Matrix (Draft) of Stove Types and Characteristics, Plus Notes

(Version 3.0, dated 2009-03-13, compiled by Paul S. Anderson) (This is a working DRAFT to obtain comments.)

The first version was dated 2006-11-18 and was prepared by Paul S. Anderson at the SIFAT Conference. Preparers of later versions should identify themselves.

\\ **Stove Types**	**3-Stone**	**Clay/Ceramic (Tradit.)**		**Improved Fuel-Controlled Stoves & Quasi-Gasifiers**				**Gasifiers (for cooking)**		**Fan-Jet**	**NOT Raw Biomass Fuel**			
Characteristics (Very generalized.)	**3-Stone**	**Mud Clay**	**Cement / Brick**	Simple **Rocket** Advanced no chimney	Onil + Eco-	**China** 1980-90s	**Vesto / Tsotso**	**TLUD**	**Updraft & Downdraft**	**Strong Air**	**Char-coal**	**Alcohol / Biodiesel**	**Refined Fossils**	**Solar**
1. Number in use. M = Millions; K = thousands ***Estimates to be adjusted***	***400 M***	***10 M***	***1 M***	***700 K***	***50 K***	***200 M***	***?? K***	***500 K***	***< 50***	***None yet*** Philips & Worldsto.	***?? M***		***Kerosene LPG***	***?? K***
2. Cost (US$)	Free	2 - 10	5 - 30	5-20	30 – 120	???	20 – 85	15 – 60	80 - 300	Unknown	2 - 30	Range		Range
3. Number of pots	1 – 2	1	1 – 2	1	1 – 4	1 – 4	1	1 – 2	1 – 4	1 – 4	1	1 – 2	1 – 2	1 - 3
4. Portability	Easy	Yes	No	Yes	Mostly no	No	Yes	Yes	Possible	Models	Yes	Yes	Yes	Yes
5. Safety G= Good	Bad	Modest	Good	Good	G - Excel	Good	Good	Mod. - G	Good	??	??	Excel.	Usually G	Good
6. Chimney	No	No	Majority	No	Yes	Yes	No	Some	Yes	No	No	No	No	None
7. Chimney cleaning	N/A	N/A	2 – 3 weeks	N/A	2 – 3 weeks	2 – 4 wks	N/A	Not need.	Not needed	N/A	N/A	N/A	N/A	None
8. Main fuel type(s)	Sticks plus Misc.	Sticks plus local biomass, dung, corncobs		Stick wood (prefers small)		Sticks plus	Sticks plus	Chip and chunky, pellets, briquettes		Chips & pieces	Only Char	Must buy	Must buy	Only sun
9. Fuel savings	Bad	30 – 50 %	30 – 50 %	60 – 70 %		60 – 70 %	60 – 70 %	60 – 70 %	60 – 80%	60 – 70%	Bad	??	Fossil = no savings	100%
10. Fuel feeding/ Attending the fire	Irregular	10 – 20 minutes		7 – 12 minutes		10 – 20 min	10 – 20 min	10 – 45 min	Automation possible	1 – 3 min ?	10 – 45 min?	Knob controlled	Knob controlled	Req. sun
11. Emissions	High	Moderate	Moderate	Moderate to Low		Low	Low	Very low	Very low	Very low	Hi CO	Very low	C positive	Zero
12. Emissions tested	*100 times*	*10*	*10*	*200 plus*		*4*	*None*	10	Not tested	*4*	*Yes*	*Yes*	*Yes*	*N/A*
13. Natural draft	Yes	Yes	Yes	Yes		Yes	Yes	Peko Pe	Options for either	No	Yes	Some are pressured	Some are pressured	N/A
14. Forced air	No	No	No	No		No	No	Reed / BP		Yes	Seldom			N/A
15. Understanding by users	Easy & tradition	Very good	Very good	Good	Good	Okay	Okay	Need instruct.	Need instruct.	Need instruct.	Easy	Very good	Very good	Good
16.														
17. A	B	C	D	E	F	G	H	I	J	K	L	M	N	O

Note:1. The **Biomass** stove types are in the following **general order across the page from left to right:** (The **NOT raw biomass** stoves are not part of that general order.)

a. Oldest technology to newest. b. Most harmful IAP emissions to least harmful. c. Most installed/in-use units to fewest units

d. Least expensive (mainly built by local people) to more expensive (with some potential for industrial production and alternative materials for lower costs.)

e. Largest pieces of fuel to smallest pieces, but small low-value or waste-biomass can become pellets and briquettes for automated fuel feeding into gasifiers.

f. Most studied (through time and funded research) to least studied (but most potentially fruitful frontier for research when funding becomes available).

Note 2. Below is a **classification** of stove technologies and a **general ranking** by fuels with associated decreasing IAP emissions. Also fuel qualities can make a difference.

A. Fuel-controlled (traditional burning) B. Air-controlled, incl gasifiers C. Renewable liquid fuels D. Processed fossil fuel; E. Non-carbon energy sources

3-Stone; "Container fires"; Rocket Stoves; Quasi-Gasifiers; TLUD Gasifiers; Fan-Jet combustors; Biogas (wet); Charcoal; Alcohol; Biodiesel; Kerosene; LPG; Nat. Gas; Solar; Retained Heat; Electric (hydro/wind).