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# CLEAN AND EFFICIENT COOKING TECHNOLOGIES AND FUELS

## 4. INTERNATIONAL STANDARDS AND TESTING PROTOCOLS



Photo credit: Winrock International

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“YOU DON’T GET WHAT YOU EXPECT,  
YOU GET WHAT YOU INSPECT.”

**DR. KIRK SMITH, JUNE 2007, ENERGY FOR SUSTAINABLE DEVELOPMENT.**

Photo credit: Berkeley Air Monitoring Group



## 4. INTERNATIONAL STANDARDS AND TESTING PROTOCOLS

Performance testing and standards development for cooking technologies and fuels help implementers, investors, donors, and consumers alike differentiate between varying levels of product performance, safety, and quality. Standards and testing also help manufacturers identify ways to make improvements to product performance, thereby distinguishing their products in the market and ultimately achieving greater impacts.

### WHY IT MATTERS

Untested “improved” stoves can have higher emissions and/or lower efficiency than the traditional options they are meant to replace, and promoting inadequate technologies can reduce or reverse expected project impacts, and also spoil the market for future higher quality technologies. The use of cookstove standards and testing can help ensure programs are able to meet their impact goals.

### BEST PRACTICES

1. Find out what test results already exist for cooking technologies and fuels on the market for your target consumers – the Alliance’s Clean Cooking Catalog is a great starting point. It includes test results for various technologies searchable by country.
2. Compare these results with international cookstove standards to ensure your choices meet performance criteria established by the funding agency or local government.
3. Undertake in-country testing of the cookstoves you plan to promote, to ensure that they perform well with local foods and fuels.

## STOVE TESTING

To better ensure and understand program benefits, donors and implementers need to use testing data for candidate stoves and fuels before undertaking any large scale dissemination efforts.

## TESTING PROTOCOLS

Cookstove performance, and especially the achievement of fuel and emissions reductions, can only be verified through testing. Standardized laboratory testing protocols and metrics allow for replicability and comparability among tests and across stoves. As stoves often perform differently when consumers use them in their own homes, field testing in consumer homes often provides a more realistic picture of actual stove performance. Field testing allows for more relevance between the test results and potential impacts, but with less comparability among tests and stoves. Laboratory testing often represents the best possible performance under ideal conditions, but cookstoves that perform well in the

## CLEAN AND EFFICIENT COOKING TECHNOLOGIES AND FUELS

lab (where the standard test is boiling water) may not always perform well cooking a specific local food, or with non-standard fuels.

Three common standardized tests are the Water Boiling Test (WBT), the Controlled Cooking Test (CCT), and the Kitchen Performance Test (KPT). The laboratory-based WBT is the most standardized of the three, and allows for comparison between stoves. The CCT assesses the performance of stoves relative to the traditional baseline, and consists of multiple cooks cooking a typical local meal (using the same amounts of the same ingredients) multiple times for each stove tested. The KPT measures the impact of the introduction of the stove on household fuel use. This is a function not just of stove performance, but also the degree to which consumers replace their traditional cooking option with the improved stove. More detail on these and other testing protocols are available here: <http://cleancookstoves.org/technology-and-fuels/testing/protocols.html>.

Testing protocols are consistently updated and reviewed by the global community to ensure methods for lab and field testing provide the best possible depiction of how each stove performs. For example, testing protocols are being evaluated and updated through an ongoing international standards process (see below). The Global Alliance for Clean Cookstoves' [Clean Cooking Catalog](#) includes test results for many cooking technologies and fuels available worldwide.



## REGIONAL TESTING AND KNOWLEDGE CENTERS

An effort to expand global capacity for, and increase access to, quality testing services has been underway for several years, resulting in several Regional Testing and Knowledge Centers (RTKCs) established around the globe. RTKCs provide independent cookstove and fuel testing services (both lab and field testing) to local manufacturers, implementers donors, investors, and governments, and are often able to provide recommendations for improving cookstove design based on these test results. Many offer related trainings and knowledge resources for local stakeholders. For a full list of RTKCs available to consumers and manufacturers, please see: <http://cleancookstoves.org/technology-and-fuels/testing/centers.html>.

## INTERNATIONAL COOKSTOVE STANDARDS: A BRIEF HISTORY

The goal of current efforts to develop international voluntary performance standards is to increase the ability of consumers and policy makers to differentiate between cooking options and increase incentives for manufacturers to develop the cleanest and/or most efficient technologies and improve these over time.

**International performance standards for cookstoves have been under discussion in the clean cooking sector for over a decade. Standards benefit:**

- Consumers by providing confidence in product quality
- Donors and investors by ensuring funds are invested in products with the highest potential for impact
- Manufacturers by driving innovation and ensuring fair competition of products on the market
- Governments by providing an international framework with which to develop their own national standards and product labeling and facilitate collaboration and trade.

The first significant advancement toward the development of international cookstove standards came in 2011 through the [Lima Consensus](#), which established an interim rating system for the evaluation of cookstove models “that reflects the varying tiers of performance in the areas of fuel efficiency, indoor air quality, emissions of particulate matter and carbon monoxide, and safety.”

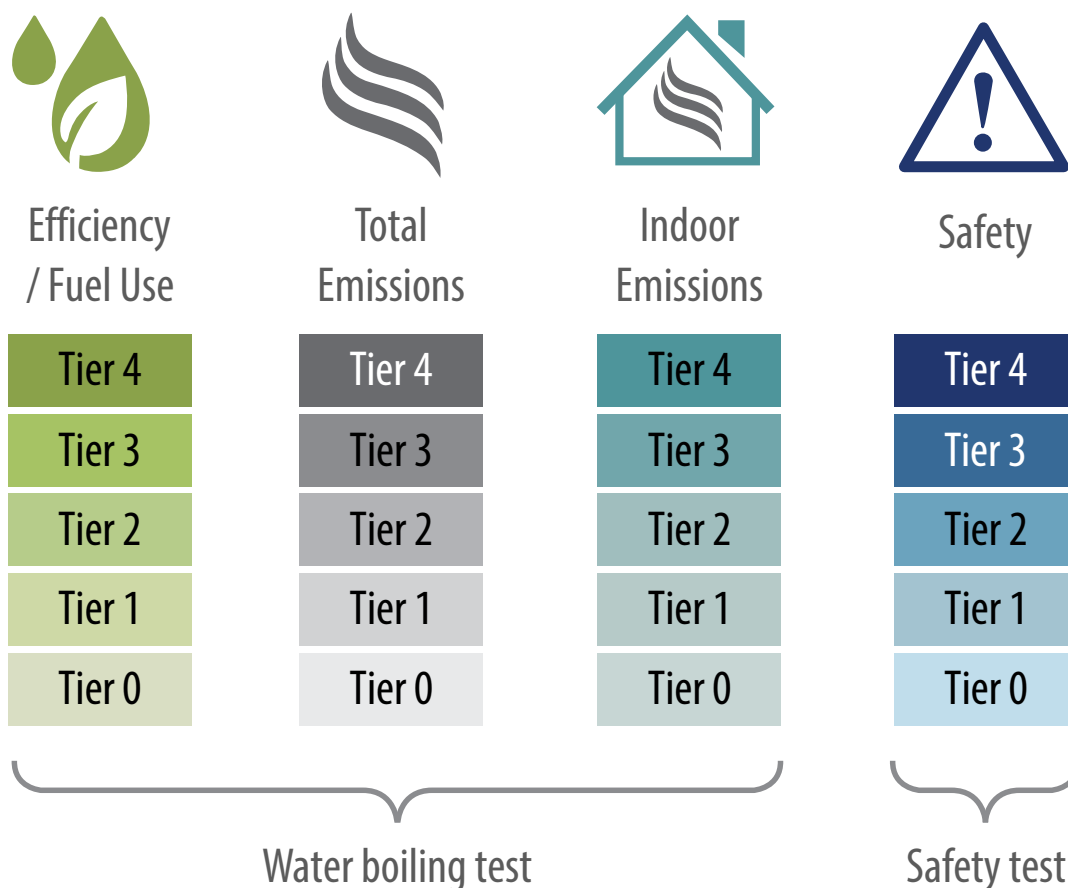
The basic principles laid out in the Lima Consensus were later used as the basis for the International Standards Organization (ISO) [International Workshop Agreement](#) (IWA) on Cookstoves, which was finalized and unanimously affirmed by more than 90 stakeholders at the ISO International Workshop on Cookstoves in 2012 in the Netherlands. Rather than select a single laboratory protocol to determine cookstove performance, the IWA sought to enable stove testers to utilize multiple options from a set of internationally-recognized laboratory protocols most appropriate for the stove and performance indicator being tested. That said, the tiers developed were based on the Water Boiling Test, as the sector has the most data available for that test, with the future goal being to develop tiers for other testing protocols.

The affirmation and widespread use of the IWA led to the establishment of ISO Technical Committee 285, which brings experts in the clean cooking sector from all over the world together to develop international voluntary standards for technologies and fuels meant to replace traditional cooking with solid fuels. These international standards can be used as guidance by countries seeking to set their own national standards (some examples include Bangladesh, Ghana, Guatemala, Kenya, Mexico, Nepal, Nigeria, Uganda and others). For countries that already have standards in place, (e.g. Bolivia, China, India and others) the international standards can facilitate international collaboration and trade. The standards and the interim IWA tiers can also be used to prescribe cooking options eligible for support or inclusion in donor-supported programs

## TIERS OF PERFORMANCE

The IWA established tiers of performance to rank stove performance across each of the 4 criteria (efficiency, total emissions, indoor emissions and safety), across a ranking spectrum from 0, which represents the performance of typical baseline open/three-stone fire, and 4, which represents a longer-term aspirational goal for biomass stoves. For total emissions (all emissions emitted by the stove, including those vented out of the kitchen) and indoor emissions (only those emissions emitted indoors, not including any vented by a chimney), the Tier 4 level is pegged to achievement of WHO [interim indoor air quality guidelines](#). Many liquid and gas stove/fuels (ethanol and LPG, but not kerosene) meet Tier 4 emission levels, as can some biomass stoves that have fans or burn processed biomass. Stoves are ranked from 0-4 for each tier level separately, so a stove will end up with scores that look like 3/3/2/4. These scores are not combined and there is no single overall ranking.

USAID and other donors should consider first the primary impacts they're trying to achieve, and then relate those impacts to the tiers that are most appropriate. For example, for programs most interested in fuel savings, the efficiency/fuel use tier levels will be the most important. For a health-related program, the indoor emissions tiers likely would become the primary determinant for a cookstove's inclusion in a program. For a climate-focused program, total emissions and efficiency/fuel use might be the most appropriate determinants. Donors should keep in mind that "Tier 4" was set as 'aspirational', especially for emissions – it is achievable to varying degrees depending on the tier category and type of fuel, but asking implementers to promote only Tier 4 stoves across the board is not yet realistic (if the ultimate objective is to maximize dissemination). It's important to prioritize which categories of performance are most important to the work you're trying to achieve, then set more stringent criteria as technologies improve and distribution channels are developed.



## THE WAY FORWARD

At an initial meeting in Nairobi, Kenya in 2014, ISO Technical Committee 285 formed four working groups responsible for developing draft standards and guidance documents on:

- 1) A framework for stove and fuel evaluation
- 2) Harmonized protocols for lab-based testing
- 3) Guidelines for field testing, and
- 4) Guidelines for examining social impacts

Working drafts for most working groups are expected to be completed by late 2017. They will then be reviewed by TC 285 participating countries (through their national committees) and finalized by the working groups, at which point all ISO member countries will have the opportunity to vote to approve the standards. National-level committees will determine how best to implement the standards within their specific settings in a way that is harmonized within their region and internationally.

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