**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.

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| **\\ 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).