



**WORKSHOP REPORT FOR IMPROVED COOKS STANDARDISATION
HELD FROM 9TH – 11TH JANUARY 2018 AT DESERT BREEZE HOTEL,
ARUA FOR NORTHERN REGION**



Supported by:

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Facilitated by:

Uganda National Bureau of Standards

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Acronyms

ADRA	Adventists Development and Relief Agency
CBOs	Community Development Organization
CCEDUC	Care Community Education
CLASP	Collaborative Labeling and Appliance Standards Program
DLG	District Local Government
DRC	Danish Refugee Council
FAO	Food and Agriculture Organization of the United Nations
LWF	Lutheran World Federation
MOEMD	Ministry of Energy & Mineral Development
OPM	Office of the Prime Minister
PoC	Person of Concern
UNBS	Uganda National Bureau of Standards
UNHCR	United Nations High Commissioner for Refugees

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Our sincere thanks goes to all the partners who participated and unreservedly made their significant contribution to this process. Great thank you to ADRA and Yumbe DLG for coordinating the field work and we thank the community in Zone 2 and 3 of Bidibidi for turning up for the focus group discussions. I am hopeful that their feedback and submission will have a great bearing on the final document.

1.0 INTRODUCTION

Uganda National Bureau of Standards (UNBS) in collaboration with the Ministry of Energy & Mineral Development (MOEMD) of the Republic of Uganda has been working with key stakeholders, including the Office of the Prime Minister (OPM), to review standards and subsequently develop and implement a certification program for clean cook stoves. This initiative, which is supported by Collaborative Labeling and Appliance Standards (CLASP), seeks to support the clean cook stoves sector through implementing appropriate national standards and improving the quality of their clean cook stoves. This will ensure that the cook stoves meet both the basic thermal efficiency and emission requirements for improved cooking and quality of life of the users. OPM, in partnership with UNHCR, are the largest buyers of improved cook stoves that are mainly used in the refugee settlements. They are currently working with a large number of improved cook stoves manufacturers and Community Based Organizations (CBOs) based in 12 Districts in the Northern and Western regions where there are large concentrations of refugee settlements.

OPM has collaborated with UNBS to support these CBOs and clean cook stove producers to implement standards in a bid to improve the quality of their cook stoves and have their cook stoves certified for compliance to quality and safety requirements. These efforts will support this sector to improve quality and grow. To kick start this initiative, UNBS & OPM, with support from UNHCR, embarked on field visits to the two regions to carry out a preliminary assessment of the production processes and technologies for cook stoves in these regions, the nature of products, and subsequently identified key challenges and gaps both in the processes and products. The team also sought to create initial awareness among the producers and CBOs on the standard and certification process requirements

1.1 PURPOSE OF THE WORKSHOP

The main purpose of the workshop was to create awareness on the appropriate national cook-stoves standards and the proposed UNBS certification scheme requirements. In the course of the workshop, participants were expected to conduct in-situ gap assessment for both the production processes of the improved clean cook stoves in selected zones of refugee settlements, quality assurance and control processes and the product quality based on physical evaluation and user feedback.

1.2 OBJECTIVES OF THE WORKSHOP

- To create awareness among CBOs and improved cook stoves producers supplying UNHCR on the national clean cook stoves standards and certification scheme requirements;
- To seek the views of the CBOs and other District staff involved in the clean cook stoves sector on their input regarding the implementation of the UNBS standards and certification program for clean cook stoves producers in these regions;
- To visit selected improved cook stoves producers to conduct a gap assessment on their production and quality assurance and control processes and practices;
- To visit selected users in refugee settlements to obtain feedback on the quality and performance of the improved cook stoves supplied by UNHCR.

1.3 ORGANIZATION OF THE WORKSHOP

- Day One (Tuesday, January 9, 2018): held a one day awareness workshop with the CBOs, cook stove manufacturers, UNHCR staff and selected District officials directly involved in the cook stoves sector;
- Day Two (Wednesday, January 10, 2018): made a visit to selected clean cook stove users to understand and assess their production methods and QA/QC processes and products;

- Made a field visit to selected CBOs to understand their role and level of support they provide clean cook stove producers;
- Day Three (Thursday, January 11): review of the previous day's excursion to the refugee settlements
- Discussions with selected District officials directly involved in the clean cook stoves sector to understand exactly their role and level of support for the cook stove producers;

1.4 WORKSHOP EXPECTATIONS

- Better awareness on the improved cook stoves standards and certification requirements created among the CBOs and cook stove producers supplying UNHCR;
- Identification of gaps and areas of improvement in the production and quality assurance/control processes and the product performance and physical quality identified;
- Better understanding with regards to implementation of the clean cook stoves standards and certification obtained from those who will actually use the standards;
- Inauguration of a workable mechanism for implementing the clean cook stoves standards and certification program for these producers developed;

1.5 PARTICIPANT'S EXPECTATIONS

- Types and efficiency of stoves available in market
- What are the actual national standards?
- Which type of stoves are recommended for PoCs
- Cost effectiveness of the stoves
- how to make existing stoves even more efficient
- Geographical coverage of stoves in the settlements
- Raw materials used and their mix in stove construction

1.6 PARTICIPANTS AT THE WORKSHOP

The workshop attracted participants from respective departments of environment and natural resources in the local governments of Arua and Moyo districts, OPM, UNHCR, GiZ, ADRA, UNBS and implementing partners and CBOs. A total of 45 participants (comprising 42 males and 3 females) participated in the workshop.

1.7 WORKSHOP METHODOLOGY

The workshop involved presentations from the facilitators followed by discussions of the presentations. Field work was carried out in the second day to have a feel of the field experience and get views of the beneficiaries of cook stove interventions. One by the district local authority and another by an International NGO in Bidibidi refugee settlement. Overall the process of delivery was participatory

2.0 DAY ONE PROCEEDINGS

2.1. Challenges faced in use of cook stoves observed by those who have interacted with them

- Adoption/adapting the stoves to the local setting
- No marking of the stoves/limited information
- Efficiency not known for most of the stoves distributed in the refugee settlements
- There are many stove types and thus PoCs getting confused on which one to use

- Many people including distributors are not aware of the laws and standards in the sector
- Weak regulation in the sector
- How best can be cook stoves be distributed – free distribution v/s sale (Market Model)
- Cook stoves should be gazetted to user groups (issues of categorization of users in relation to energy sources)
- Issues of how easy it is to light or make fire in the stoves needs to be addressed by the stove manufacturers
- Cultural issues relating to cooking affecting adoption of cook stoves. This relates to design of cook stoves and its integration of cultural practices of user groups
- Standards question, where is it coming from and who is it meant for? The manufacturer, distributor or the user (in this case the PoCs and the Host community)?

2.2. PRESENTATION BY UNBS

- UNBS is a standards body and is responsible for development and implementation of standards in Uganda
- Standards development is demand driven and thus the need for standards comes from the specific sectors and groups of people who have felt a need for standards to regulate their operation and processes
- All standards are developed as voluntary standards but can be upgraded to a mandatory standard upon need for regulation and sensitivity of the sector. Sectors such as those that have significant impact on health and the environment are categorised under mandatory standards and thus the biomass cook stove standards falls under the mandatory category
- The presentation also highlighted fact that voluntary standards have optional implementation whereas mandatory standards must be implemented and thus an implementation strategy needs to be put in place
- The presenter further highlighted the vision, mission, objectives and values of UNBS and emphasized UNBS promotes innovation as a key value and thus seeks to promote healthy product development and marketing rather than kill innovation
- Key steps in certification of a product such as the biomass cook stoves were presented as follows;
 - Complete and submit application
 - Production and Quality Assessment and Quality Conformity processes assessment
 - Product evaluation
 - Obtain Certification

The basic components of a typical Clean Cook Stoves Certification Scheme would therefore include; Process flow (methodology, material mix), Administrative requirements (status of the manufacturing agency – whether legally registered or not), technical requirements relating to the cook stove and certification fees which charged to facilitate the process since certification is demand driven.

Key technical requirements for a typical cook stove includes;

- i. Thermal efficiency (percentage of energy saved by the stove - this requires tests to be done both infield and in the laboratory)
- ii. Information and labelling – details of the materials used, manufacturing date, name of the company, operation procedures etc.
- iii. Durability – minimum duration of 2 years for households cook stoves according to the current standard
- iv. Safety – this emphasis the need to protect the user from heat and other health risks that are likely to happen while using the cook stoves. Issues of stability of the stove, heat leakage and

surface emission of heat while cooking using the stoves are all taken care of under safety properties of the stove

- v. Indoor emissions - this looks at the smoke and heat emissions from the stove while being used
- vi. Workmanship – this looks at the physical features of the stove after finishing. The heat protections, the rough edges and it plays a big factor on the safety of the user

2.3 DRAFT COOKSTOVE STANDARD

The draft standard was presented at the workshop by UNBS. The presentation focused on key areas of technical specifications, manufacturing and distribution of the finished product. Following the presentations, participants emphasized the need to certify the stoves already distributed in the refugee settlements. Laboratory and field tests of stoves needs to be complied with before they can be distributed in the refugee settlements. The issues of design, size and type of stoves was said not be an issue that can be addressed by the standard. According to the presentation, there can be as many type of stoves as possible but the most important thing is that all of them conform to the minimum conditions set in the standards as already enlisted in previous sections.

The irreducible minimums identified by UNBS with regards to the cook stoves were:

- Emission factor
- Thermal efficiency
- Safety
- Durability

Participants concerns on the draft standards

- The participants noted that the standard was mainly focused on the formal manufacturing sector thus leaving the informal sector in the refugee settlements
- The type of fuel was not clearly defined in the standard. This was later on clarified by UNBS that the fact that the standard focus on Biomass cook stoves clearly means that it covers all biomass fuel types including but not limited to firewood, charcoal, briquettes and bio-gas.
- Participants emphasized the need to strongly incorporate safety requirements in the standards
- The standard should also provide for local artisans operating in the local settings
- The issue of weight of the stoves especially for the portable stoves was raised as one of the factors curtailing adoption of the stoves
- There was a request to know if there are standards for locally constructed stoves like Lorena, mud shielded firewood stoves and the metallic charcoal stoves
- The cost of cook stoves varies greatly and there is need to standardize the cost issues relating to cook stoves
- There was expression of need to adapt the cook stoves to the different cultures. This entails doing assessment of the energy needs and demands, the analysis of cooking habits so that stoves can be designed to target specific cultures and technical needs can be customized to fit within the cultural and resource limitation context of the intervention

Key highlights from UNBS

- The design question to be answered by the consumers/users other than defined by the standard but basics on performance benchmarks must be established at a minimum.
- Certification with a Q mark indicates the minimum requirement; you must choose what is better for the target population
- Set up guidelines in the form of SOPs and strengthen the technical coordination programs. For as long as it attains the basic minimum standards

- Strengthen the existing structures locally for stove manufacturing and construction rather than buying stoves from far away which are not consistent with the demands of the PoCs and the host communities.
- Subject the procured stoves to specific laboratory and field tests before they are distributed to confirm compliance to the standards

2.4 Presentation from Care Community Education (CCEDUC) a CBO that constructs and promotes construction of energy saving stoves in Bidibidi

- The CBO is based in Yumbe District with offices in the town council. Their major objective is to reduce firewood usage in the community for both refugees and host community. In reducing firewood usage, which accounts for over 98% of the fuel needs for cooking, they believe that tree cutting can be reduced and environment protected.
- The stoves are constructed using raw mud bricks and they have proved to be a success reducing firewood usage from three headload (a weak to just one headload) which he called buddles. The efficiency of this stove was said to be up to 50% thus saving 50% biomass that would be cut down for cooking. The stove produces minimal smoke and is appreciated by the community.
- In the discussions, it was agreed that this stove could be improved and the efficiency pushed even further up with appropriate use of materials and improvement in designs especially in the saucepan cavity.

2.5 UNHCR Information Portal for Energy and Environment and FAO Presentation

UNHCR: The environmental health expert UNHCR presented in a short session on the newly created information portal for Energy and Environment. And emphasized the need to collect information to upload in the portal from the different operations. The portal can be accessed through the following url; www.ugandarefugees.org.

FAO: Report was presented to appreciate the need for sustainable energy interventions and for joint and collective efforts to invest in the supply site of energy response. The report presented three scenarios. Scenario one indicated that if the current trends of wood fuel consumption is maintained, all the available vegetation in Bidibidi settlement would be finished in 3 years. Scenario two modelled that with intervention of using energy saving stoves by all households, the available wood fuel would be finished in 4 years and Scenario Three, which is the plausible scenario shows that if use of improved cook stoves is combined with development of 9,000-12,000ha of fast growing trees species, then the vegetation and fuelwood supplies can be sustained in a long haul and this would promote peaceful coexistence between the refugees and the host communities as well as sustaining the environment

3.0 DAY TWO: FIELD WORK IN YUMBE DISTRICT (BIDIBIDI SETTLEMENT)

The field work was guided by ADRA and Yumbe District Local government. Its purpose was to have a field learning experience on use of improved cook stoves. The team paid a courtesy call to UNHCR Field Office and OPM before heading to the community. The community focus group discussions were held in two sites in Zone II and Zone III and comprised both the PoCs and the host community. The main issues raised by the community on the cook stoves were captured and discussed on day three of the workshop. This process was useful in guiding recommendations for the workshop and for incorporation into the Biomass Cook Stove standards which is to be finalised in February 2018.

3.0 DAY THREE: DISCUSSION OF FIELD FINDINGS AND RECOMMENDATIONS / WAYFORWARD

3.1 Group Reflections from field

In day three each group provided feedback on the findings in the field and the key issues and way forward from the field experience are presented below;

Group 1 (Zone 2- Bidibidi);

- The partner implementing energy interventions in this zone is ADRA
- Intervention currently covers three villages (out of the 16 villages in Zone 2) and targets approximately 2000 households
- The approach adopted by the project is to reach out to the community and train them through ToTs to make / construct the energy efficient stoves in their kitchens

Team reflection and way forward

- Great work by ADRA on enhancing energy efficiency in Zone 2
- Near universal adoption of the Lorena improved cook-stoves by refugees residing in the 3 villages in Zone 2
- ADRA spends only UGX 10,000 (less than US\$3) per cook-stove
- TOTs have been trained to fabricate the cook-stoves
- The TOTs move around the zone, doing maintenance work with HHs
- TOTs have each been assigned between 200 and 300 HHs
- Reductions of households' biomass use by at least 50% as testified by women who reported use of 1.5 bundles per week, instead of 3 bundles they previously used before ADRA intervention
- In our zone, women expressed their satisfaction with the cook-stoves
- High preponderance of fruit trees, especially in Zone 2
- Denudation of vegetation cover in other parts of the settlement – evident when compared to areas with no refugees

Group 2: Zone III Refugee and Host Community Feedback on Cook Stoves

The group comprised the PoCs and the host community with over 80% of the participation of PoCs. The meeting venue is also where the temporary storage for energy saving stoves distributed by Yumbe District Local Government supplied by International Lifeline Fund (ILF) and a site for manufacturing of local portable stoves by a women group trained by GiZ. The major focus was on the type of stoves used by the community, the challenges they face and the way forward.



A well-constructed and maintained Lorena stove in a PoCs kitchen in Zone II Bidibidi



A Lorena cook stove operating side by side with three stone open stove



Figure 2A stove that uses both charcoal and firewood



Figure 2A Lorena stove no longer in use

The major challenges

1. ILF stoves

- Heavy, difficult to move in and outside
- Poor air flow (no air inlet)
- Difficult to light
- Opening for wood is very small
- Too small for sauce pans
- Some use but also still using 3-stones
- Refugee perceive lighter, metallic portable stove as better
- Would prefer to use charcoal as it produces less smoke



2. Local Mud stoves

- Clay is cracking – this may be an issue related to the raw material quality and formulation
- Users prefer better air flow and that saucepans are placed inside for better heat transfer in this model versus ILF
- Minimal local distribution and usage at present



Samples of Local Mud Stoves made by ToTs Trained by GiZ showing cracking and broken saucepan cavity

3. Recommendations from group

- Direct follow-up should take place with the community that was consulted within 2 weeks
- Existing supplied stove may be improved by creating clearance underneath and removing accumulated ash. Perhaps mounting on top of bricks to allow airflow from underneath – some training and troubleshooting can be done
- Recommend 1-day training for all extension workers and representatives from refugee and host communities that received the ILF stoves who can then bring knowledge back to the community
- Distribution and training to be improved in general – all interventions should include **pre-consultation with the community for stove selection**, training and follow-up with the community.
- Pre-consultation should include demonstration whether by traveling to other villages or on-site
- Clay making procedure for locally made stoves or alternative stove types can be reviewed
- Design of stove must be tested and refined with user-feedback
- Testing and approval of a few key models to be accepted for implementation in refugee settlements and host communities
- Technical Working Group Sub-Committee on Cook Stoves to be established

4. Additional comments by participants after field work

- Some households are constructing their own Lorena stoves
- Sauce pan diameters should be included in product order specifications
- Clay binding may be improved by adding grass and other additives – production technique should be reviewed
- If there was demand for the stoves then the stoves would not have been left idle in storage
- Intimate engagement is needed to achieve the results of environmental protection
- Stoves are bought from Lira by ILF who have worked with GIZ, stoves were tested by CREEC – there should have been a user manual and training
- Using half-dry firewood – this stove is not compatible and efficient in that case
- Partners are between producers and users – end-users have not been prepared well. Rapid nature of humanitarian projects such that partners struggle to implement in short timelines. User feedback is important.
- Culture plays a key role in the usage of the stoves – cassava is a primary food that is cooked, cook stoves should be designed to be suited for the cooking techniques
- Cook stoves are social products – should be designed to be responsive to people’s needs and uses

3.2 Presentation on cook stoves by GiZ

The GiZ presentation focused on the EnDev Programme which aims at transforming the energy interventions through market oriented model. The program looks at both the supply and demand side of the energy equation. The focus is on energy saving stove technologies and also generation of fuel wood through planting of fast growing tree species.

Recommendations from GiZ

- Build capacity of local artisans
- Explore option of using a business model to stove distribution rather than issuing for free
- There is need to strengthen coordination between partners intervening in the energy sector to avoid duplication of efforts as observed in some instances
- Stove construction should pay keen attention to the social as well as technical details to make them acceptable
- The choice of material and mixing of materials plays a major part in ensuring thermal efficiency of a stove
- The stove needs to be supplied with user manuals and beneficiaries should be trained on how to effectively use the stoves as part of the package by the manufacturer

4.0 WRAP UP REMARKS

UNHCR: Need ongoing collaboration and participation through Technical Working Group and ongoing regional meetings to leverage the knowledge and experience of partners, information sharing through ugandarefugees.org portal, lessons learned and best practices need to be identified and scaled up, more engagement with community yields better empowerment and outcomes

UNBS: Procurement and Delivery; Batch Certification; Product Certification; Continuous Improvement

District Local Government

- Feel that what specific stoves should be promoted in the settlements and the surrounding host communities at the household level?, preference is given to Lorena stoves because they are easy to make and users can easily repair them and there is available knowledge and skill for making them
- Each district as district energy focal persons; district focal persons should be invited to review procurement as they have technical background
- Ministry of Energy – spearheading the use of renewable energy in coordination for GIZ
- Networking and information sharing – suggests quarterly meetings and field visits
- Commitment to compliance – environmental screening
- More emphasis on fuel wood e.g. in Moyo refugees being chased away in areas that they are going to collect firewood which can cause conflict; host communities are interested in cutting grass and selling to host communities, resources are limited – technology will not function without fuel wood
- Partners to share work plans – need to avoid duplication of target areas
- Some partners look for soft landings in zones where it is easier to implement
- DLGs should map which partners are doing what

Office of the Prime Minister:

- Role of OPM is coordination but not technical as such OPM works hand in hand with the technical people to make sure that services are delivered to the persons of concern.

- OPM has come on spot light several times being accused of destroying the environment, not given jobs to the children of the host community and not giving business and so forth. It is true that in all sectors environment scores average yet money has been spent. It is therefore important that the districts take up the coordination role with full engagement of the line ministries to ensure accountability and value for money for the investments in the energy conservation efforts.

5.0 SUMMARY FINDINGS AND RECOMMENDATIONS

5.1 General lessons and key findings from the workshop

- Different partners have different yet uncoordinated interventions in the settlements on energy cook stoves
- The cook stove distribution exercise was not preceded by training and there has been limited post distribution monitoring by partners
- The ADRA model of training local ToTs and facilitating them to carry on stove construction has worked well in Bidibidi and could be replicated in other zones and settlements by energy partners
- All stove distributions were not preceded by training and this has resulted into low adoption rates and abandonment of stoves
- There has been weak or no coordination mechanism for energy in the settlements as such all interventions are in parallel and in some cases same community has been targeted and some households have multiple stoves while others do not have
- They have general resentment for ILF stoves describing them as heavy and have some design mal-functions - this afterwards was traced to the fact that stoves were distributed without manufactures user manual and training thus affecting its effectiveness and use
- There was general consensus that there is need to conserve the existing fuel wood by adopting more sustainable cooking approaches
- The standards are geared towards household cook stove however general principles apply also to the institutional stoves such as thermal efficiency, safety, durability, emission levels and finishing
- The locally made stoves can be certified for as long as they meet the necessary technical and social specifications

5.2. Recommendations and Action Points

- Need for profiling of stove types and designs in the settlement. This will eventually lead to settlement specific recommendations for cook stoves for promotion
- There is need to make a follow up to the community in Zone III to do further analysis of the stove issue and come out with practical recommendations for further intervention. This may include training of the beneficiaries
- The recommendations of the workshop to be incorporated into the final discussion of the standards. In the main time, the draft standards will to be shared for acclimatization by the participants
- There is need to maintain a platform for discussion of energy needs and interventions in the region. A quarterly meeting is proposed on rotational basis for the workshop group and key partners to discuss energy and environment interventions for more mainstreamed and targeted interventions in the sector
- UNBS cannot pronounce itself on a stove type or design. This is basically to promote innovation which is one of the core values of UNBS. What the standard does is to set minimum conditions

which stove must conform to have them accepted for distribution. The UNBS is open to provide services to partners, OPM and UNHCR in terms of tests and pre and post distribution verification for cook stoves both household and Institutional.

- The stove standards now focus on household cook stoves. Standards for Institutional cook stoves are being worked upon. In the main time for institutional cook stoves, it advised to use already certified companies for manufacture and distribution of Institutional cook stoves. These organizations/companies are under the umbral bodies of Biomass Energy Efficient Technologies Association (BEETA)
- From a similar workshop for western Uganda, it was recognized that some Institutional stoves have already been constructed and this could form a basis for lesson learning and further recommendations for Settlement based Institutional stove construction especially for the settlements in West Nile and Northern Uganda.



Energy Access in Refugee Settings

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*energising
development*

Outline

- Background- Refugee Energy crisis
- GIZ Approach to Energizing Development (EnDev)
- Non Conventional Energy sources-Practical examples for Refugees in Uganda
- Improved stove construction using local materials
- Dimensions and structural designs
- Tools, Local Materials preparation and basic steps in construction
- The Million Question Challenge for development partners
- Monitoring and Evaluation

Background - World ^(1/2)

15 armed conflicts in the last 5 years, e.g. South Sudan, DRC, Burundi (**UN Annual Report 2017**):

A long horizontal line of small, dark silhouettes representing a large group of people, including men, women, and children.

65.3 million forcibly displaced people

A horizontal line of small, dark silhouettes representing a group of people, including men, women, and children.

21.3 million refugees

A horizontal line of small, dark silhouettes representing a small group of people, including men, women, and children.

10 million stateless people

A single dark silhouette of a person.

107.000 settled refugees



Background - Uganda (2/2)

- 1.4+ million refugees, among which 900.000+ from South Sudan
- More than **80%** live in **rural settlements**
- Largest settlements located in **North-Western** Uganda
- Around **97%** of refugees lack access to **safe, clean and sustainable energy**



What is Energising Development (EnDev)?

General

GIZ EnDev is a partnership program that promotes **sustainable access to modern energy services** that meet the needs of the poor - long lasting, affordable, and appreciated by users.

Regional Presence

All parts of Uganda and New service areas including refugee response, collaborative presence through partnerships with other NGOs

Sector Support

Support to advocacy & awareness creation and innovation in the clean and efficient cooking sector. Support to key private sector actors

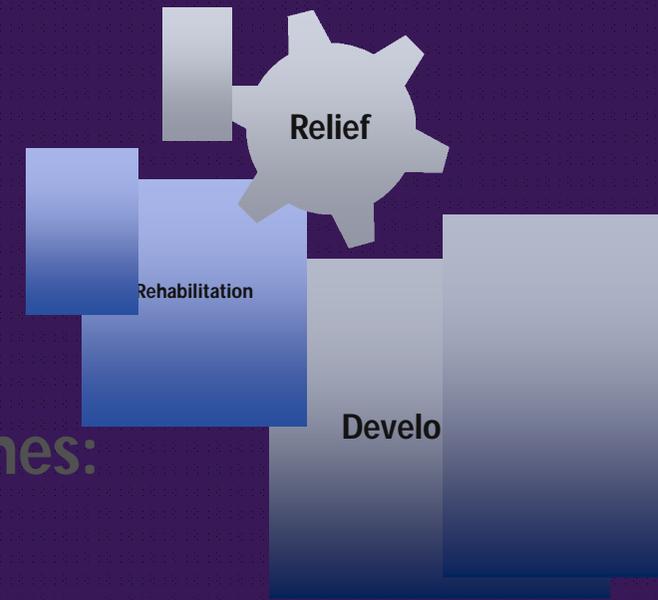
Quality Brand

GIZ EnDev Uganda jointly works with MEMD on a concept for possible next steps of the "Good stove - Better cooking"-brand and certification.

Standards

Stove testing labs; Supporting partners (CREEEC, Nabeya Forestry school, NGOs) to develop tailored specifications of stove designs, testing, and training materials/manuals

Demand-Driven (Market-Based) Approaches and LRRD



- **Characterization of market-based approaches:**
 - ✓ Involvement of private sector actors
 - ✓ Replacement of giveaways by Non monetary (Vouchers) and monetary payments
 - ✓ Balance demand and supply
- **Linking Relief, Rehabilitation and Development (LRRD)**
- **Create evidence that demand-driven(market-based) approaches can facilitate access to modern energy services in refugee settings.**



Intercropping maize with p/peas

Intercropping: More maize from the same land

- planted at the same time, p/pea removed just before new planting season
- **nitrogen fixing legume** reduces fertilizer needs and provides ground cover nearly all year (**less soil erosion** by wind and surface run-off)
- **improves yield of maize** (healthier plants, better root development, thicker stems, broader and darker leaves, more and bigger cobs, more grain etc.)
- annual crop, can be planted as **short rotation food+energy crop** on private land
- annual biomass yield can exceed **5 tons/ha**, depending on climate and variety
- p/pea leaves with high nitrogen content decompose easily and improve fertility, **infiltration and water retention capacity** of the soils (less water logging, improved drought tolerance and resilience of crops)
- after use as fuel mineral nutrients from ash can be reincorporated into soils

BAMBOO

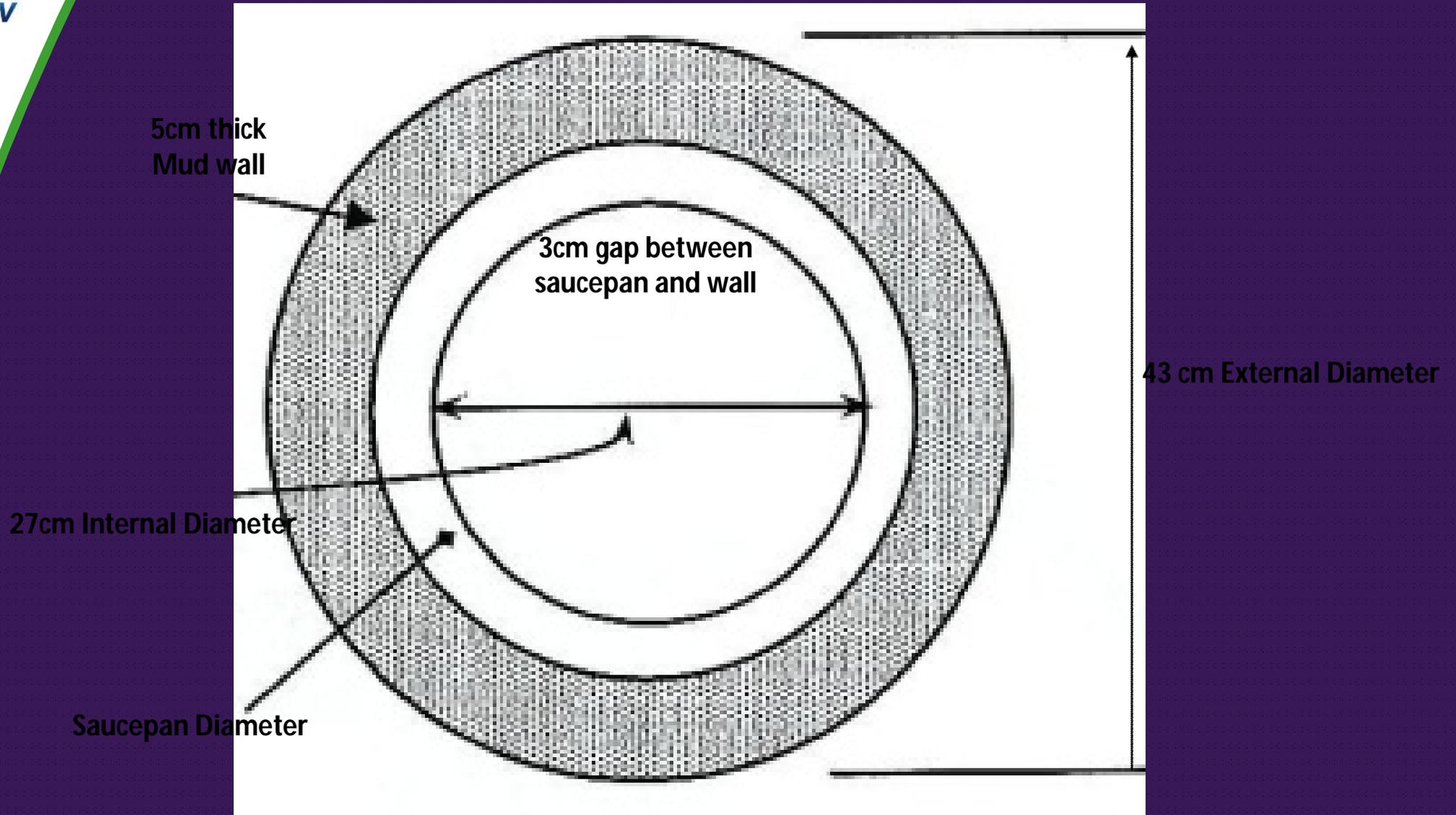
a sustainable source of cooking energy



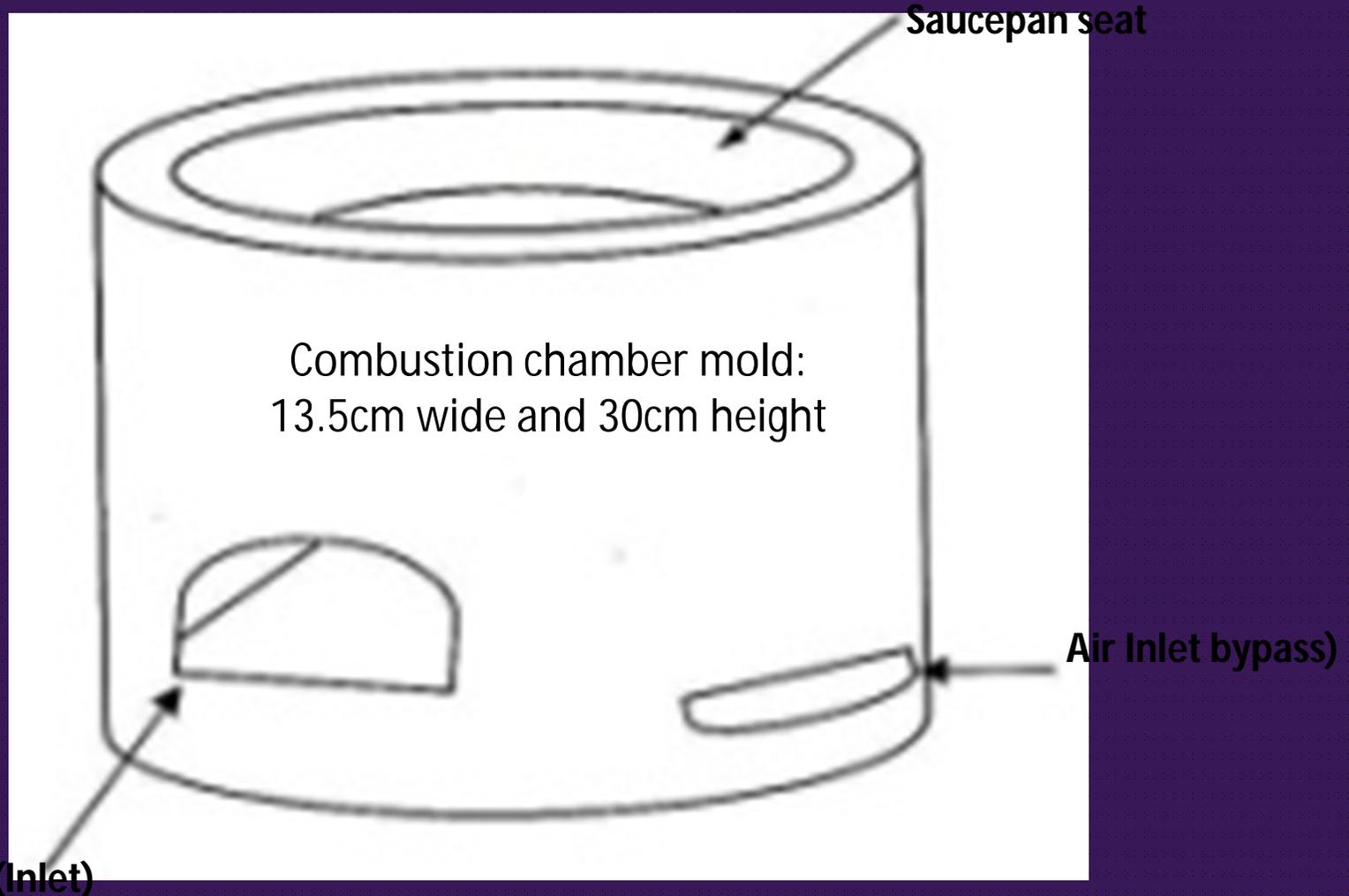
Dimensions between saucepan size & Combustion chambers

Saucepan Diameter (cm)		Square mould (cm)	Circular diameter (cm)	Height (cm)	wood box, 2/3 (cm)	Air Inlet, 1/3 (cm)
Size 1	≤ 27	12	13.5	24-30	9	4.5
Size 2	27-35	14	16	35	10.7	5.3
Size 3	35-45	16	18	40	12	6

Metric measurements between saucepan size & body of the stove wallings

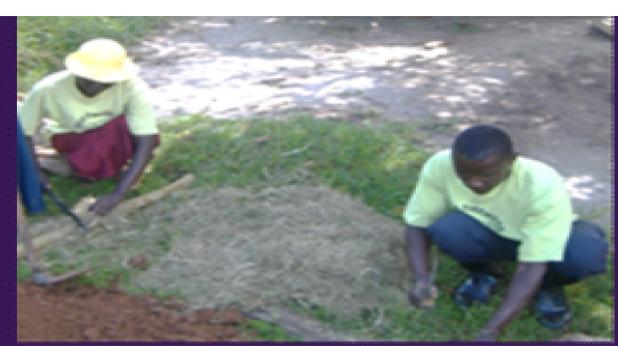


Basic Architectural design of ICS- Maximizing performance



Preparing Materials

1. Chop the dry grass into small pieces using a machete (approximate length: 1cm)
2. Crash the anthill soil into smaller granules, and sort it to eliminate stones, sticks and other unwanted materials.
3. Mix the chopped dry grass and anthill soil in a volumetric ratio 1:2 (or with clay soil in a ratio of 1:1).
4. Slowly add water to the mixture to make it moldable and allow binding process (2-3 days).



Basic Tools Required

Tools	Purpose
Hoe	Digging foundation and mixing ingredients
Shovel or spade	Mixing ingredients
Jerry can	Fetching water
Trough (4mm)	Sifting ingredients
Trowel/blunt machete	Smoothing plaster/stove finish
Measuring tape	Taking measurements
Machete (Panga)	Cutting & sizing grass, banana stems & stove body
Wheel barrow (wb)	Carrying construction material
<u>Optional:</u>	
Spirit level	Inspecting horizontal level for laid bricks
Plumb line	Inspecting vertical alignment for laid bricks
Try Square	Inspecting right angled corners



Construction layout and processes

- ✓ Lay the 6cm high foundation of soil-grass mixture.
- ✓ Draw two perpendicular lines across the stove foundation and mark their point of intersection.
- ✓ Place the vertical combustion chamber mould at the centre of the stove foundation.
- ✓ Place bypass air inlet mould (4.5cm thick) at the stove foundation level at a right angle (90°) to the vertical stem as shown in the figure
- ✓ Place a smoke chimney outlet at angle(45°) at the rear end (Only for fixed stoves build)
- ✓ Build the soil – grass mixture around the mould up to the level of the flat face of the inverted stem
- ✓ Position the bigger mould (9-12 cm thick) perpendicular to the bypass air inlet mould. Ensure that its flat surface faces downwards to form the mould for the firewood inlet

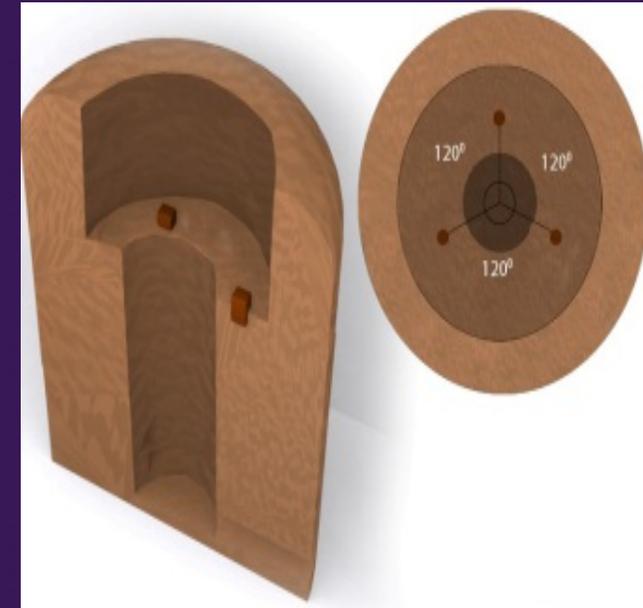
Construction layout and processes... Cont,

- ✓ Continue building the stove up to the height of the combustion chamber mould.
- ✓ Level the top of the stove structure as illustrated.
- ✓ **Wet the outside of the saucepan** using a mixture of wood ash and water to ease its removal at a later stage.
- ✓ Position the saucepan on top of centre of the vertical mould and then place a considerable weight e.g. a piece of brick or stone in the saucepan to hold it in position.
- ✓ Fill the space around the saucepan with the insulation mixture as shown in illustration up to the height of the saucepan rim.



Process cont,.....

- ✓ Remove the saucepan carefully by rotating back and forth while lifting it out.
- ✓ Cut out a 3cm thickness of the mixture layer off the saucepan cavity to enlarge it and give room for the fire (fuel energy) to flow around the saucepan cavity during stove use in future.
- ✓ **Build 3 saucepan supports inside the saucepan seat, equidistant from the centre of the combustion chamber to dry for 3-4 weeks and be using wet fingers to smoothen such that the stove is without cracks.**



Key Questions, challenges and Intervention bottlenecks

- What are the main reasons associated with low adoptions of the technologies?
- Do our interventions answer most key needs of the beneficiaries?
- Why are there so many cases of overlaps and duplication of same interventions to same HHs?
- Do IPs understand the needs of the communities before a choice of intervention is selected?
- Do we as development partners align our trainings (Energy/Environment) to conform to basic standards and guidelines? (e.g Quality control issues)
- What are the Monitoring and evaluation questions the development partners are attempting to address?





Monitoring and Evaluation

- Do our interventions answer most key Monitoring and evaluation questions?
- ...whether and to what extent the energy interventions are feasible, sustainable and durable in refugee settings in Uganda.

Before Intervention

What was the case?

Why did you need to intervene?

During Intervention

1. *Status of case during implementation*
2. *Has the intervention to the case been Accepted? (Adopted)*
3. *Obstacles and problems*

After Intervention

- Final evaluation report; Can the interventions be replicated
- Are lessons learnt significantly positive



Thank you for your attention.

Funded by:



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1. Required materials and tools:

Materials	Quantity for 1 stove		
	Size 1	Size 2	Size 3
Anthill soil (clay)	2 wheel barrows	4wb	6wb
Dry chopped grass (sawdust, dry chopped banana leaves)	1 wheel barrows	2wb	3wb
Mud bricks	10 bricks		
Water (jerry cans (20L))	2	4	6
Moulds	3 moulds		

Tools	Purpose
Hoe	Digging foundation and mixing ingredients
Shovel or spade	Mixing ingredients
Jerry can	Fetching water
Trough (4mm)	Sifting ingredients
Trowel/blunt machete	Smoothing plaster/stove finish
Measuring tape	Taking measurements
Machete (Panga)	Cutting & sizing grass, banana stems & stove body
Wheel barrow (wb)	Carrying construction material
Optional:	
Spirit level	Inspecting horizontal level for laid bricks
Plumb line	Inspecting vertical alignment for laid bricks
Try Square	Inspecting right angled corners

2. Relationship between saucepan and Combustion Chamber

Saucepan Diameter (cm)	Square mould (cm)	Circular diameter (cm)	Height (cm)	wood box, 2/3 (cm)	Air Inlet, 1/3 (cm)	
Size 1	≤27	12	13.5	24-30	9	4.5
Size 2	27-35	14	16	35	10.7	5.3
Size 3	35-45	16	18	40	12	6

Example: Saucepan Diameter , 27cm
Stove measurements Looking at the stove from the side
 Combustion chamber mold: 13.5cm thick and 30cm height

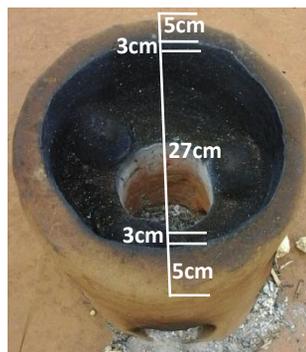
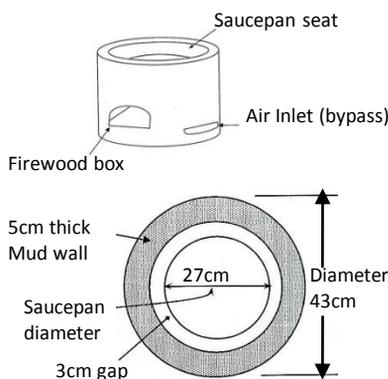
Firewood inlet: 9cm thick

Bypass air inlet: 4.5cm thick



Looking at the stove from the top

Important: The size of the stove depends on the size of the saucepan to be used in cooking!



3. Preparing the soil:

1. Chop the dry grass into small pieces using a machete (approximate length: 1cm)
2. Crash the anthill soil into smaller granules, and sort it to eliminate stones, sticks and other unwanted materials.
3. Mix the chopped dry grass and anthill soil in a volumetric ratio 1:2 (or with clay soil in a ratio of 1:1).
4. Slowly add water to the mixture to make it moldable.



4. Building the stove:

1. Lay the 6cm high foundation of soil-grass mixture.
2. Draw two perpendicular lines across the stove foundation and mark their point of intersection.
3. Place the vertical combustion chamber mould at the centre of the stove foundation.
4. Place bypass air inlet mould (4.5cm thick) at the stove foundation level at a right angle (90°) to the vertical stem as shown in the figure
5. Build the soil – grass mixture around the mould up to the level of the flat face of the inverted stem
6. Position the bigger mould (9cm thick) perpendicular to the bypass air inlet mould. Ensure that its flat surface faces downwards to form the mould for the firewood inlet (magazine).
7. Constructing the stove body: Continue constructing the stove using the soil – grass mixture up to the height of the combustion chamber mould. Level the top of the stove structure as illustrated.
8. Wet the outside of the saucepan using a mixture of wood ash and water to ease its removal at a later stage.



8. Position the saucepan on top of centre of the vertical mould and then place a considerable weight e.g. a piece of brick or stone in the saucepan to hold it in position.
9. Fill the space around the saucepan with the insulation mixture as shown in illustration up to the height of the saucepan rim.
10. Remove the saucepan carefully by rotating back and forth while lifting it out.
12. Cut out a 3cm thickness of the mixture layer off the saucepan cavity to enlarge it and give room for the fire (flue gas) to flow around the saucepan cavity during stove use in future.
13. Build 3 saucepan supports inside the saucepan seat, equidistant from the centre of the combustion chamber with a uniform angular spacing of 120° as shown in figure
14. Finishing the stove construction, leave it to dry for 3-4 weeks and be using wet fingers to smoothen such that the stove is without cracks.



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2018-01-10 Zone 3 – Bidi Bidi

Refugee and Host Community Feedback on Cook Stoves



Supplied Stoves – ILF Stoves



Townhall discussion user feedback:

- Heavy, difficult to move in and outside
- Poor air flow (no air inlet)
- Difficult to light
- Opening for wood is very small
- Too small for sauce pans
- Some use but also still using 3-stones
- Refugee perceive lighter, metallic portable stove as better
- Would prefer to use charcoal as it produces less smoke

Locally Made Stoves



- Clay is cracking – may be issue with raw material or formulation
- Users prefer better air flow and that sauce pans are placed inside for better heat transfer in this model versus ILF
- Minimal local distribution and usage at present

Way Forward

- Direct follow-up should take place with the community that was consulted within 2 weeks
- Existing supplied stove may be improved by creating clearance underneath and removing accumulated ash. Perhaps mounting on top of bricks to allow airflow from underneath – some training and troubleshooting can be done
- Recommend 1-day training for all extension workers and representatives from refugee and host communities that received the ILF stoves who can then bring knowledge back to the community
- Distribution and training to be improved in general – all interventions should include **pre-consultation with the community for stove selection**, training and follow-up with the community.
- Pre-consultation should include demonstration whether by traveling to other villages or on-site
- Clay making procedure for locally made stoves or alternative stove types can be reviewed
- Design of stove must be tested and refined with user-feedback
- Testing and approval of a few key models to be accepted for implementation in refugee settlements and host communities
- Technical Working Group Sub-Committee on Cook Stoves to be established

Additional Comments & Discussion

- Some households are constructing their own Lorena stoves
- Sauce pan diameters should be included in product order specifications
- Clay binding may be improved by adding grass and other additives – production technique should be reviewed
- If there was demand for the stoves then the stoves would not have been left idle in storage
- Intimate engagement is needed to achieve the results of environmental protection
- Stoves are bought from Lira by ILF who have worked with GIZ, stoves were tested by CREEC – there should have been a user manual and training
- Using half-dry firewood – this stove is not compatible and efficient in that case
- Partners are between producers and users – end-users have not been prepared well. Rapid nature of humanitarian projects such that partners struggle to implement in short timelines. User feedback is important.
- Culture plays a key role in the usage of the stoves – cassava is a primary food that is cooked, cook stoves should be designed to be suited for the cooking techniques
- Cook stoves are social products – should be designed to be responsive to people's needs and uses

Improved cook-stoves workshop in Arua

Familiarization visit to Bidibidi refugee settlement (*Wed.,
Jan 10, 2017*)

Zone 2 team

What we saw

- Members of the team visited Zone 2 of Bidibidi Refugee Settlement
- The partner implementing energy interventions in this zone is ADRA
- Their interventions are limited currently to 3 villages (out of the 16 villages in Zone 2) – perhaps 2,000 HHs
- Their theory of change revolves around getting the communities themselves (through 28 TOTs appointed from within their ranks, both genders) to fabricate the energy-efficient cook-stoves

Lorena – well constructed and maintained



Uses both charcoal and firewood



A decommissioned cook-stove



Operating side by side with 3-stone



Our reflections

- Great work by ADRA on enhancing energy efficiency in Zone 2
- Near universal adoption of the Lorena improved cook-stoves by refugees residing in the 3 villages in Zone 2
- ADRA spends only UGX 10,000 (less than US\$3) per cook-stove
- TOTs have been trained to fabricate the cook-stoves
- The TOTs move around the zone, doing maintenance work with HHs
 - TOTs have each been assigned between 200 and 300 HHs

What else we saw

- Reductions of households' biomass use by at least 50%
 - Women reporting using approximately 1.5 bundles per week, instead of the former 3 bundles
- In our zone, women expressed their satisfaction with the cook-stoves
- High preponderance of fruit trees, especially in Zone 2
- Denudation of vegetation cover in other parts of the settlement – evident when compared to areas with no refugees

Challenges identified

- The design can be improved
 - The existing one chimney for the cook-stove is not well designed
 - As a result, evacuation of smoke is not efficient
- UNBS certification is critical and should be acquired

Opportunities for scaling out

- ADRA to share their methodology and approach
 - GiZ to bring onboard their experience with cook-stoves
 - UNHCR to consider experiential learning – whether ADRA and GiZ can partner to scale out this approach
- Standardisation of dimensions of the cookstoves
- Constructing shelters for the cook-stoves
- Improvement of the Lorena cook-stove in order to reduce possibilities of indoor air pollution and consequences for human health
- Adding value to waste – WtE – enhancing briquettes construction

Way forward

- Align design of cook-stoves with possible use of briquettes
- Crop residues use – possible continuation of nutrient mining need to be addressed
 - However, noted that refugees are using cereal residues, which is inconsequential in terms of nutrient mining

**Attendance sheet for Improved Cookstove Workshop
Desert Breeze Hotel Arua**

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