

THE “LIMA CONSENSUS”

The signers of this agreement,

RECOGNIZING *the substantial level of consensus that exists among standards and testing stakeholders gathered at the 2011 PCIA conference in Lima, Peru, in key areas of agreement;*

COGNIZANT *of critical hurdles that must be addressed for cookstove evaluation measures to become meaningful and useful;*

ACKNOWLEDGING *that much work will be required, beyond this document, before a comprehensive, consensus, and achievable global standard can be introduced, yet*

DESIRING *to record, for the Global Alliance Standards and Testing Working Group, this first step in creating a larger consensus around standards and testing.*

WE RESOLVE THE FOLLOWING...

- 1. To adopt a temporary rating system that reflects varying tiers of performance in the areas of fuel efficiency, indoor air quality, emissions of particulate matter (PM) and carbon monoxide (CO), and safety. Each area will be ranked separately.**
- 2. That tiered ratings reflect a desired sequence of evolution within the stove industry. Examples of potential tiers are given in attached appendix, with actual numbers to be determined by the Global Alliance Standards and Testing Working Group with input from global stakeholders. The tiers would roughly match the following levels of current (2011) technology:**

Tier 0	Typical, Unimproved
Tier 1	Measurable Improvement using Minimum Best Practice
Tier 2	Substantial Improvement Over Minimum Best Practice
Tier 3	Stretch Goals which achieve Significant, Measurable Health and/or Environmental Goals

- 3. That these ratings shall serve as temporary guidelines of performance while formal, consensus standards are being developed; and furthermore, that these ratings shall not supplant standards or benchmarks in countries that have already promulgated such standards.**
- 4. To use the Water Boiling Test (WBT 4.0) as the interim protocols for emission and efficiency ratings with the following provisions:**
 - The testing task shall be defined as a fixed value of energy transfer to the pot (during high-power hot and cold start phases) plus a fixed time of simmering or constant heat
 - Simmer phase is defined as maintaining a certain task.
 - Plancha stoves may count some fraction¹ of the energy transferred to the plancha surface as useful heat
 - Report stove firepower

5. **To use the Iowa State or Peru/Bolivia Safety Rating protocols for safety ratings**
6. **That the following methodology is allowable for certified rating of indoor air pollution:**
 - a. Calculated from measured emission rates using an accessible, open source model using a standard room with instantaneous mixing and a standard room size and air exchange rate¹, or
 - b. Measure concentrations in a standard test kitchen¹
7. **To translate ratings given here into percentage reductions by defining the PM and CO emissions, fuel use, and time to boil of a standard baseline fire**
8. **That the following minimum equipment or methodology is required for certified testing of emissions and performance:**
 - a. For carbon monoxide emissions measurement: non-dispersive infrared (with calibration consistent with U.S. EPA 40 CFR Part 60 Method 10) or electrochemical cell (with pre/post calibration method¹)
 - b. For particulate matter emission measurement: (i) real-time measurement of a particulate matter proxy via light scattering, AND (ii) gravimetric measurement with cyclone for 2.5 micron cutoff
 - c. For exhaust gas flow: constant volume pump or flow grid both with real-time temperature and pressure correction consistent with U.S. EPA 40 CFR Part 60 Method 1 and 2d
 - d. For temperature measurement: Type K thermocouple
 - e. Computer datalogging of all measurements
 - f. Some method of real-time PM monitoring

FURTHER RESOLVED, THAT A DATA-DRIVEN, LONG-TERM TEST PROTOCOL AND STANDARD THAT MEET THE FOLLOWING OBJECTIVES SHALL BE DEVELOPED WITHIN AN 18-MONTH TIME FRAME:

1. **Harmonizes, to the extent possible, existing protocols and targets from major national initiatives**
2. **Evaluates the suitability of the temporary rankings described above and recommends changes as necessary**
3. **Requires field validation to reach the highest tiers**
4. **Better incorporates field operating conditions into laboratory tests**
5. **Connects to WHO Indoor Air Pollution guidelines that protect user health, assuming a standard room and ventilation**
6. **Transitions well from the proposed temporary standard (equipment, etc) but adopts additional “approved” equipment when required**
7. **Evaluates particulate composition including black carbon**
8. **Tests the robustness of the stove to common variables (moisture content, feed rate, fuel type)**
9. **Further clarification around testing with variable fuels (pellet, ag. waste, etc.,) and variable fuel conditions (moisture, size, etc.)**
10. **Addresses common stove configurations that are currently not well captured by testing protocols, including charcoal and batch stoves**

HOWEVER, THIS CONSENSUS IS CONTINGENT UPON THE FOLLOWING:

1. **Identifying funds to support a grant process so that regional knowledge and testing centers** (we recommend a minimum of 7; perhaps India, China, South/East Africa, West Africa, Central America, South America, and Southeast Asia) **can receive equipment grants and training support enabling these centers to provide testing services per the adopted protocol. In particular, new capabilities for gravimetric measurement of particulate matter must be supported for success of the testing efforts.**
2. **Creating ongoing support mechanisms to develop and retain qualified personnel at regional knowledge and testing centers who are capable of performing testing**
3. **Creation of a fund to provide small grants to innovative stove developers and projects that seek to test their stove per the adopted protocol, especially after demonstrating the ability to meet basic performance standards**
4. **Developing ongoing support mechanisms to retain qualified personnel who employ testing results for continuous improvement of stove quality**
5. **Identify funds to support specific R&D tasks required to develop a long-term standard, including the impact of variations in operation**
6. **Identify and support experts who work toward harmonization of standards through interaction between the Global Alliance, national governments, and other stakeholders**

Notes: (1) Items to be determined in the next 30 days.

SIGNATURES:

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*** GA S&T Co-Chair, * GA S&T group member*

APPENDIX A: **POTENTIAL** STANDARDS ASSOCIATED WITH THE CONSENSUS RATING PROTOCOL
(TO BE DETERMINED AT A LATER DATE)

	Reduction	CO Emissions (g)
Tier 0	< 66%	> 4 g/L
Tier 1	> 66%	< 4 g/L
Tier 2	> 83%	< 2 g/L
Tier 3	> 90%	< 1.2 g/L

	Reduction	PM _{2.5} Emissions (mg)
Tier 0	< 40%	> 300 mg/L
Tier 1	> 40%	< 300 mg/L
Tier 2	> 70%	< 150 mg/L
Tier 3	> 90%	< 50 mg/L

	Reduction	IAP Rating (g) ¹
Tier 0	< 85%	> 30 µg/m ³ PM _{2.5} and > 300 ppm CO
Tier 1	> 85%	< 30 µg/m ³ PM _{2.5} and < 300 ppm CO
Tier 2	> 90%	< 20 µg/m ³ PM _{2.5} and < 200 ppm CO
Tier 3	> 95%	< 10 µg/m ³ PM _{2.5} and < 100 ppm CO

	Reduction	Efficiency (Wood)	Efficiency (Charcoal)
Tier 0	< 50%	> 170 g/L	> 60 g/L
Tier 1	> 50%	< 170 g/L	< 60 g/L
Tier 2	> 55%	< 153 g/L	< 50 g/L
Tier 3	> 60%	< 136 g/L	< 40 g/L

	Safety (Iowa State)	Safety (Peru/Bolivia Standard)
Tier 0	< 50 points	GIZ to provide
Tier 1	≥ 50 points	GIZ to provide
Tier 2	> 70 points	GIZ to provide
Tier 3	> 90 points	GIZ to provide