COMPARISION OF BIOMASS COOKSTOVES IN SRI LANKA

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ABSTRACT

Biomass plays an important role in Sri Lanka Energy Sector. The consumption of biomass in the commercial and household sector is declining due the popularity of fossil fuels. Consumption of biomass is getting less popular due to various reasons. Handling difficulties due to various sizes, combustion difficulties due to various calorific values, low combustion efficiency due to high moisture content and high storage and transportation cost due to bulk size and moisture.

To evaluate the performance of selected biomass cookstoves thermal efficiency together with other performance parameters were tested by Shell Foundation Version 4.3.2 Water Boiling Test. The tested stoves are Semi-enclosed firewood cookstove, popular Anagi-2 firewood stove, Turbo charcoal stove, Desha Shakthi saw dust pellet stove and Spectra saw dust pellet stove. Desha Shakthi stove shows the highest efficiency of 0.59 at high power operation while Spectra shows 0.43 and fallen in to the tier 4 of IWA matrix. Turbo charcoal stove categorized in to tire 2 as it is having thermal efficiency of 0.26. Anagi-2 and semi-enclosed stoves can be categorized in to tire 1 since they are having efficiencies of 0.17 and 0.15 respectively.

Anagi- 2 stove shows the lowest time to boil while DeshShakthi stove takes highest time to boil water. Desha Shakthi stove shows lowest burning rate which is 5 g/min while Anagi -2 shows the highest burning rate of 28.65g/min. Specific fuel consumption of Desha Shakthi is the lowest as 0.05 kg of fuel per kg of water while semi-enclosed stoves shows the highest as 0.16.

Overall average specific energy consumption of Desha Shakthi stove is the lowest as 1.10 kJ/kg of water and highest of Anagi-2 as it is 5.27 kJ/kg of water. The highest fire power of 8712.71 W is shown by Anagi-2 while Desha Shakthi has the lowest fire power as 1279.58 W.

To categories stove emissions and safety under IWA performance matrix, the emission tests also should be done during the WBT. When comparing the designs of stoves there is a possibility of improving the performance of Spectra stove by introducing design modifications.

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LIST OF ABBREVIATIONS

PJ	-	Pica Joules
CEB	-	Ceylon Electricity Board
ICS	-	Improved Cook Stoves
NGO	-	Nongovernmental Organization
toe	-	tons of oil equivalent
SLSEA	-	Sri Lanka Sustainable Energy Authority
CO_2	-	Carbon dioxide
CO	-	Carbon monoxide
DC	-	Direct current
WBT	-	Water boiling test
IDEA	-	Integrated Development Association
IDB	-	Industrial Development Board
NERD	-	National Engineering Research and Development
CCT	-	Control Cooking Test
KPT	-	Kitchen Performance Test
SUMs	-	Stove Use Monitors
ITI	-	Industrial Technology Institute
DC	-	Direct Current
IWA	-	International Workshop Agreement
ISO	-	International Organization for Standardization

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