditional cookstoves as zero/nil. Although such consideration negatively impacts the annualized emission reductions estimate but such consideration is being conservatively considered for the purpose of calculation.

3.2 Deviations

3.2.1 Methodology Deviations

Not Applicable

3.2.2 Project Description Deviations

Not Applicable

3.3 Grouped Projects

Not Applicable

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	B _{old}
Data unit	tonnes/ household/year
Description	Quantity of woody biomass used in absence of the project activity
Source of data	Teri Energy Data Directory Yearbook for 2010
Value applied	1.469
Justification of choice of data or description of measurement methods and procedures applied	The study as per Wood Fuel Trade in India – Food and Agricultural Organisation of the United Nation, July 2001, per capita per day biomass consumption of 1.52 kg and 5.6 kg of fuel wood consumption per household per day. Annual consumption per household per day is therefore estimated at 2.044 tonnes. Further, the publication of TERI Energy Data Directory and Yearbook2010 outlines that, the per capita per month consumption of fire wood in Maharashtra at 25.51 kg/month/capita. With average population size of 4.8 persons/household/the annual consumption of firewood is estimated at 1.469 tonnes/year/household. Being the annual household fuel consumption data estimated on the basis of the TERI Energy Data Directory is most conservative amongst the available fuel wood consumption figure available secondarily the value of 1.469 tonnes/household/year is considered for estimation of By, savings.

Purpose of Data	Quantity of biomass utilization is used to estimate the quantum of biomass that will be saved in the project scenario after factoring into the improvement of efficiency.
Comments	The maximum value of Bold is fixed at ex-ante. Factors calculated based on the number of days of traditional cook stove usage and number of days of improved cook stoves usage is multiplied with Bold to estimate the Bold to be used for emission reduction calculation.

Data / Parameter	η_{new}
Data unit	%
Description	Efficiency of the cook stove being deployed as a part of the project activity
Source of data	Test report issued by Biomass Cook stove Testing Centre, Dept. of Renewable Energy Sources, Udaipur
Value applied	29.88%
Justification of choice of data or description of measurement methods and procedures applied	Thermal efficiency test carried out as per water Boiling Test Protocol specified as per IS13152 protocol.
Purpose of Data	Efficiency of the improved cookstoves is used to estimate the saving in fuel wood. (The factor is not fixed ex-post and estimated based on monitored efficiency of sample number of cookstoves)
Comments	The value of Efficiency is monitored on an annual basis and vintage wise.

Data / Parameter	$B_{y,savings}$
Data unit	tonne/household/year
Description	Quantity of woody biomass saved due to implementation of the project activity
Source of data	Calculated
Value applied	0.9774
Justification of choice of data or description of measurement methods and procedures applied	$B_{y,savings}$ is calculated using equation $B_{y,savings} = B_{old} * (1 - \eta_{old} / \eta_{new})$ $= 1.469 * (1 - 0.1 / 0.2988)$ $= 0.9774$ tonne /household/year

Purpose of Data	Fuel wood saving is calculated for estimation of emission reduction.
Comments	The efficiency of the improved cook stoves is monitored on an annual basis based on the sample survey and if appliances are found to be operational with lower efficiency then, the actual efficiency determined during monitoring is considered to calculate emission reduction.

Data / Parameter	Energy Saving per cook stove or household
Data unit	GWh _{th} /household/year
Description	Energy saving per cook stove due to improved efficiency of the distributed cook stove
Source of data	Calculated
Value applied	0.00407
Justification of choice of data or description of measurement methods and procedures applied	$\text{Energy Saving} = B_{y, \text{ saving}} * NCV_{\text{biomass}}$ $= \text{Bold} * (1 - \eta_{\text{old}}/\eta_{\text{new}}) * NCV_{\text{biomass}}$ $= 1.469 * (1 - 0.1/0.2988) * 0.0150$ $= 0.01466 \text{ TJ /household /year}$ $= 0.00407 \text{ GWhth/household/year}$ $= 4.073 \text{ MWhth/ household/year}$ $= 1.358 \text{ MWhe / household/year}$ Note: Value of NCV_{biomass} is considered as per Paragraph 5 of the applicable methodology AMS -II. G. Version 04; IPCC default value for fuel wood i.e. 0.015 TJ/tonne is chosen.
Purpose of Data	The data is used to assess the applicability condition of the project under micro small scale guidelines and also de-bundling.
Comments	-

Data / Parameter	F_{NRB,y}
Data unit	-
Description	The factors relates to the fraction of non-renewable biomass
Source of data	Calculated using secondary sources
Value applied	87.9%
Justification of choice of data or description of	The fraction of non-renewable biomass is calculated based on the fuel wood demand and supply of biomass across the state of Maharashtra.

measurement methods and procedures applied	
Purpose of Data	Data is used for estimation of emission reduction.
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	η_{new}			
Data unit	%			
Description	Efficiency of the system being deployed in project activity			
Source of data	Third party efficiency test report.			
Description of measurement methods and procedures to be applied	The sample systems tested as per Water Boiling Test Protocol indicated in IS 13152 (Part 1): 1991 for solid biomass cook stove. The testing is carried out on annual basis of representative sample. The minimum value of tested efficiency or 29.88% which so ever is lower is used to calculate emission reduction of the systems for particular year of operation.			
Frequency of monitoring/recording	Efficiency of the improved cookstoves under operation is monitored across sample system on an annual basis			
Value monitored	Period	Date of Monitoring	Number of Improved cookstoves assessed	Minimum efficiency of the lot
	08-October-12 – 07-October-13	25-11-2013 27-11-2013 07-12-2013 03-12-2013 09-01-2014 11-01-2014 13-01-2014 13-01-2014 15-01-2014 15-01-2014 11-01-2014 09-01-2014 07-12-2013 05-12-2013 03-12-2013 01-12-2013 29-11-2013 27-11-2013 25-11-2013	40	28.03%
	08-October-13 – 07-October-14	09-01-2015 27-11-2014 07-12-2014 03-12-2014 25-11-2014 11-01-2015 13-01-2015 13-01-2015 15-01-2015 15-01-2015 11-01-2015	40	27.30%

		09-01-2015 25-11-2014 27-11-2014 29-11-2014 01-12-2014 03-12-2014 05-12-2014 07-12-2014		
	08-October-14 – 07-October-15	13-01-2016 03-12-2015 09-01-2016 13-01-2016 11-01-2016 07-12-2015 25-11-2015 27-11-2015 11-01-2016 15-01-2016 09-01-2016 15-01-2016 07-12-2015 03-12-2015 01-12-2015 05-12-2015 29-11-2015 27-11-2015 25-11-2015	40	26.84%
	08-October-15 – 07-October-16	07-12-2016 09-01-2017 25-11-2016 27-11-2016 03-12-2017 13-01-2017 11-01-2017 13-01-2017 07-12-2016 09-01-2017 05-12-2016 03-12-2016 15-01-2017 15-01-2017 11-01-2017 27-11-2016 25-11-2016 01-12-2016 29-11-2016	40	26.50%
	08-October-16 – 07-October-17	25-11-2017 11-01-2018 13-01-2018 03-12-2017 01-12-2017 29-11-2017 27-11-2017 25-11-2017 07-12-2017 05-12-2017 13-01-2018 27-11-2017 07-12-2017 03-12-2017 09-01-2018 15-01-2018 15-01-2018 11-01-2018 09-01-2018	40	25.96%
	Monitoring equipment	1. Digital Thermometer 2. Weighing scale		

QA/QC procedures to be applied	Efficiency of the system is tested by third party agency on principle of the Water Boiling Test Protocol indicated in IS 13152 (Part 1): 1991. The number of sample system to be inspected is estimated in accordance to “ Guidelines for Sampling and Surveys for Project Activities and Programme of Activities ” Version 02, EB 69 Annex 5 and procedure for sample size calculation is specified in Section B.7.2 of the CDM PDD.																								
Purpose of the data	The value of the efficiency is used to calculate the $B_{y, savings}$ used for ex-post estimation of emission reduction.																								
Calculation method	Heat utilized = $(n-1) \times (W \times 0.214 + w) \times (t_2 - t_1) + (W \times 0.214 + w) \times (t_3 - t_1)$ kcal Heat Produced = $[(X \times c_1) + (x \times d / 1000 \times c_2)]$ kcal Thermal Efficiency = Heat utilised/ Heat Produced $\times 100$ Where <table border="1"> <tr> <td>w</td><td>Mass of water in vessel, in kg</td></tr> <tr> <td>W</td><td>Mass of the vessel complete with lead and stirrer, in kg</td></tr> <tr> <td>X</td><td>Mass of the fuel consumed, in kg</td></tr> <tr> <td>c_1</td><td>Calorific value of wood in kcal/kg</td></tr> <tr> <td>x</td><td>Volume of the kerosene consumed, in ml</td></tr> <tr> <td>c_2</td><td>Calorific value of kerosene in kcal/kg</td></tr> <tr> <td>d</td><td>Density of kerosene, in g/ml</td></tr> <tr> <td>t_1</td><td>Initial temperature of the water, in $^{\circ}\text{C}$</td></tr> <tr> <td>t_2</td><td>Final temperature of the water, in $^{\circ}\text{C}$</td></tr> <tr> <td>t_3</td><td>Final temperature of the water in the last vessel at the completion of the test, in $^{\circ}\text{C}$</td></tr> <tr> <td>n</td><td>Total number of vessels used</td></tr> <tr> <td>0.214</td><td>Specific heat of aluminium in kcal/kg$^{\circ}\text{C}$</td></tr> </table>	w	Mass of water in vessel, in kg	W	Mass of the vessel complete with lead and stirrer, in kg	X	Mass of the fuel consumed, in kg	c_1	Calorific value of wood in kcal/kg	x	Volume of the kerosene consumed, in ml	c_2	Calorific value of kerosene in kcal/kg	d	Density of kerosene, in g/ml	t_1	Initial temperature of the water, in $^{\circ}\text{C}$	t_2	Final temperature of the water, in $^{\circ}\text{C}$	t_3	Final temperature of the water in the last vessel at the completion of the test, in $^{\circ}\text{C}$	n	Total number of vessels used	0.214	Specific heat of aluminium in kcal/kg $^{\circ}\text{C}$
w	Mass of water in vessel, in kg																								
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n	Total number of vessels used																								
0.214	Specific heat of aluminium in kcal/kg $^{\circ}\text{C}$																								
Comments	As a part of the third party sample assessment of the operational efficiency of improved cookstoves, the minimum of the assessed efficiency from amongst the fourty system tested below 29.88% is considered as a efficiency to be considered for purpose of emission reduction calculation in place of 29.88% (rated efficiency). Although the ICS distributed under the current phase pertains to different batch of manufacturing, but since the products are being manufactured complying to a particular performance standard (IS13152 (Part 1):1991) the quality output for each unit of products complies to a minimum level. Moreover, the distribution is carried out during same period amongst homogeneous beneficiary segment, moreover the onset of operations of ICS has been kept at the same point of time.																								

	Therefore, as per the guidelines specified under the registered PDD Simple Random sampling methods were selected. The data estimated is archived both in paper and electronic spread sheet whereby the paper and the electronic form of the documents is maintained by the Project Participant for period of two year and electronic data is maintained till 2 years after the last issuance.
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Data / Parameter	No. cook stoves in use												
Data unit	Number												
Description	The number of improved cook stoves distributed to households under the project activity and under operation.												
Source of data	Third party agency survey report and database managed by the Project Participant (the end user agreement)												
Description of measurement methods and procedures to be applied	The monitoring consists of third-party survey of representative sample on annual basis to evaluate the number of systems in operation. The percentage of cook stove in usage as estimated from the survey result is multiplied with the total number of cook stove to determine number of cook stove in operation and to be considered for the purpose of emission reduction calculation.												
Frequency of monitoring/recording	Number of improved cookstoves under operation is monitored annually based on sample survey												
Value monitored	During survey in case beneficiaries were evaluated to be using improved cook stoves for a limited period along with usage of traditional cookstoves the beneficiaries are considered as partial users. Partial users are beneficiaries /household, those who have not discontinued using of ICS but have been using ICS for a limited period and also using traditional cookstoves for the purpose of cooking along with ICS. Since the number of days of operation of partial ICS usage during a particular crediting period is hard to ascertain (uncertainty of estimation), therefore as a conservative approach the beneficiaries /household using ICS partially are considered as discontinued users for the purpose of estimating emission reduction. <table><tr><th>Period</th><th>No. of Dis-continued user</th><th>Date of Survey</th><th>Number of beneficiaries surveyed</th><th>% of partial users</th><th>% of users used ICS only</th></tr><tr><td>08-October-12 – 07-October-13</td><td>0</td><td>25-11-2013 27-11-2013 07-12-2013 03-12-2013 09-01-2014 11-01-2014 13-01-2014 13-01-2014 15-01-2014 15-01-2014 11-01-2014 09-01-2014</td><td>160</td><td>1.88%</td><td>98.13%</td></tr></table>	Period	No. of Dis-continued user	Date of Survey	Number of beneficiaries surveyed	% of partial users	% of users used ICS only	08-October-12 – 07-October-13	0	25-11-2013 27-11-2013 07-12-2013 03-12-2013 09-01-2014 11-01-2014 13-01-2014 13-01-2014 15-01-2014 15-01-2014 11-01-2014 09-01-2014	160	1.88%	98.13%
Period	No. of Dis-continued user	Date of Survey	Number of beneficiaries surveyed	% of partial users	% of users used ICS only								
08-October-12 – 07-October-13	0	25-11-2013 27-11-2013 07-12-2013 03-12-2013 09-01-2014 11-01-2014 13-01-2014 13-01-2014 15-01-2014 15-01-2014 11-01-2014 09-01-2014	160	1.88%	98.13%								

			07-12-2013 05-12-2013 03-12-2013 01-12-2013 29-11-2013 27-11-2013 25-11-2013			
	08-October-13 – 07-October-14	0	09-01-2015 27-11-2014 07-12-2014 03-12-2014 25-11-2014 11-01-2015 13-01-2015 13-01-2015 15-01-2015 15-01-2015 11-01-2015 09-01-2015 25-11-2014 27-11-2014 29-11-2014 01-12-2014 03-12-2014 05-12-2014 07-12-2014	160	3.13%	96.88%
	08-October-14 – 07-October-15	0	13-01-2016 03-12-2015 09-01-2016 13-01-2016 11-01-2016 07-12-2015 25-11-2015 27-11-2015 11-01-2016 15-01-2016 09-01-2016 15-01-2016 07-12-2015 03-12-2015 01-12-2015 05-12-2015 29-11-2015 27-11-2015 25-11-2015	160	5.00%	95.00%
	08-October-15 – 07-October-16	0	07-12-2016 09-01-2017 25-11-2016 27-11-2016 03-12-2017 13-01-2017 11-01-2017 13-01-2017 07-12-2016 09-01-2017 05-12-2016 03-12-2016 15-01-2017 15-01-2017 11-01-2017 27-11-2016 25-11-2016 01-12-2016 29-11-2016	160	6.88%	93.13%
	08-October-16 – 07-October-17	0	25-11-2017 11-01-2018 13-01-2018 03-12-2017 01-12-2017 29-11-2017	160	9.38%	90.63%

	27-11-2017 25-11-2017 07-12-2017 05-12-2017 13-01-2018 27-11-2017 07-12-2017 03-12-2017 09-01-2018 15-01-2018 15-01-2018 11-01-2018 09-01-2018
	Number of Improved Cook stoves distributed – 14,200
Monitoring equipment	-
QA/QC procedures to be applied	The project proponent obtains an authorization from each /group of the household in form of end user agreement for processing of carbon revenue. The database containing all information of the end user agreement is maintained in a central server located with project participant and accessible to the project team at different locations. During the time of verification, the VVB can verify the list of beneficiaries who has signed the end user agreement (for which the emission reductions are claimed).
Purpose of the data	For estimation of baseline emission
Calculation method	$\frac{\text{Share of beneficiaries using Improved cookstoves}}{160} = \frac{160 - \text{no of partial users}}{160}$
Comments	The percentage of the representative sample using the improved cook stove determined from the sample survey is used to calculate the total number of cook stoves in operation. The survey report is kept and maintained by the project proponent for the period of two years after the last issuance. Since, the distribution of Improved cook stoves is carried out during same period amongst homogeneous beneficiary segment, and moreover the onset of operations of ICS has been kept at the same point of time. Therefore, as per the guidelines specified under the registered PDD Simple Random sampling methods were selected.

Data / Parameter	Days of Operation
Data unit	Number
Description	The parameter relates to the number of days for which the cook stove in operation during the particular year
Source of data	Monitoring Database

Description of measurement methods and procedures to be applied	The emission reduction as against the cook stove is calculated when the system is being delivered to the end user, the end user initiated its operation and the end user agreement is being signed. Since, the emission reduction is based on the days of operation therefore, it is important to monitor the number of days of non-functioning. The days of non-functioning is estimated based on the number of days between the date of complaint as against damage or non- functioning received and date of repair or replacement. The information is maintained in form of database and archived. $\text{Number of days of operation} = 365 - \text{Average number of days the cook stove was non-functional}$ The number of non-functional days is based on the number of days the cook stoves were under repair/replacement			
Frequency of monitoring/recording	Days of operation of improved cookstoves under operation is monitored annually based on sample survey			
Value monitored	Period	Total number of beneficiaries	Number of beneficiaries for which defunct date was a day/more	Average days of operation
	08-October-12 – 07-October-13	14,200	0	365
	08-October-13 – 07-October-14	14,200	0	365
	08-October-14 – 07-October-15	14,200	0	365
	08-October-15 – 07-October-16	14,200	0	365
	08-October-16 – 07-October-17	14,200	0	365
Monitoring equipment	-			
QA/QC procedures to be applied	The database for the date of dissemination of cook stoves, date of receipt of complaint for repair/ replacement and the date of repair/replacement is recorded by the village coordinator. The related information is maintained by the village co-ordinator and passed on to the VCS team on a monthly basis. In case of the cook stove being replaced, a new end user agreement is signed with the end user and attached to the original agreement. Monitoring database and the end user agreement is maintained both in soft as well as hard copy.			
Purpose of the data	For estimation of baseline emission			
Calculation method	-			
Comments	The number of days for which the improved cook stoves were non-functional is considered for estimation of emission reduction. The record of database and copy of end user agreement is kept and maintained by the project participant for the period of two years after the last issuance. For ex-post, the total number of days of non-operation of the improved cook stoves due to repair, maintenance is retrieved from the maintenance log books is averaged as against the			

	total number of cook stoves in actual operation (as per survey) and is considered. Say, if n is the total no of non- operational days as per the maintenance records of all of the cook stoves, the average days of non-operation for each cook stove is estimated as $= n/x$ where x is the number of cook stoves in actual operation as per the sample survey.
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Data / Parameter	Number of days of functioning of traditional cook stoves
Data unit	Number
Description	The parameters refer to the number of days for which the traditional cook stove is being used by the household.
Source of data	Annual third-party agency survey of representative sample household
Description of measurement methods and procedures to be applied	Survey is carried out to estimate the number of days for which the household has operated the traditional cook stove during a particular monitoring period.
Frequency of monitoring/recording	Number of days of functioning of traditional cook stoves is monitored annually based on sample survey
Value monitored	0 During survey in case beneficiaries were evaluated to be using improved cook stoves for a limited period along with usage of traditional cookstoves the beneficiaries are considered as partial users. Partial users are beneficiaries /household, those who have not discontinued using of ICS but have been using ICS for a limited period and also using traditional cookstoves for the purpose of cooking along with ICS. Since the number of days of operation of partial ICS usage during a particular crediting period is hard to ascertain (uncertainty of estimation), therefore as a conservative approach the beneficiaries /household using ICS partially are considered as discontinued users. Since the beneficiary using traditional cookstoves were opted out of emission reduction estimation therefore the beneficiaries considered resembles only to those who are using improved cookstoves. Therefore the days of usage of traditional cookstoves for beneficiaries considered is zero.
Monitoring equipment	-
QA/QC procedures to be applied	The survey is carried out by third party agency and is co-ordinated by the project proponent.
Purpose of the data	For estimation of baseline emission
Calculation method	-

Comments	Number of days of operation of the traditional cook stove is obtained from the result of sample survey. The number of days of traditional cook stove as per the survey is used to obtain the average days of usage of the traditional cook stoves for all the households who still use the improved cook stoves of this project activity. This average day is used to arrive at a factor - $= (365 - \text{Average number of days of traditional cook stove usage in all households} / 365)$
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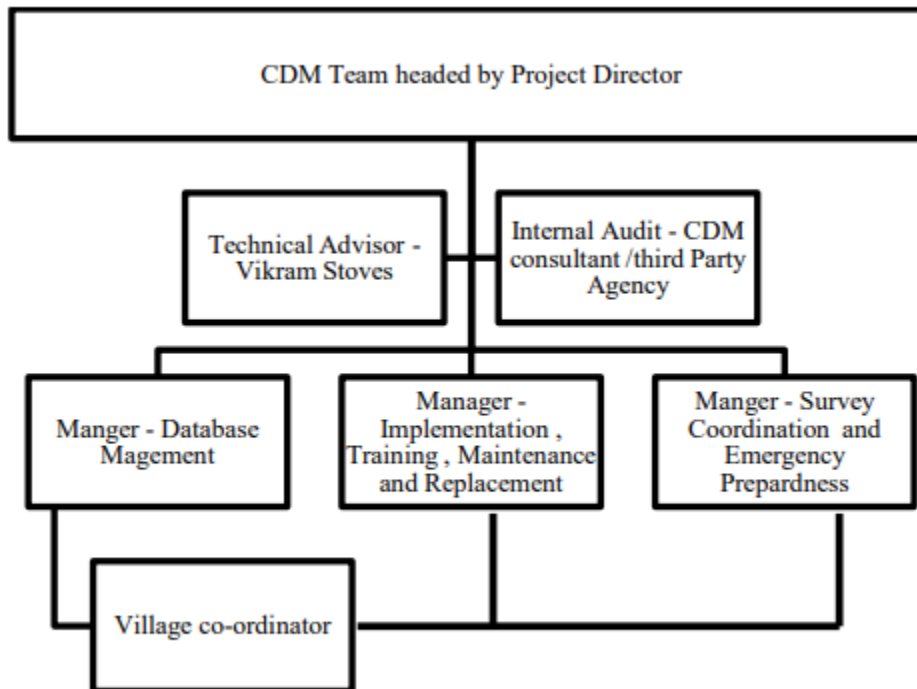
Data / Parameter	Number of Cook stove replaced			
Data unit	Number			
Description	The parameters refer to the number of cook stove that are replaced (due to end-of-life time or damage) by the new cook stove with efficiency greater than or equal to 29.88%.			
Source of data	Monitoring database, new end user agreement and test certificate of the new system supplied.			
Description of measurement methods and procedures to be applied	Record is being updated in the databases as and when the improved cookstoves are replaced by a new one . On replacement a new end user agreement is signed with the existing end user and the information relating to the replacement along with necessary details is updated in the database.			
Frequency of monitoring/recording	Recorded as and when replaced			
Value monitored	Period	Number of improved cookstoves distributed and under operation	Number of cookstoves replaced post end of life time	Number of cookstoves replaced due to defunct
	08-October-12 – 07-October-13	14,200	0	0
	08-October-13 – 07-October-14	14,200	0	0
	08-October-14 – 07-October-15	14,200	0	0
	08-October-15 – 07-October-16	14,200	0	0
	08-October-16 – 07-October-17	14,200	0	0
Monitoring equipment	-			
QA/QC procedures to be applied	The copy of the new end user agreement for the replaced cook stove along with the efficiency certificate of the new system is archived along with the existing agreement. The database is updated as and when the system is replaced.			
Purpose of the data	Assessment of baseline emission			
Calculation method	-			

Comments	The record of database and copy of end user agreements (both new and old one) is maintained by the project participant for the period of two years after the last issuance.		
Data / Parameter	B_{y, savings}		
Data unit	Tonnes/year/household		
Description	Quantity of woody biomass that is saved through the project activity.		
Source of data	calculated		
Description of measurement methods and procedures to be applied	The quantity of woody biomass saved is calculated following the equation $B_{y, \text{savings}} = B_{\text{old}} * (1 - \eta_{\text{old}}/\eta_{\text{new}})$ Where, B_{old} is calculated based on number of days cook stove is operational as calculated above and per capita biomass consumption of 25.51 kg/person/month multiplied by 4.8 members per rural household also factoring into the number of days for which the traditional cook stoves were in operation and the number of days of non-functioning of the improved cook stoves. The efficiency of the project system is tested on a representative sample basis.		
Frequency of monitoring/recording	Calculated on an annual basis		
Value monitored	Period	Operational Efficiency considered	Estimated By savings/ ICS
	08-October-12 – 07-October-13	28.03%	0.9449
	08-October-13 – 07-October-14	27.30%	0.9309
	08-October-14 – 07-October-15	26.84%	0.9216
	08-October-15 – 07-October-16	26.50%	0.9146
	08-October-16 – 07-October-17	25.96%	0.9032
Monitoring equipment	-		
QA/QC procedures to be applied	The minimum tested efficiency of the representative samples or 29.88% is used for η_{new} .		
Purpose of the data	-		
Calculation method	-		
Comments	The data estimated and the survey related documents is archived by the project participant for the period of 2 years after the last issuance.		

4.3 Monitoring Plan

The monitoring of the Project activity is executed by the team of the Project Participant, Village level coordinator appointed by the Project Participant, Technical Advisor from Vikram Stoves and consultant whose specific role and responsibilities are explained as follows. The following section also explicitly indicates the monitoring plan, implementation and record archiving procedure, management of monitoring, facilitating survey, training, maintenance plan and emergency preparedness.

The detailed team structure for executing the monitoring is as follows:



Roles and Responsibilities

The roles and responsibilities of the team include:

- Undertaking awareness amongst the beneficiaries relating to usefulness of the cook stoves.
- Providing training to each entity on the operating methods and regular maintenance practice of improved cook stoves.
- Undertaking maintenance of the cook stoves on a periodic basis.
- Replacing supplied improved cook stoves with new one at the end of technical life time of the distributed system within the crediting period.
- Development and monitoring of project.
- Undertaking spot check, annual survey to access the usage, functional efficiency, maintain database and facilitate monitoring as described in section B.7.as well as the following section of the PDD.

The end users or beneficiaries is responsible for -

- Continual usage of cook stoves
- Undertaking regular maintenance
- Supporting the village coordinator and the project participant in undertaking monitoring
- Inform the village coordinator in case the cook stove malfunctions.

- Dismantle or refrain from use of traditional cook stove
- In case the family decides to shift to the same is intimated to the village coordinator.

The purpose of monitoring is to achieve actual and credible emission reduction estimation pertaining to the project activity. The project participant therefore, needs to monitor and archive data required for estimation of emission reduction.

According to the approved methodology AMS -II. G.; the monitoring comprises of –

1. Efficiency check of the representative sample on annual basis to ensure that, the cook stoves are still operating at the specified efficiency (η_{new}). If appliances are found to be operational with efficiency lower than 29.88%, the efficiency determined during monitoring is used to calculate emission reduction. (In accordance to Paragraph 15 of the approved methodology)
 - Thermal efficiency test is carried out in accordance to the Water Boiling Test Protocol as specified in IS 13152 (Part 1): 1991 standard.
 - The sample size is selected in accordance to "Guidelines for Sampling and Surveys for Project Activities and Programme of Activities" Version 2, EB 69.
2. Monitoring also consists of checking of representative sample on annual basis to determine if the improved cook stoves are still operating or are replaced by an equivalent in service appliance. In case of replacement, it is ensured that, efficiency of new equipment is similar to the equipment being replaced.
If the cook stove is replaced with higher efficiency appliances, then, the efficiency of 29.88% is considered as conservative approach. (In accordance to Paragraph 16 of the methodology)

3. Monitoring ensures that:

- a. Either the replaced low efficiency appliances are disposed of and not used within the boundary or within the region; or
- b. If baseline stoves continue to be used, monitoring ensures that the fuel-wood consumption of those stoves is excluded from Bold.

Therefore, the project proponent has developed a plan for monitoring under the following heads –

Implementation Arrangements and Record archiving-

All the household post to the distribution of the cook stoves is oriented to its usage and regular maintenance. With registration of the project under the UNFCCC; the project participant imparts an awareness session over cookstove usage.

As a part of the implementation program the project participant ensures:

1. Signing of the end user agreement with the beneficiaries (the project participant completes signing of end user agreement with all the beneficiaries who are being provided with the cook stoves before registration of the project). As a part of the contractual agreement with each of the beneficiaries for the titled project a unique identification number is issued as against to each project cook stoves. Moreover, as a part of the agreement each of the end user ascertains that they won't be entering into agreement with other agencies to obtain revenue. The above two steps nullify the chances of double counting.
2. The coordinators are employed under the project activity and is responsible for monitoring, archiving of the records and undertaking maintenance.

3. Creating database to archive relevant information about the end user, cook stoves and related information of the end user agreement. The database is created based on the end user agreement and is managed by the team. The database contains all the relevant information about the beneficiary in regard to the end user agreement. Each of the beneficiaries in the database is identified by the unique identification number. The database manager ensures that there has been no double counting/ repetition of the beneficiary information, location and unique identification number of the cook stoves. The database is updated on a regular basis to include:
 - a. Replacement of the cook stoves after schedule life time
 - b. Scheduled maintenance
 - c. Unscheduled maintenance or fault rectification measures undertaken
 - d. Temporary or permanent drop out

Finalizing the number of cook stoves for emission reduction estimation

As described in the section above in regard to the implementation arrangement and record archiving the dissemination of the cook stove to the household and its usage thereafter includes the following steps:

1. Signing of end user agreement
2. Dissemination of improved cookstoves

In accordance to the guidance of the methodology, emission reduction as against each cook stoves can only be estimated from the point of cook stove usage. Therefore, the date of dissemination of cook stoves and signing of the end user agreement with each beneficiary after dissemination is considered as the date from where the emission reduction calculation is initiated for each cook stove for the first monitoring period. For the purpose of estimation, the end date of cookstoves dissemination is considered as start date of the monitoring period.

Management of monitoring activities

The monitoring of the project activity is reviewed and coordinated by the top management of the Project Participant (GKEMPL) through Monitoring Coordinator, team of Project Participant (GKEMPL) headed by Project Director and technical team from Vikram Stoves.

The persons and staffs involved in monitoring is trained over the procedure in accordance to the manual and works out under the supervision of the Project Director. The major task to be undertaken and the responsibility are as follows:

1. Co-ordinator: Each coordinator acts as coordinating point between the project household and the Team (respective manger). The village coordinator is responsible to facilitate and oversee continual operation of cook stoves, maintain database related to number of cook stoves distributed and replaced thereafter, filing complain relating to non-functioning and undertaking on-call maintenance, recording of the complaint and maintenance time line and periodic submission of information to the team.
2. Team: Creating and maintaining database and end user agreement, up-gradation of beneficiary level information in the central database. The team monitors related

information pertaining to the replacement of the cook stoves¹⁴. In case household considered under the project activity fails to meet the condition of the end user agreement or household drops out (because of the shift to location outside project boundary for employment purpose/migration for a temporary period or even the beneficiary decided to discontinue usage of improved cook stoves) then, such dropout household is conservatively deducted on temporary or permanent basis from the emission reduction calculation for the particular monitoring period. The VCS team is responsible for estimating the emission reduction.

3. Maintenance team – Vikram Stoves is responsible for imparting training relating to the cook stove scheduled maintenance and undertaking periodic maintenance and on-call maintenance.
4. Daily usage- Household uses cook stove and intimate from time to time relating to non- functioning or temporary transfer/migration. The coordinator on basis of the usage report intimates the team.
5. Replacement of Existing improved cook stoves: In case the old cook stove is replaced by a new cook stove the same is to be done with similar or higher efficiency of existing cook stove (29.88%). On replacement a new end user agreement is signed with the existing end user the same information relating to the replacement along with necessary details is updated in the database. The copy of the new end user agreement for the replaced cook stove along with the efficiency certificate of the new system is archived along with the existing agreement. The database is updated as and when the system is replaced. The replaced cook stoves is dismantled and sold out to the cast iron and steel units respectively in order to recycle the system components. Such initiatives nullify the chances of the replaced cook stove to be re-used.

Monitoring of Traditional cook stove usage

The traditional cook stove is considered as an auspicious with religious value and household consider it as a linkage to their tradition so, the household has kept the stove. However, each household has assured and confirmed through signing of end user agreement with the project participant to continue using of improved cook stoves at household.

However, as a conservative approach to monitor fuel wood consumption in the project household from use of existing mud cook stove, third party survey is carried out of representative sample household on annual basis to evaluate the number of days for which the traditional stoves has been operated across the year. The number of days for which the traditional stoves were in operation is used to derive the factor to be adjusted with B_{old} . The factor is calculated as follows:

$$= (365 - \text{Average No. of days of traditional cook stoves usage in all households}) / 365$$

The factor calculated using above approach is multiplied with B_{old} to calculate the value of B_{old} to be used for ex-post calculation of emission reduction.

Sampling design

Objective: The objective of the sample design is to determine –

¹⁴ The replaced cook stoves is to dismantled and sold out to the cast iron and steel units respectively in order to recycle the system components. Such initiatives nullifies the chances of the replaced cook stove to be re-used.

- a) **Efficiency of Improved cook stove in operation:** Efficiency of the system is tested by third party agency of a representative sample on principle of the Water Boiling Test Protocol indicated in IS 13152 (Part 1): 1991.
- b) **Usage Survey** – This is conducted on annual basis to determine the number of cook stove in operation. The survey is initiated after a year from date of project registration.
- c) **Usage of traditional cook stoves:** The survey is conducted to determine the number of days for which the household is using the traditional cook stoves.

Reliability Requirement: As per paragraph 22 of the approved methodology AMS - II.G; 90% confidence interval and 10% margin of error needs is considered conceiving the fact that survey is carried out on an annual basis.

Target Population: The number of cook stove conceived under the project activity is 14,200.

Survey Method: Simple Random sampling is chosen, as the population under the project activity are homogeneous owing to the selection of beneficiary from similar socio-economic circumstances.

Sample Size:

The sample size is calculated using exact equation for random sampling –

$$n \geq 1.6452N * p * (1-p) / ((N-1) * 0.12 * p^2 + 1.6452 * p*(1-p))$$

Where,

N	=	Sample size
N	=	14,200.
P	=	expected proportion (on basis of assumption that, 90% of the cook stove is in operation and at the desired efficiency)
1.645	=	Represents 90% confidence required
0.1	=	Represent 10% relative precision

a) Sample size for Efficiency test

Although the cook stoves are designed to operate at a desired efficiency level throughout its life time subjected to periodic maintenance; efficiency test of the cook stoves is carried out on annual basis. The sample size for undertaking efficiency test is therefore, decided considering 90% of the cook stoves operates at a specified efficiency of 29.88%.

Following equation (3) above, the number of sample size arrived as below –

Time Period	Percentage of cook stove operational at specified efficiency at any point of time during the entire crediting period (This assumption is only for estimation of sample size) ⁶²	Sample size for survey (No. of systems)	Sample size after conceiving response rate of 80%
Annual	90%	31	40

(Note: the final sample size is rounded up and increased to the next closest integer)

The household for testing the efficiency as stated above is selected on a random sample basis. However while undertaking the sample beneficiary selection it is ensured that the household opted for efficiency testing are not common with the household /beneficiary selected for sample survey for improved cook stove usage and traditional cook stove usage during a particular year. Moreover, it is ensured that the household once selected for efficiency testing during a particular year is opted out from the selection procedure in course of the crediting period for further testing.

Data to be collected -

Field Measurement – Frequency: The efficiency testing of sample system is carried out on an annual basis. The inspection is carried out one year after the date of registration. There after once in every year the survey is conducted.

QA/QC Procedure: Each system is assigned with unique identification details. The systems to be sampled is randomly selected using software or random number tables and screen shots of the same is kept in the data base. The PP gets the services of third party agency or any scope accredited DOE including the verifier for conducting the efficiency test of the samples presented by the PP before the preparation of the monitoring report.

Analysis: In case of the efficiency tested for the sample system is found to be lower than 29.88% then, the minimum value of efficiency tested is considered as a threshold for the subsequent years in place of 29.88% till the point further lower value of efficiency is tested.

b) Sample size determination for no. of improved cook stoves in operation and no of days of traditional cook stove usage

The sample size is estimated for determining the number of cook stoves in operation on basis of assumption that, 90% (This assumption is only for estimation of sample size) of cook stove is operational i.e. proportion of the cook stove in operation during a particular year is 0.9.

Therefore, $n \geq 31$

For covering 100 percent of the sample and expecting a response rate of 80%. Thus, the sample size is estimated as $31/80\% = 39$. However, to cover the wide range of population and have a conservative sample the PP selects 4 times the number of sample estimated i.e., 156 numbers of household every year for the sample.

The household survey is designed to estimate the percentage of cook stove still in operation and number of days for which the traditional cook stoves are used for the purpose of estimation of emission reduction. The survey questionnaire essentially contain the unique identification details of the household, satisfactory level of usage and service, date of signing of the agreement, information regard to the maintenance or replacement if any, number of person in the household, other type of stoves used if any (type of fuel) and number of days of traditional cook stove usage (specific details about the festive season and any other occasion the traditional cook stove is used, if the size of the members are extremely high when it is not possible to use the improved cook stove).

It is to be noted that the household selected for the usage survey for determination of proportion of cook stove in operation is common where the survey for determining the number days for which the traditional cook stoves usage is carried out. The samples once surveyed in a year is not considered for subsequent year.

Data to be collected

Field Measurement – Frequency: The survey is carried out on an annual basis from the date of registration in specified format duly signed by the beneficiary to assess whether the

beneficiary has been using the cook stoves distributed till date and to assess the number of days for which the beneficiary has used the traditional cook stoves during that year.

QA/QC Procedure: Each system is assigned with unique identification details. The systems to be sampled is randomly selected using software or random number tables and screen shots of the same is kept in the data base. The PP gets the services of third party agency or any scope accredited DoE including the verifier for taking the survey before the preparation of the monitoring report.

Analysis: Based on the response the percentage of improved cook stoves which are distributed as the part of this project activity that are still operated by the households and the average number of days of operation of the traditional cook stoves by each household would be estimated and the same is considered for ex-post emission reduction calculation.

The sample beneficiaries/household is same where the survey is carried out for estimation of operation of improved cook stoves and traditional cook stoves i.e. a single survey is designed to capture both. Moreover, it is ensured that the household once selected for survey during a particular year is opted out from the selection in course of the subsequent crediting period for further testing.

Sl. No.	Description	Data to be collected	Method of survey	Sampling method	Proposed Sample size	Variance
1	Efficiency of Improved cook stove	Testing of the Efficiency of the improved cook stoves	Household Collection and conducting the test for the selected samples.	Simple Random sampling	40	90% Confidence level
2	Usage survey	No of system in operation	Household survey	Simple Random Sampling	160 household/ annum	90% confidence level
	Traditional cook stove usage	No of days for which the household use traditional cook stoves are used in the project household	Household survey	Simple Random Sampling	160 household/ annum	90% confidence level

Reliability Check

The sample size as indicated in the table above is subjected to the final value of the precision calculated and in case the value of the precision estimated from the survey result is less than $\pm 10\%$ then, the sample size is re-estimated and the additional number of beneficiary/households is interviewed to obtain the desired level of precision. The precision is calculated as follows:

Step1: Estimation of the value of proportion (p)

$P = \text{number of success/ number of cook stoves that were observed in the sample}$

Step 2: Estimating Standard Error of the proportion

The standard error of the proportion is estimated using the following equation Standard error of proportion = $\sqrt{(1-f) pq/n}$

Where,

$f = \text{sampling fraction} = \text{number of cook stoves that are observed in the sample}/14,200.$, i.e., $160/14,200.$ $p = \text{proportion, } 90\%$

$q = (1-p)$

n = number of cook stoves that are observed in the sample

Step 3: Estimating of Precision

Proportion = $\pm z$ value * standard error of proportion

z value = for 90% confidence level the value of z is 1.645 Standard error of proportion = estimated in step 2

Step 4: Estimating of Relating Precision Relative Precision = Precision/proportion Where, Proportion is estimated in step 1 and precision in step 3

In case the value of the relative precision estimated based on the level of success relating to

1. Tested Efficiency of the improved cook stove being equal to greater than 29.88%
2. Number of the beneficiaries using improved cook stove
3. Number of beneficiaries/households using traditional cook stoves is not within the specified limit of $\pm 10\%$ the value of sample size is increased and survey is carried out amongst the additional population to obtain the desired level of precision i.e. within $\pm 10\%$.

Training

The training is imparted to the following entities in following way-

Entity	Objective of training	Trained by	Onset	Frequency
Household	Operational procedure Scheduled maintenance Itemised recording and reporting	Vikram Stoves (for item no 1. and 2) team (for item 3)	After distribution	Once
Village Coordinator	Monitoring of the related parameter like Spot check of cook stove usage, situational review Database management and coordination with team System Maintenance	VCS team (for item no. 1 and 2) Vikram Stoves (for item 3)	On appointment	Once in a year
VCS team	Database management Undertaking Monitoring, Recording and archiving Preparation of monitoring report	Consultant and Top Management of the Project participant	On registration	Once in a year

Quality Assurance and Quality Control of monitoring activities–

Top management of the Project participant (GKEMPL) is responsible for QA/QC which includes monitoring of accurate and transparent record keeping, monitoring and evaluation so that all supporting documentation and records for the project is easily accessible for spot checking and cross referencing by a third-party agency. Top management of the project participant ensures quality control of the monitoring activities in order to guarantee of records and to confirm absence of double-counting in any form. Project participant ensures that, the detailed beneficiary level database and the project database is up to date and the latter is representative of the most recent definitions of clusters. Internal audit is carried out on six month basis by the consultant or third party agency and includes -

1. The internal review is carried out in every six month for compliance check in accordance to the manual.
2. Non conformity if noted is reported and brought into the notice of the top management and measures is undertaken to ensure that required compliance is met.

3. Training on the monitoring if felt by the auditor is imparted to the team.

Emergency Preparedness

In case the village coordinator is reported against malfunction/ non-function of cook stove which the technical team is unable to rectify the fault and unable to co-ordinate with the technical team of Vikram Stoves; the coordinator immediately replace the existing cook stove with the new one. The faulty stoves thereafter be transported to the industry for repair.

1. The coordinator is provided with stand-by stove components for repair and/or replacement.
2. Few numbers of cook stoves are stocked with the Panchayat Samity/ Block Development Office to reduce the down time of replacement.
3. In case the coordinator is unable to carry out maintenance, the same is reported to the technical team of Vikram Stoves and the nearby representatives visits the village to support the co- Ordinator in rectifying the fault.

The improved cookstoves distributions were carried out between 08-October-2012 to 17-December- 2012 amongst 14,200 beneficiaries.

The date wise distribution of the cookstoves along with the number of cookstoves distributed is mentioned below:

Date of Distribution	Number of Cookstoves Distributed
08/10/12	544
13/10/12	526
19/10/12	508
26/10/12	504
29/10/12	708
02/11/12	801
08/11/12	908
14/11/12	809
17/11/12	808
19/11/12	816
25/11/12	793
27/11/12	808
29/11/12	808
01/12/12	805
07/12/12	708
10/12/12	908
13/12/12	822
15/12/12	793
17/12/12	823
Total	14200

A hands-on approach was opted to distribute the improved cookstoves to the sites by deploying their own dedicated personnel. With a mission to enhance sustainable living and mitigate the adverse effects of traditional cooking methods, M/s G K Energy Marketers Pvt. Ltd's team meticulously navigated rural areas. Equipped with extensive knowledge about the benefits of their improved cookstoves, these personnel engaged directly with communities, conducting on-ground demonstrations and workshops. Their approach was rooted in fostering relationships and building trust. By establishing personal connections and addressing specific needs, M/s G K Energy Marketers Pvt. Ltd's personnel successfully introduced these efficient cookstoves, promoting a healthier and environmentally conscious lifestyle among households.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline Emissions is estimated in following way –

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

Where, in accordance to paragraph 13 of the methodology, leakage related to the non-renewable woody biomass saved by the project activity is assessed based on ex post surveys of users and the areas from which this woody biomass is sourced. Subsequent to the clarification provided in sub paragraph (a) survey is not required for ex-post estimation of leakage in case B_{old} is multiplied by a net to gross adjustment factor of 0.95 to account for leakages.

Parameter	Data	Unit
B_{old}	1.469	Tonne fuel wood /cook stove/ year
$B_{y, savings}$	0.9774	Tonne fuel wood /cook stove/ year
$f_{NRB,y}$	87.90%	
$NCV_{biomass}$	0.015	TJ/tonne
$EF_{projected fossil fuel}$	81.60	tCO ₂ e/TJ
$ER_{y,WGA,per cook stove}$ (Emission reduction/ cook stove /year without gross adjustment factor for B_{old} to account for leakage)	1.0515	tCO ₂ e /cook stove/ year

The leakage emission for ex-ante estimation of emission reduction is thereby calculated as a difference between the emission reduction estimated considering the actual value of B_{old} i.e. 1.469 Tonne fuel wood /cook stove/ year and emission reduction estimated by considering the value of B_{old} is estimated by multiplying B_{old} with a net to gross adjustment factor of 0.95.

For the purpose of ex-ante estimation of emission reduction, it is assumed that, only 90% of the cook stoves are operational in any point of time. Thus, the emission reduction per year

($ER_{y, WGA}$) without gross adjustment factor for B_{old} to account for leakage considering 90% of the cook stove as operational for the entire crediting period is 13,438 tCO₂e /year.

The Baseline Emissions achieved for this monitoring period is 64,071 tCO₂e /year.

The year wise efficiency of the improved cookstoves tested and considered for estimation of baseline emission is outlined in the table below

Third party assessment for monitoring period – Year 1			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-9900	Sudarshan Babanrav Pawar	Bhandara	28.027%
GKEMPLPH-22-6308	Devidas Shivaji Kute	Akola	28.032%
GKEMPLPH-22-502	Tukaram Baliram Fasate	Jalna	28.048%
GKEMPLPH-22-503	Sindhu Tukaram Rakhonde	Jalna	28.076%
GKEMPLPH-22-6508	Muktabai Kondibhau Anande	Washim	28.093%
GKEMPLPH-22-2303	Balaji Nagorao Jatale	Hingoli	28.110%
GKEMPLPH-22-10796	Sarngdhar Vikrama Wable	Chandrapur	28.160%
GKEMPLPH-22-12311	Shivaji Narayan Solanke	Gadchiroli	28.200%
GKEMPLPH-22-11858	Rushikesh Sundarrao Chaudhari	Gadchiroli	28.224%
GKEMPLPH-22-6911	Mathurabai Dadarao Surung	Amravati	28.227%
GKEMPLPH-22-8805	Dashrath Vitthalrao Wawre	Nagpur	28.256%
GKEMPLPH-22-38	Kamalaji Devrao Sarkate	Aurangabad	28.261%
GKEMPLPH-22-10443	Shakuntala Govindrao Ipklawar	Bhandara	28.275%
GKEMPLPH-22-12795	Someshwar Umrao Garkar	Gadchiroli	28.285%
GKEMPLPH-22-4963	Kartik Keshavrao Jadhav	Latur	28.319%
GKEMPLPH-22-2086	Dnyanba Tukaram Shinde	Parbhani	28.382%
GKEMPLPH-22-6672	Pralhad Sopanrao Andhale	Amravati	28.391%
GKEMPLPH-22-7855	Sajeda Ali Ayuba Ali Sayyad	Wardha	28.396%
GKEMPLPH-22-13403	Vishnu Govindrao Bangar	Gondia	28.421%
GKEMPLPH-22-7032	Pandurang Maroti Sirsat	Yavatmal	28.423%
GKEMPLPH-22-501	Maroti Jalindar Paratkar	Jalna	28.441%
GKEMPLPH-22-9590	Kailas Gangaram Masolakar	Bhandara	28.454%
GKEMPLPH-22-504	Sachin Subhash Bhutekar	Jalna	28.514%
GKEMPLPH-22-6040	Santosh Ashokrao Kadam	Buldhana	28.531%
GKEMPLPH-22-2354	Datta Kathalu Ghugase	Hingoli	28.571%
GKEMPLPH-22-7153	Sharda Bhagorao Pole	Yavatmal	28.599%
GKEMPLPH-22-12651	Balasaheb Rangnathrao More	Gadchiroli	28.600%
GKEMPLPH-22-6611	Sundarrao Haribhau Pawar	Washim	28.602%
GKEMPLPH-22-8103	Gangasagar Nagorao Ingole	Nagpur	28.635%
GKEMPLPH-22-6159	Ashokarao Vishwanathrao Bende	Akola	28.677%
GKEMPLPH-22-4350	Rama Govind Aghade	Nanded	28.717%
GKEMPLPH-22-3698	Sakhubai Dnyanoba Ghuge	Beed	28.724%
GKEMPLPH-22-4673	Pravina Devidas Rohinkar	Osmanabad	28.737%
GKEMPLPH-22-13115	Ramji Mahepati Raut	Gondia	28.741%
GKEMPLPH-22-10950	Sopan Manikrao Karhale	Chandrapur	28.859%
GKEMPLPH-22-13348	Indrajit Rawji Ghanwat	Gondia	28.885%
GKEMPLPH-22-5644	Ramji Fakira Asole	Buldhana	28.895%
GKEMPLPH-22-4272	Madhavrao Sambharao Shinde	Nanded	28.913%
GKEMPLPH-22-9085	Sandip Dushyantrao Salunke	Bhandara	28.956%
GKEMPLPH-22-7886	Devidas Kundalikrao Rasal	Wardha	28.996%

Third party assessment for monitoring period - Year 2			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-5748	Sulochana Prabhuji Devade	Buldhana	27.302%
GKEMPLPH-22-10009	Dwarkadas Namdevrao Jojar	Bhandara	27.546%
GKEMPLPH-22-519	Ramdas Kashiba Jadhav	Jalna	27.565%
GKEMPLPH-22-5022	Rama Arjun Khillare	Latur	27.578%
GKEMPLPH-22-6200	Anita Suresh Jadhav	Akola	27.622%
GKEMPLPH-22-7023	Rukhminbai Gangadhar Suryawanshi	Yavatmal	27.633%
GKEMPLPH-22-8070	Janabai Nandkishor Naik	Nagpur	27.633%
GKEMPLPH-22-7246	Krushna Neminath Dhabadkar	Yavatmal	27.671%
GKEMPLPH-22-12167	Sachin Baburao Galande	Gadchiroli	27.678%
GKEMPLPH-22-7774	Gangasagar Sakharam Tirthe	Wardha	27.724%
GKEMPLPH-22-6897	Suman Uttamrao Lomate	Amravati	27.747%
GKEMPLPH-22-2095	Suryabhan Rngnath Sable	Parbhani	27.759%
GKEMPLPH-22-6464	Sheshanarayan Gulabrav Atkal	Washim	27.806%
GKEMPLPH-22-7536	Yenubai Laxmanrao Sawane	Wardha	27.840%
GKEMPLPH-22-517	Ashamati Baburao Raut	Jalna	27.874%
GKEMPLPH-22-4674	Kiran Namdevrao Sawandkar	Osmanabad	27.882%
GKEMPLPH-22-10575	Suraj Chandrakant Borade	Chandrapur	27.886%
GKEMPLPH-22-3911	Kailas Laxman Bhapkar	Nanded	27.891%
GKEMPLPH-22-6409	Uttam Tukaram Narwade	Washim	27.938%
GKEMPLPH-22-9461	Kaushalyabai Shankarrao Yadav	Bhandara	28.080%
GKEMPLPH-22-9051	Kailas Subhanrao Pole	Bhandara	28.131%
GKEMPLPH-22-6919	Sk Mohiyoddin Shaikh	Amravati	28.174%
GKEMPLPH-22-8831	Narayan Laxman Birnavale	Nagpur	28.193%
GKEMPLPH-22-37	Ganesh Pandurang` Ladane	Aurangabad	28.222%
GKEMPLPH-22-5320	Venubai Amrutrao Karhale	Buldhana	28.252%
GKEMPLPH-22-9836	Tukaram Subhashrao Renge	Bhandara	28.319%
GKEMPLPH-22-6132	Gangubai Aappasaheb Khandare	Akola	28.349%
GKEMPLPH-22-14128	Pavan Arvind Pund	Gondia	28.363%
GKEMPLPH-22-12305	Santosh Shivpratap Samale	Gadchiroli	28.426%
GKEMPLPH-22-14181	Prakash Namdev Paighan	Gondia	28.493%
GKEMPLPH-22-10742	Suvarna Asaram Kakde	Chandrapur	28.550%
GKEMPLPH-22-12622	Ravan Wamnrao Bongane	Gadchiroli	28.572%
GKEMPLPH-22-4052	Sandhya Prakash Ardad	Nanded	28.599%
GKEMPLPH-22-2320	Prayagbai Ramrao Palatankar	Hingoli	28.608%
GKEMPLPH-22-3146	Pandit Achyutrao Shinde	Hingoli	28.617%
GKEMPLPH-22-3676	Ramji Laxman Kotkar	Beed	28.643%
GKEMPLPH-22-12027	Laxman Bapurao Kukade	Gadchiroli	28.645%
GKEMPLPH-22-518	Nivrutti Namdev Mandal	Jalna	28.762%
GKEMPLPH-22-13067	Nisant Vinayak Jadhav	Gondia	28.863%
GKEMPLPH-22-520	Sakharam Majadu Ambhore	Jalna	28.977%

Third party assessment for monitoring period - Year 3			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-9346	Uttam Kondbarao Ringe	Bhandara	26.836%

Third party assessment for monitoring period - Year 3			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-7095	Sarajabai Sakharam Kadam	Yavatmal	27.022%
GKEMPLPH-22-4415	Sambhaji Narayanrao Rakhonde	Nanded	27.056%
GKEMPLPH-22-6557	Vishnu Bhaurao Gaikwad	Washim	27.105%
GKEMPLPH-22-8182	Kondibhau Dagaduba Athavale	Nagpur	27.146%
GKEMPLPH-22-13876	Dattatray Jagannath Puri	Gondia	27.165%
GKEMPLPH-22-7761	Gajanan Dashrath Mudhavar	Wardha	27.225%
GKEMPLPH-22-2580	Vimalbai Dhondaba Teknor	Hingoli	27.238%
GKEMPLPH-22-535	Vitthal Daruji Limbule	Jalna	27.348%
GKEMPLPH-22-12986	Parmeshwar Limbaji Repe	Gadchiroli	27.372%
GKEMPLPH-22-2118	Keshav Trimbakrao Dhoble	Parbhani	27.387%
GKEMPLPH-22-2475	Balaji Champati Hivale	Hingoli	27.398%
GKEMPLPH-22-9874	Sharada Shailendra Deshmukh	Bhandara	27.507%
GKEMPLPH-22-3764	Subhash Janardhan Yeul	Beed	27.507%
GKEMPLPH-22-11736	Dipak Navnath Wakale	Gadchiroli	27.554%
GKEMPLPH-22-6421	Rekha Babarao Bhondwe	Washim	27.615%
GKEMPLPH-22-8947	Dnyaneshwar Narayan Deshmukh	Nagpur	27.641%
GKEMPLPH-22-4872	Dattatray Nivritti Kadam	Osmanabad	27.652%
GKEMPLPH-22-4426	Prasad Satavarao Bhise	Nanded	27.658%
GKEMPLPH-22-10585	Nurulakha Rahemtulakha Pathan	Chandrapur	27.666%
GKEMPLPH-22-533	Avinash Madhavrao Narwade	Jalna	27.673%
GKEMPLPH-22-6877	Shreeram Shankar Gandhile	Amravati	27.692%
GKEMPLPH-22-6112	Laxman Dashrathrao Awachar	Akola	27.717%
GKEMPLPH-22-5521	Haribhau Avdhutrao Khade	Buldhana	27.774%
GKEMPLPH-22-7117	Vaijanath Kishanrao Savandkar	Yavatmal	27.799%
GKEMPLPH-22-12227	Uddhavrao Dattarao Renge	Gadchiroli	27.848%
GKEMPLPH-22-10905	Mahesh Vilas Dhawal	Chandrapur	27.867%
GKEMPLPH-22-9539	Maroti Bapusaheb Kalyankar	Bhandara	27.901%
GKEMPLPH-22-13722	Dinkar Shriram Tayade	Gondia	28.036%
GKEMPLPH-22-14023	Vilasrao Dattarao Patange	Gondia	28.168%
GKEMPLPH-22-11974	Ramdas Munjaji Dase	Gadchiroli	28.173%
GKEMPLPH-22-6786	Balaji Ashruba Rahate	Amravati	28.185%
GKEMPLPH-22-9242	Nandkishor Vishwanath Londhe	Bhandara	28.234%
GKEMPLPH-22-5641	Someshwar Digambar Vaidya	Buldhana	28.244%
GKEMPLPH-22-27	Kondaba Maroti Paikrao	Aurangabad	28.325%
GKEMPLPH-22-534	Ashroba Bapurao Kadam	Jalna	28.509%
GKEMPLPH-22-6223	Chaya Bhagwan Surawase	Akola	28.634%
GKEMPLPH-22-5063	Aapasaheb Babasaheb Bhanuse	Latur	28.804%
GKEMPLPH-22-536	Babarao Shripatrao Chafe	Jalna	29.724%
GKEMPLPH-22-7371	Digambar Bhaurao Dhabadkar	Wardha	29.955%

Third party assessment for monitoring period - Year 4			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-3912	Ashok Vitthal Kale	Nanded	26.497%
GKEMPLPH-22-6353	Vishnu Babasaheb Londhe	Washim	26.774%
GKEMPLPH-22-552	Gangadhar Tanaji Ambhore	Jalna	26.874%
GKEMPLPH-22-551	Neelabai Munjajee Solanke	Jalna	26.910%

Third party assessment for monitoring period - Year 4			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-3593	Ranjit Vithalrao Dangat	Beed	26.913%
GKEMPLPH-22-11379	Somani Dhanraj Shriram	Chandrapur	26.920%
GKEMPLPH-22-2616	Vijaykumar Dnyanba Wable	Hingoli	26.952%
GKEMPLPH-22-4625	Kalyan Manikrao Pandharkar	Nanded	26.968%
GKEMPLPH-22-6121	Gangaram Dagduji Guvhade	Akola	26.972%
GKEMPLPH-22-8719	Ashok Shankarrao Bhoskar	Nagpur	26.995%
GKEMPLPH-22-5534	Santosh Vilasrao Waghmode	Buldhana	27.013%
GKEMPLPH-22-7712	Santosh Hamchand Padole	Wardha	27.022%
GKEMPLPH-22-13230	Pandurang Vishvanath Londhe	Gondia	27.027%
GKEMPLPH-22-9387	Amarnath Anand Chaudhari	Bhandara	27.062%
GKEMPLPH-22-549	Baban Sonba Sonsale	Jalna	27.074%
GKEMPLPH-22-550	Digambar Amarsing Rathod	Jalna	27.138%
GKEMPLPH-22-7561	Dinkarrao Dattrao Deokar	Wardha	27.151%
GKEMPLPH-22-13520	Kalavantibai Devarao Lomate	Gondia	27.155%
GKEMPLPH-22-6056	Shivashankar Radhakisan Wagdare	Buldhana	27.172%
GKEMPLPH-22-7272	Bhimrao Narayan Hanumante	Yavatmal	27.190%
GKEMPLPH-22-12248	Madhav Keshavrao Kenche	Gadchiroli	27.251%
GKEMPLPH-22-13268	Nagarbai Baburao Wayakar	Gondia	27.255%
GKEMPLPH-22-4899	Baliram Gulab Taur	Osmanabad	27.268%
GKEMPLPH-22-5227	Shantabai Ramrao Kadam	Latur	27.336%
GKEMPLPH-22-2025	Narayan Kerba Muthal	Parbhani	27.393%
GKEMPLPH-22-12699	Ramdas Gamaji Khokle	Gadchiroli	27.414%
GKEMPLPH-22-9488	Kamlbai Tukaram Suryavanshi	Bhandara	27.426%
GKEMPLPH-22-8393	Bhagvan Sakhamam Nichal	Nagpur	27.428%
GKEMPLPH-22-9479	Raman Kashiram Bodkhe	Bhandara	27.522%
GKEMPLPH-22-299	Baburao Punjarao Maske	Aurangabad	27.524%
GKEMPLPH-22-6923	Sandip Malikarjun Gundle	Amravati	27.540%
GKEMPLPH-22-6253	Chandrakala Rangnath Taur	Akola	27.547%
GKEMPLPH-22-6644	Dnyaneshwar Ramrao Choudhari	Washim	27.551%
GKEMPLPH-22-12833	Vilas Rajaram Mundhe	Gadchiroli	27.616%
GKEMPLPH-22-7197	Umaji Vithoba Kokane	Yavatmal	27.649%
GKEMPLPH-22-10433	Shivaji Mahadev More	Bhandara	27.837%
GKEMPLPH-22-12824	Panduragn Limbaji Khokale	Gadchiroli	27.877%
GKEMPLPH-22-6787	Shivaji Lakshman Kadam	Amravati	27.885%
GKEMPLPH-22-11391	Suryakant Shankarappa Here	Chandrapur	27.974%
GKEMPLPH-22-2599	Suresh Namdev Zunzurde	Hingoli	28.679%

Third party assessment for monitoring period - Year 5			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-13299	Santosh Karbhari Bahad	Gondia	25.962%
GKEMPLPH-22-4167	Sunil Dnyanenba Tambile	Nanded	26.163%
GKEMPLPH-22-13251	Sarwati Walmik Kokate	Gondia	26.267%
GKEMPLPH-22-12291	Shankar Kishanrao Narote	Gadchiroli	26.343%
GKEMPLPH-22-2038	Kartik Ganesh Tangade	Parbhani	26.419%
GKEMPLPH-22-3233	Vishnu Tatyasaheb Udhan	Hingoli	26.483%
GKEMPLPH-22-12524	Pandurang Piraji Satbhai	Gadchiroli	26.526%

Third party assessment for monitoring period - Year 5			
Identification number	Beneficiary name	District	Tested Efficiency
GKEMPLPH-22-3367	Shankar Jayaji Gite	Beed	26.550%
GKEMPLPH-22-11997	Rushikesh Radheshyam Khadke	Gadchiroli	26.648%
GKEMPLPH-22-6280	Vasantrao Marotao Magar	Akola	26.679%
GKEMPLPH-22-10477	Parbatabai Ganpatappa Sontakke	Bhandara	26.709%
GKEMPLPH-22-9252	Vishnu Shrirang Khodke	Bhandara	26.795%
GKEMPLPH-22-3925	Vishnukumar Dattappa Dukre	Nanded	26.808%
GKEMPLPH-22-7005	Kevlabai Shankar Shinde	Yavatmal	26.861%
GKEMPLPH-22-5846	Tukaram Kondiba Latpate	Buldhana	26.866%
GKEMPLPH-22-568	Baliram Laxman Bhusnar	Jalna	26.887%
GKEMPLPH-22-7972	Tukaram Subhashrao Renge	Wardha	26.906%
GKEMPLPH-22-566	Bhagwat Balasaheb Ganje	Jalna	26.926%
GKEMPLPH-22-7268	Shivanand Balagod Santpure	Yavatmal	26.934%
GKEMPLPH-22-565	Anusayabai Namdev Gokhare	Jalna	26.966%
GKEMPLPH-22-6034	Dnyaneshwar Yedoji Sule	Buldhana	26.983%
GKEMPLPH-22-6609	Ramakant Ramchandra Mokashi	Washim	27.104%
GKEMPLPH-22-13910	Gangadhar Sambhaji Nadre	Gondia	27.251%
GKEMPLPH-22-2521	Sarswati Baburao Vyavahare	Hingoli	27.293%
GKEMPLPH-22-6416	Ratabmala Pralhad Dahire	Washim	27.347%
GKEMPLPH-22-6347	Dnyanedv Mokinda Wakale	Akola	27.383%
GKEMPLPH-22-12821	Sheshrao Champatrao Narwade	Gadchiroli	27.391%
GKEMPLPH-22-10472	Kalyanrao Baburao Sawane	Bhandara	27.402%
GKEMPLPH-22-6667	Shanta Shrinivasrao Chaduphale	Amravati	27.467%
GKEMPLPH-22-10507	Parasram Kishan Khandare	Chandrapur	27.523%
GKEMPLPH-22-317	Raju Gopinath Nevhal	Aurangabad	27.558%
GKEMPLPH-22-4964	Ashok Waman Kakde	Latur	27.634%
GKEMPLPH-22-10772	Dnyandev Kisanrao Sangale	Chandrapur	27.666%
GKEMPLPH-22-4828	Dnyaneshwar Raghunath Dhembre	Osmanabad	27.676%
GKEMPLPH-22-7637	Sayyad Furkan Sayyad	Wardha	27.789%
GKEMPLPH-22-6759	Gayabai Namdev Bhutekar	Amravati	27.799%
GKEMPLPH-22-8982	Shamrao Shankarrao Maske	Nagpur	27.849%
GKEMPLPH-22-10147	Navnath Haribhau Gore	Bhandara	28.019%
GKEMPLPH-22-567	Shivram Ganpati Kokate	Jalna	28.053%
GKEMPLPH-22-8138	Shrinivas Murlidharrao Deshmukh	Nagpur	28.593%

5.2 Project Emissions

Project emissions are considered as zero for this project as no fossil fuels are used

5.3 Leakage

The leakage emission per cook stove is estimated as difference between the emission reduction estimated considering the actual value of Bold and emission reduction estimated considering the value of Bold obtained by multiplying Bold with a net to gross adjustment factor of 0.95.

Parameter	Data	Unit
Leakage emission	0.053	tCO ₂ e /cook stove/ year

Leakage emission due to use of traditional cook stove usage (assuming 0 for ex-ante)	0	tCO ₂ e /cook stove/ year
Leakage emission, (LE _y , per cook stove)	0.053	tCO ₂ e /cook stove/ year

Therefore, the total leakage emission (LE_y) for the project activity assuming 90% of 14,200 Nos. cook stove distributed is 672 tCO₂e /year.

The leakage emissions achieved for this monitoring period is 3,206 tCO₂e /year.

5.4 Net GHG Emission Reductions and Removals

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)
08-October-2012 - 07-October-2013	11,407	0	571	10,836
08-October-2013 - 07-October-2014	13,776	0	689	13,087
08-October-2014 - 07-October-2015	13,375	0	669	12,706
08-October-2015 - 07-October-2016	13,010	0	651	12,359
08-October-2016 - 07-October-2017	12,503	0	626	11,877
Total	64,071	0	3,206	60,865

Comparison with the actual emission reductions achieved with the estimated emission reductions:

Duration	Net emission reduction for the project activity in the year y, ER _y	Estimated Emission Reductions	Comparison
08-Oct-2012 - 07-Oct-2017	60,865	63830	-4.87%