

INSTITUTE OF ENERGY

(শক্তি ইনস্টিটিউট)

ঢাকা বিশ্ববিদ্যালয়
ঢাকা-১০০০, বাংলাদেশ
দূরাল্পনী: +৮৮০-২-৯৬৭৭১২৫, ৯৬৬১৯০০/৪৫৭০
ফ্যাক্স: +৮৮০-২-৯৬৬৭২২২
ই-মেইল: ire@du.ac.bd



University of Dhaka
Dhaka-1000, Bangladesh
Phone: +880-2-9677125, 9661900/4570
Fax: +880-2-9667222
E-mail: ire@du.ac.bd

নং- শই/

তারিখঃ ১৯ আশ্বিন, ১৪২৪ বঙ্গাব্দ
০৪ অক্টোবর, ২০১৭

To,
Managing Director
Luxur Green Energy Ltd
33, Sohid Faroque Road
North Jatrabari, Dhaka-1204

Subject: WBT Tests for ICS.

Dear Sir,

The ICS model “Luxur Cook Stove Single Mouth” has been tested using Water Boiling Test (WBT 4.2.3) protocol used worldwide. The WBT was developed to assess stove performance in controlled manner.

Although the WBT is a useful tool for the reasons given above, it is important to remember its limitation also. It is an approximation of cooking process and is conducted in controlled conditions by trained experts. ICS Technical committee of Institute of Energy, Dhaka University has tested the above mentioned ICS of metal based stove. The summary test result and the detail test result from measurements are given in table -1 and table-2 accordingly.

Table-1: Summary (WBT Efficiency Test) of ICS test

Sl. No.	Type	High Power	CO (ppm)	PM _{2.5} (µg/m ³)	Comments
01.	“Luxur Cook Stove” Single Mouth (Portable and Metal)	Tier-3 (Efficiency)	4.89±0.8	89±13	The flame was near to the middle position of the test pot. The highest measured surface temperature was found satisfactory.

Note: IWA High Power Benchmark are: Tier-1 (Efficiency ≥15%), Tier-2 (Efficiency ≥25%), Tier-3 (Efficiency ≥35%) and Tier-4 (Efficiency ≥45%). Data for CO and PM_{2.5} levels have been entered for simmering process.

Begum
Dr. Bilkis Ara Begum
Head
Chemistry Division
Atomic Energy Centre, Dhaka

Saiful Huque
(Prof. Dr. Saiful Huque)
Director
Institute of Energy
University of Dhaka.

INSTITUTE OF ENERGY

(শক্তি ইনস্টিটিউট)

ঢাকা বিশ্ববিদ্যালয়
ঢাকা-১০০০, বাংলাদেশ
দূরসংযোগ: +৮৮০-২-৯৬৭৭১২৫, ৯৬৬১৯০০/৪৫৭০
ফ্যাক্স: +৮৮০-২-৯৬৬৭২২২
ই-মেইল: ire@du.ac.bd



University of Dhaka
Dhaka-1000, Bangladesh
Phone: +880-2-9677125, 9661900/4570
Fax: +880-2-9667222
E-mail: ire@du.ac.bd

নং- শই/

তারিখঃ ১৯ আশ্বিন, ১৪২৪ বঙ্গাব্দ
০৪ অক্টোবর, ২০১৭

Table- 02

RESULTS OF WBT & IAP MEASUREMENTS OF DIFFERENT ICS's STOVE

The thermal efficiency measurements were done under the supervision of Dr. S. M. Nasif Shams, Incharge of ICS Test Lab, Institute of Energy, Dhaka University and IAP measurements were supervised by Dr. Bilkis A. Begum, Chief Scientific Officer of BAEC, Dhaka, Bangladesh

SI # 1: ICS -Luxur Cook Stove Single Mouth: *It is a Portable Metal ICS*

SI#	Parameters	Units	Stages of WBT (Average)			Picture
			Cold Start	Hot Start	Simmering	
i	ii	iii	iv	v	vi	
1	Time to Boil	min	12	10	45	
2	Thermal Efficiency	%	38.7	39.2	29.8	
3	Specific fuel consumption	g/liter boiled	51	50	98	
4	CO	ppm	8.10±0.92	6.50±0.22	4.89±0.8	
5	PM ₁₀	µg/m ³	805±41	697±63	113±1.80	
6	PM _{2.5}	µg/m ³	613±56	544±27	89±13	
7	BC in PM2.5	µg/m ³	165±21	142±17	23±5	

IWA PERFORMANCE METRICS	units	Test 1	Test 2	Test 3	Average	St Dev	COV
High Power Thermal Efficiency	%	38.1%	39.7%	39.1%	0.389667	0.81%	2.1%

IWA PERFORMANCE TIERS	units	Test 1	Test 2	Test 3	Average
High Power Thermal Efficiency	%	3	3	3	3

Comments:

a. Userfriendly and Overall safety rating for weighted final metric is Best (25 ≤ Summed safety points ≤ 75)

b. IWA Performance Matrices - Tier 3 (efficiency)

SAIFUL HUQUE
Director
Institute of Energy
University of Dhaka

Dr. Bilkis Ara Begum
Head
Chemistry Division
Atomic Energy Centre, Dhaka

INSTITUTE OF ENERGY

(শক্তি ইনস্টিটিউট)

ঢাকা বিশ্ববিদ্যালয়
ঢাকা-১০০০, বাংলাদেশ
দূরসংযোগ: +৮৮০-২-৯৬৭৭১২৫, ৯৬৬১৯০০/৪৫৭০
ফ্যাক্স: +৮৮০-২-৯৬৬৭২২২
ই-মেইল: ire@du.ac.bd



University of Dhaka
Dhaka-1000, Bangladesh
Phone: +880-2-9677125, 9661900/4570
Fax: +880-2-9667222
E-mail: ire@du.ac.bd

নং- শই/

তারিখঃ ১৯ আশ্বিন, ১৪২৪ বঙ্গাব্দ
০৪ অক্টোবর, ২০১৭

To,
Managing Director
Luxur Green Energy Ltd
33, Sohid Faroque Road
North Jatrabari, Dhaka-1204

Subject: WBT Tests for ICS.

Dear Sir,

The ICS model “Luxur Cook Stove Double Mouth” has been tested using Water Boiling Test (WBT 4.2.3) protocol used worldwide. The WBT was developed to assess stove performance in controlled manner.

Although the WBT is a useful tool for the reasons given above, it is important to remember its limitation also. It is an approximation of cooking process and is conducted in controlled conditions by trained experts. ICS Technical committee of Institute of Energy, Dhaka University has tested the above mentioned ICS of metal based stove. The summary test result and the detail test result from measurements are given in table -1 and table-2 accordingly.

Table-1: Summary (WBT Efficiency Test) of ICS test

Sl. No.	Type	High Power	CO (ppm)	PM _{2.5} (µg/m ³)	Comments
1	“Luxur Cook Stove” Double Mouth (Portable and Metal)	Tier-3 (Efficiency)	3.20±0.62	134±41	The flame was near to the middle position of the test pot. The highest measured surface temperature was found satisfactory.

Note: IWA High Power Benchmark are: Tier-1 (Efficiency ≥15%), Tier-2 (Efficiency ≥25%), Tier-3 (Efficiency ≥35%) and Tier-4 (Efficiency ≥45%). Data for CO and PM_{2.5} levels have been entered for simmering process.

Begum
Dr. Bilkis Ara Begum
Head
Chemistry Division
Atomic Energy Centre, Dhaka

Saiful Huque
(Prof. Dr. Saiful Huque)
Director
Institute of Energy
University of Dhaka.

INSTITUTE OF ENERGY

(শক্তি ইনস্টিটিউট)

ঢাকা বিশ্ববিদ্যালয়
ঢাকা-১০০০, বাংলাদেশ
দূরালাপনী: +৮৮০-২-৯৬৭৭১২৫, ৯৬৬১৯০০/৪৫৭০
ফ্যাক্স: +৮৮০-২-৯৬৬৭২২২
ই-মেইল: ire@du.ac.bd



University of Dhaka
Dhaka-1000, Bangladesh
Phone: +880-2-9677125, 9661900/4570
Fax: +880-2-9667222
E-mail: ire@du.ac.bd

নং- শই/

তারিখঃ ১৯ আশ্বিন, ১৪২৪ বঙ্গাব্দ
০৪ অক্টোবর, ২০১৭

Table -02

RESULTS OF WBT & IAP MEASUREMENTS OF DIFFERENT ICS's STOVE

The thermal efficiency measurements were done under the supervision of Dr. S. M. Nasif Shams, Incharge of ICS Test Lab, Institute of Energy, Dhaka University and IAP measurements were supervised by Dr. Bilkis A. Begum, Chief Scientific Officer of BAEC, Dhaka, Bangladesh

SI # 2: ICS - Luxur Cook Stove Double Mouth: It is a portable Metal ICS

SI#	Parameters	Units	Stages of WBT (Average)			Picture
			Cold Start	Hot Start	Simmering	
i	ii	iii	iv	v	vi	
1	Time to Boil	min	12.7	10	45	
2	Thermal Efficiency	%	39.3	41.1	36.5	
3	Specific fuel consumption	g/liter boiled	51	49	120	
4	CO	ppm	5.62±0.09	4.32±0.11	3.20±0.62	
5	PM ₁₀	µg/m ³	640±99	477±79	177±78	
6	PM _{2.5}	µg/m ³	504±105	379±95	134±41	
7	BC in PM _{2.5}	µg/m ³	131±26	99±26	35±11	

IWA PERFORMANCE METRICS	units	Test 1	Test 2	Test 3	Average	St Dev	COV
High Power Thermal Efficiency	%	40.9%	39.8%	39.9%	0.402	0.61%	1.5%

IWA PERFORMANCE TIERS	units	Test 1	Test 2	Test 3	Average
High Power Thermal Efficiency	%	3	3	3	3

Comments:

- Userfriendly and Overall safety rating for weighted final metric is Best ($25 \leq$ Summed safety points ≤ 75)
- IWA Performance Matrices - Tier 3 (efficiency)

SAIFUL HUQUE
Director
Institute of Energy
University of Dhaka

Dr. Bilkis Ara Begum
Head
Chemistry Division
Atomic Energy Centre, Dhaka