

**MINISTRY OF ENERGY AND MINERAL DEVELOPMENT**

**MODERN BIOMASS FOR RURAL DEVELOPMENT**

**INSPECTION AND EVALUATION OF INSTITUTIONAL STOVES ADOPTION**

**AND**

**PERFORMANCE IN SCHOOLS AND INSTITUTIONS**

**OCTOBER 2011**

## 1. Introduction

Inspection and evaluation of institutional stoves in Mbarara, Isingiro and Bushenyi Masaka, Rakai and Lwengo districts were carried out as part of a national wide survey on stoves in schools and institutions in the country. The major objectives of investigating the stoves was to establish the adoption rate, performance, constructional designs and structural strengths; ascertain qualities and value for money accruing to adopting institutions; and other relevant energy aspects prevailing at the institutions.

During the course of this activity;

- i) meetings were held with District Education Officers to establish whether schools' energy issues are tackled at the district level, to advocate for and raise awareness with district education officers on issues of institutions acquiring improved stoves, to curb on schools' fuelwood consumption so as to protect the dwindling biomass resources in the districts, and to help encourage institutions to adopt and use institutional stoves.
- ii) Several schools were visited to establish the kind of stoves adopted, sensitize administrators about the economic, health and environmental benefits of adopting institutional stoves that accrue to the schools, cooks and pupils
- iii) Held a one day focused group discussions with stove builders in the districts to establish the causes of stove constructional errors and ways to correct them, find ways of promoting institutional stove dissemination and established the level of training stove builders underwent.

### Key outputs

- Six districts including Mbarara, Isingiro, Bushenyi, Masaka, Lwengo and Rakai were visited during the field surveys,
- 65 schools in the districts were reported to have institutional stoves by DEOs,
- Of the 33 schools visited, 23 had institutional stoves of the Berallive design,
- Many of the Berallive design stoves at schools were donated by ICR between 2000 - 2005
- More than 50% of these stoves were in bad condition, with some like at St Cecilia Girls Sec. Secondary school Bushenyi, emitting too much smoke and heat in the

kitchen (see photo) chocking the inspection team which could not stay in the kitchen to complete the inspection.

- The team identified very few schools (~5) having the rocket type stoves.
- Some schools used to cook with electric boilers before the 1979 e.g Ntare school, St. Henry's Kitovu. Some boilers are still functional but schools can't afford the cost of power and therefore use firewood



**Figure 1. Broken Berallive stoves at St Cecilia Girls SSS Bushenyi 1; and Part kitchen Mbarara High School 2.**

- Mostly town and peri-urban schools tend to have institutional stoves since they buy firewood at higher prices than rural schools do,
- Medium schools (~600 students) have between 3- 5 stoves while large schools (800 - 1500students) have 5 – 8 stoves,
- All DEOs contacted indicated that provision and use of energy at schools is not among their priority concerns, yet improved stoves enable students to get properly cooked and timely meals enabling them to continue with schools timetable unimpeded.

**Table 1. Summary of Institutions Visited**

District Visited	Number of Institutions	No. of schools having institutional stoves (Boarding & Day, Pri. Sec & Voc)	Percentage having Institutional stoves %	No of institutions Having	
				Berallive Stoves	Rocket Stoves
Mbarara	38 (sec. ) 108 (pr)	11	7	4	1
Bushenyi *		10	**	3	4
Rakai *		19	**	7	1 Rocket oven
Lwengo	149(pr)	13	8	1	-
Masaka *		12	**	3	

\*The total number of schools in these districts could not be established since officials were not at the posts

\*\* Percentages here could also not be estimated since total school numbers not obtained –

**Table 2. A Simple payback period for a school with an institutional Berallive stove:**

Item		Description	Remarks
District		Rakai	
School Name:	Christ the King Senior Secondary School – Kalisizo		
School Population		1000	
Stove type		Berallive	~ 40% efficiency
Current Fuelwood consumption when using stove		50tons / term	
Consumption during stove repair period		85 tons / term	Confirmed by Head teacher
Fuelwood saved when stoves are in full use (85 – 50 )		35 tons / term	
Cost of fuelwood per 10-ton lorry (landed price)		300,000/-	Confirmed by Head teacher
Cost of fuelwood saved (300,000*35/10) /term		1,050,000	
Cost of stove		2.5 – 3.0 m sh	
<b>Simple Payback period</b>		<b>2.5 terms</b>	

- Some schools improvise by building concrete trenches in place of the three stones to protect the fire and stabilize sauce pans, but this does not reduce fuelwood consumption

3.



4.



Figure 2: Same kitchen at Mbarara High School – pic 3; St. Cecilia Girls SSS - Bushenyi

### Stove Artisans

- Institutional stove artisans trained by MEMD in the region are very few. The team identified about 3. However, several other stove artisans who are copying the ICR design and constructing quasi berallive stoves in the region exist, table below.

**Table 3: Artisans on Institutional stoves central – south region**

District	Stove Artisans	
	Trained by MEMD	Trained by Other
Bushenyi	Katera Daniel (0772439447)	
Mbarara	Barugahale Ibrahim (0772442557)	Najura Ratex
	Katirima	Hajji Mande (0772410128)
	Innocent	Kambagira David
		Tinkasimire David (0783700865)
Masaka		Mulindwa John (0772919907)
		Seremba Francis (0782532030)
Lwengo		Bukenya Karoli (0782977410)

## Observations

- On the whole only 5 – 10% of all schools in the region have institutional stoves
- Most schools, including day schools offer meals (optional to students) at school;
- Most schools find it very difficult to cope with firewood situation whose availability is fast reducing; and where the cost have increased by 50 – 90% in one year's time. A 3.5 ton truck costs between 230,000 – 350,000/- (July 2001) depending on origin, from 120,000/.
- In Rakai town, a small bundle of firewood weighing 3.5 kg and measuring 4ft x 1ft circumference was being sold at 1,000 shs from 500/ five months before this survey, 100% rise in cost.
- A simple payback period for an institutional stove is about 7months or two terms according to the survey
- The sampled schools have Berrallive stove types with a poorly designed fire chamber – whose efficiencies are far below the established rocket type stove efficiency. Most stoves seen are in a state of disrepair.
- It emerged that private and the traditional big primary and secondary schools have improved cookstoves – since they can afford them;
- Most UPE and USE schools do not have improved stoves since they cannot afford the cost of the stoves
- There is a high degree of lack of awareness and trained artisans on institutional stoves in rural schools.
- It was confirmed that Saucepan makers are highly involved in construction of substandard cook stoves. These are normally not trained but learn by copying from existing stove structures when they are called to repair saucepans

## Recommendation and way forward

- Discussions with District Education officers indicated that energy issues are not a concern of the district schools administration. It was agreed however, to sensitize all head teachers about energy conservation issues. In this regard the Ministry was requested to carry out a sensitization of Head teachers through The Head Teachers associations which are in existence on the potential savings and benefits of using improved biomass technologies.
- MEMD should always participate in the head teachers' beginning of term workshops on a regional basis to sensitize head teachers on the importance of using improved energy technologies – since energy takes a big share of the school's budgets, and is becoming more difficult to get.
- The Ministry of Energy should liaise with the Ministry of Education to advocate for a policy where schools would be required to adopt more efficient cooking biomass energy conversion technologies.

- Meet with stove builders and companies on a regional basis to chart out mechanisms through which schools can start obtaining institutional stoves on soft terms which may include payments in installment, credits, etc
- Ministry to organize retraining of institutional stove artisans on the rocket stove design on a regional basis, beginning with the central southern region where the survey has been done.
- Continued survey for inspection and evaluation of institutional stoves and artisans in other regions of the country to establish their status.

#### Appendices:

#### **District Officials Contacted**

##### **Mbarara District**

1. Mr. Nsasure Steven, Assistant Education Officer; Tel: 0772432969, [sasirwe@yahoo.com](mailto:sasirwe@yahoo.com)
2. Mr. Edwards Mbabazi, District Education Officer; Tel: 0772614715

##### **Rakai district**

3. Mr. Sskyondwa, District Education Officer; Tel: 0752656258
4. M/s. Nakazibwe Catherine, Education officer, Special Needs Educ

##### **Lwengo District**

5. Mulumba Joseph, District Inspector of Schools, Tel: 0772387277
6. Hajjati Kitatta, Inspector of Schools, 0772551226

##### **Masaka District**

7. Mr. Nsamba Gerald, District Education Officer, 0772/0701 312545
8. Mr. Kahigiriza Charles, H/M Kijjabwemi Sec school, Chairman Head Teachers' Association – Central - Southern region, 0772681780
  - Raw data

### Raw data: Institutional stoves survey in Central – Southern regional schools

District	Name of Institute	Size of institute	Stove type	Number	Condition of stoves	Fuelwood (tons) Consumed /term	Cost of fuelwood/ 10ton truck	Person Contacted	Title	Contact
Mbarara	Mbarara High Sch	2000	Berallive	16	Broken	3 trucks / wk (300 ton )	230,000/ truck	Muhumuza Julius	Head Cook	0772657215
	Ntare Sch	1500	Berallive	7	Broken	200- 230		Deogratiuous Mbogorora	Head Cook	0782683578
	Mbarara Municipal Council P.Sch	2000	Berallive	9	Fair	160 – 200		Kananura Martin	Head Teacher	0772490258 0701490258
	Rubindi parents sch									
	Rubindi vocational school									
Isingiro	Kweziringiro Tech Sch	406	Rocket stove	2	Good	20 tons	300,000		HeadTeacher	
	Aisha Girls High sch	260	Rocket type	2	Good				Headmistress	
	St. Bridget Girls Sec sch	500	No kitchen						Headmistress	
Bushenyi	Rwanja Parents Boarding Sch	350	Rocket Stoves	1	Good			D. Katera	Stove builder	
	Nyakisojwa Sec Sch	818	Rocket stove	2	Good	40			HeadTeacher	0752463559
	St. Cecilia Girls Voc. sch	700	Berallive	5	Broken	NK		Kamanzi Stell	HeadMistress	0772576399
	Kashenyi voc. Sec sch	120	Rocket	1	Good	10	160,000	Nasasira Twesigye	Headteacher	0773233421
	St Kaggwa pr. Boarding school	800; (500 boarders)	Berallive	5	Broken / Need repairs	50	200,000			
	Bishop McAllister Kyogere college	600	Berallive	4	All Broken	80	250,000			
Rakai	Rakai Community School of	500	Berallive	3	Good	40	150,000; own woodlots	Mr. Sirus Bbulime	Deirector	



[illegible]

<i>Name of Institution</i>	Mbarara High School	Ntare School	Kweziringiro Tech Sch
<i>Type of institution</i>	Boarding secondary school	Boarding sec sch	Vocational Tech Sch
<i>Size of institution</i>	2000 students ; 1700boarders	1500 students	406
<i>Type of stoves in operation</i>	Bellarive Circular stoves	Bellarive stoves	Rocket type stove
<i>Combustion chamber</i>	Immersion type, very wide	Immersion type	“
<i>Total Number of stoves</i>	13	7	3
<i>Number current in use</i>	6	3	2
<i>No. in good efficient working condition cfb to rocket stove</i>	2	1	2
<i>Age of stove</i>	6 1/2 yrs; 1yr	15yrs; 10yrs	3 months
<i>Original energy sources used</i>	Firewood	Electric boilers 7	Firewood
<i>Other energy sources in use</i>	Open trench fires 3	Open fire 1	None
<i>Capacity of stove(s)</i>	100l, 250l, 400l,	100l, 4_200l,	160lts
<i>Cost of stove construction (labour)</i>	13stoves: 128,000/ @ 1,664,000/ (2004)	NK	1.1/stove
<i>Type / Cost of Sauce pans</i>	1.7m Steel ; 250lts 1.5m Aluminium, 400lts 0.6mshs M/Steel 100lts	1.5m – 250l	M/Steel 1.6m 1.2
<i>Total cost of Stove(s)</i>	0.728m, 1.628m, 1.828m	NK	5.0m
<i>Expected lifetime of stove</i>	> 5	>5yrs	>5
<i>Fuelwood consumption per term</i>	18lorries*10tons = 180tons	21lorries (10ton)= 210tons	1.5lorries = 15tons
<i>Previous fuel consumption without stove</i>	32lorries*10ton = 320tons		4 lorries = 40tons
<i>Prices of fuelwood (current)</i>	230,000/ per 10ton lorry + 100,000/ fuel (330,000/)	160,000-10ton truck + 100000 fuel = 260,000	300,000
<i>Cost of fuelwood without stove</i>	330,000x 32 = 10,560,000/	NK (Assume 40% savings) 7,644,000	1,200,000
<i>Total cost of fuelwood (with stove)</i>	330,000x18= 5,940,000/	260,000*21lorries = --- 5,460,000	330,000x 1.5 = 495,000
<i>Percent Savings in fuelwood per term</i>	44% (4,620,000)	40% (1,984,000)	62.5% (705,000)
<i>Problems with stoves</i>	Fire chamber broken, too wide	Fire chamber Liners broken	Firewood splitting (User training)
<i>Maintenance schedule</i>	1yr	1yr	
<i>Stove builder details</i>	Hajji Mande	Hajji Mande	Barugahalle Ibrahim
<i>Tel contact</i>	0772410128	0772410128	0772
<i>Method of advertisement</i>	Self - Promoter		Self - promoter
<i>Kitchen air condition</i>	Some smoke – from open fires,	Little smoke - bearable	Clean -no smoke
<i>Source of fuelwood</i>	Lake Mburo		
<i>Other renewable sources</i>	Cow dung, Biolatrine		None
<i>Institutional ability for adoption of new technology</i>	Able	OK	No
<i>Interviewee</i>	Muhumuza Julius	Mr. Mbogorora Deo	
<i>Contact</i>	0772657215	0782683578	
<i>Other institutions with stoves</i>		Bassajja SS St. Kagwa	Kabale, Kanungu, Mbarara

**Other Schools****Rakai**

St. Cecilia , Buyamba

Nabbunga Inst, of Education

Kibaale Community

St. Simon Nazareth

Kakuuto Pr. Sch

Bulinda Christ the King

Kabuwoko SSS

Kyotera Academia

Sacred Heart Kiteredde

Kamengo Technical Institute

Mbuya Farm

Kakoma Secondary

St Mary's and Kabaale -Sanje

Rakai Town Council