PARTNERSHIP FOR CLEAN INDOOR AIR

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Stove Testing Protocols, Facilities and Standards Development

This quarterly newsletter provides updates on the activities of the Partnership for Clean Indoor Air (PCIA) and its Partners to improve health, livelihood and quality of life by reducing exposure to indoor air pollution, primarily among women and children, from household energy use. Currently, **320** governments, public and private organizations, and multilateral institutions are working together to increase the use of affordable, reliable, clean, efficient, and safe home cooking and heating practices. Visit www.pciaonline.org to join!

This issue's introduction was written by Guest Editor Nordica MacCarty, Laboratory Manager at Aprovecho Research Center.

At the PCIA forum in Kampala this March, it was exciting to see the strong interest in stove testing that has been developing in our community. In the practice sessions, many Partners asked great questions and actively participated to learn about testing. Many people also expressed how eager they were to begin quantifying stove performance when they returned home to their projects. More than half of the participants reported having conducted stove performance tests. PCIA's goal is for all Partners to test their stoves to understand how they perform, and the Partnership is committed to help them.

Testing helps us to compare and improve our stove designs, and to understand the most important thing: how much of an improvement we are making in people's lives. I know from personal experience that it can be extremely satisfying to carefully design and build a stove and then receive testing results back from the field that show a substantial improvement over traditional cooking methods.

When stoves are carefully tested and adhere to quality and performance criteria, continued funding and the success of projects seems a lot more certain. Efforts in many countries toward internationally accepted performance standards are rapidly moving forward, leading to better stove designs and greater confidence of success in the international spotlight.

Today we are fortunate that emission measuring devices and standard tests are readily available. Many PCIA Partners are using these resources to develop better stoves, monitor their performance, and feel confident that expectations are met when stoves are disseminated. In this issue of the Bulletin, some of the groups who have embraced testing share their experiences. We hope this information will be of use as we work together as a united community to bring millions of improved stoves to the world.

In This Issue

☼ FEATURE ARTICLES

A Path to International Stove Performance Standards: Protocols, Equipment, Testing Centers, and Benchmarks

Nordica MacCarty, Aprovecho Research Center, nordica.maccarty@gmail.com

Stove projects' continued funding and user acceptance around the world will have a much better chance at success when stoves are carefully tested and adhere to certain standards. Today we are fortunate that many of the tools needed to make this happen are available. There are essentially four steps needed on the path to international standards for stove performance.

STEP 1: Standard Testing Protocols

The good news is that standard testing protocols and procedures have been well under development for the past two decades based on international standards. In 1982, USAID organized a series of international conferences resulting in three tests, one in the lab and two in the field (the 1985 VITA protocols). Revised VITA protocols and procedures have been used by many organizations all over the world. In 2003, Dr. Kirk Smith at University of California at Berkeley, Shell Foundation, and Aprovecho revised these tests and created Excel spreadsheets to help users with calculations. At every ETHOS conference since 2007, meetings have been held to further improve those protocols. Recently, Dr. Tami Bond has led this effort. Learn how you can get involved on page 9 of this Bulletin.

Nordica MacCarty demonstrates stove performance testing at 2009 PCIA Forum

For the past 5 years, Aprovecho staff and others have been visiting projects around the world teaching stove testing and design in workshops for the PCIA. The overwhelming response has been that stove testing is both extremely informative and necessary.

The three standard tests needed to thoroughly evaluate a stove from lab to field are:

- The Water Boiling Test (WBT) -- a laboratory test that compares stove performance while completing a standard task in a controlled environment to investigate the heat transfer and combustion efficiency of the stove. The
- Controlled Cooking Test (CCT) -- a field test that measures stove performance in comparison to traditional methods when a cook prepares a local meal to investigate stove performance using local fuels, pots, and practice.
- The Kitchen Performance Test (KPT) -- a community field test that measures fuel use in homes after stoves have been distributed to ensure real-world savings and use.

The latest addition to the standard testing protocol is the Gold Standard Cook Stove Methodology, for project developers that want to secure carbon credits. The Gold Standard Methodology is essentially an extended KPT. These tests validate the stove from initial optimization of the technical design all the way to what happens when cooks are using them in their homes under highly variable circumstances. The tests are used in series, moving from one to the next after satisfactory results are achieved. This is because it doesn't make sense to do an expensive and time consuming KPT if the stove did not meet expectations on the first two tests.

The protocols, and data calculation sheets are available on the PCIA website at www.pciaonline.org/testing, and training slides developed by Aprovecho are available at www.aprovecho.org/.

Why do standard tests? When PCIA Partners conduct the same tests in the same way, then we can compare our data. Since benchmarks must be set on laboratory tests (because the field is simply too variable around the world), the WBT is the best candidate for international stove performance standards. Aprovecho Research Center (ARC) operates a state-of-the-art laboratory facility for testing stoves, and has evaluated hundreds of stoves using the WBT and measuring emissions. Jim Jetter at the EPA lab and others have found similar results to ours using the WBT protocols. You can read his article on page 4 of this Bulletin.

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STEP 2: Emissions Testing Equipment

Because fuel use is only a part of the picture of improved stove performance, emissions measurements are also necessary. Equipment for measuring emissions can range from a hundred to a million dollars, with many levels of complexity. There are several high level labs around the world that have the ability to test stoves. But due to the need for easy to use, inexpensive, and accurate equipment for projects everywhere, Aprovecho worked for the past four years to develop a portable emissions testing kit.

The Portable Emissions Measurement System (or PEMS) is essentially a laboratory that fits in a suitcase. It uses a hood to collect all of the emissions made during a test, while monitoring levels of CO, CO2, PM and volumetric flow in real-time. Collection of methane and particle samples can also be added for carbon credit testing. This emissions collection method is essential for optimizing stove design, as direct measurements are required to calculate total emissions accurately. As opposed to IAP measurements, which vary with time, space, and ventilation, the hood collects all the smoke and gases resulting in consistent measurements of total emissions. For information about this equipment please visit www.aprovecho.org.

If one does not know how a stove performs, then one does not know how to improve it. Small changes in size and shape can have dramatic effects on fuel use and emissions. The magic of stove testing is that you can easily optimize your stove design by doing a series of tests so that down the road, all of your efforts toward dissemination and adoption may become a lot easier.

STEP 3: Regional Testing Centers

In order for testing to be effective, it must be done well, hopefully by testers with experience. Testers need to accurately generate data and know how to change the stove to improve performance. Stove projects often send their stoves to Aprovecho for thorough evaluation and recommendations for improvement, but this service needs to be available worldwide! Our vision is to help set up regional testing centers where locals will become experts in stove testing and design and help local projects to improve and test their stoves. We hope that regional testing centers will:

- Be places that provide ongoing support, whether grant-based or self-sustaining by paid fees;
- Have quality equipment and know how to use and interpret results;
- Be experts in stove testing; and
- Understand stove design in order to help identify problems and recommend improvements.

Forum participants watch stove testing demonstration

Some of the regional testing centers, most with PEMS, that are in the beginning stages include: the Asia Regional Cookstove Program (Indonesia), Zamorano University in Honduras, Makarere University in Uganda, China Agricultural University, and the GTZ offices in Bolivia and Peru. You can read more about three of these testing centers on pages 5-8. Staff from these organizations have been trained in stove testing and use of equipment, as well as the principles of stove design. Aprovecho intends to continue in close relationship with these testing centers, sharing discoveries and experiences.

It is hoped that regional testing centers will assist in standardized evaluation, improvement, and certification of improved stoves worldwide. Transferring the technology and knowledge to local organizations is an essential part of widespread adoption of improved cook stoves.

STEP 4: Benchmarks for Improved Stoves

By testing stoves and measuring their emissions reliably, the stage is set to create standards or benchmarks for stove performance.

For standards/benchmarks to be effective, they must be:

- Appropriate: They must give some indication of real-world performance. They can be similar to the EPA fuel efficiency ratings for cars, where not everyone will achieve that gas efficiency, but it is reached under standard conditions.

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- Replicable: The protocol needs to be general enough that it can be reasonably reproduced around the world.
- Fair and Aspirational: we can't expect to meet WHO air quality guidelines tomorrow, but we should try to improve stoves as much as possible.

Hopefully, as we move forward, protocols and standards can help ensure optimal stove performance and thus generate increased funding and attention for cook stove projects worldwide.

It's a very positive sign that so many PCIA member organizations are committed to testing and improving their stove's performance. I think that it shows how we appreciate the need to make optimized stoves that are loved by cooks. The new regional testing centers will be a tremendous resource for these efforts. I am happy to have helped move stove and emissions testing forward in our community, and I look forward to continuing to see stove projects succeed.

Webinar Q&A now posted

A transcript of the Q&A session following the June 23, 2009 PCIA Health Research Webinar on Cardiovascular Mortality and Household Solid Fuel Use is now available. Visit **http://www.pciaonline.org/node/959** to download the text in PDF format.

U.S. EPA Stove Testing

Jim Jetter, U.S. EPA, jetter.jim@epa.gov

U.S. EPA's Office of Research and Development has a facility in Research Triangle Park, North Carolina where performance and emission testing is performed on solid-fuel, household cook stoves. EPA's facility has been testing air pollutant emissions from combustion sources, including wood-burning heating stoves, for approximately 30 years. Much of the emissions testing has been done to support EPA regulations and to develop air-pollution control technology. Household stove testing was more recently initiated to provide technical support to PCIA Partners.

The WBT (Water Boiling Test) protocol is used for testing performance. The protocol is currently under review, and the updated version is posted on the PCIA web site. Pollutant emissions are measured while the stove is operated according to the protocol. The WBT protocol is relatively simple to follow, but obtaining accurate results requires good preparation, practice, and focused attention during the testing. A main challenge in testing is controlling variables to obtain consistent and reproducible results. This challenge can be addressed by carefully specifying and controlling the fuel type, fuel preparation (size and moisture content), stove operation technique, and operating conditions. Variation in stove dimensions or materials can cause variation in results, but stoves manufactured with appropriate dimensional tolerances and quality control can be tested with consistency.

Pollutant emissions are captured with a hood and duct system and are measured as follows:

Continuous emission monitors

- CO_2 (carbon dioxide) – measured in real time with NDIR (nondispersive infrared) CEM (continuous emission monitor), approximate cost for instrument: $9,000.
- CO (carbon monoxide) – measured in real time with NDIR CEM, approximate cost: $12,000.
- THC (total hydrocarbons) – measured in real time with FID (flame ionization detection) CEM, approximate cost: $14,000. An instrument that measures both THC and CH_4 (methane) costs approximately $17,500.
- PM (particulate matter) – size range from 0.0025 to 1.0 μm (micro meter) measured in real time with SMPS (scanning mobility particle sizer), approximate cost: $84,000.
- PM – size range from 0.03 to 10 μm measured in real time and particles captured on a cascade impactor with ELPI (electrical low-pressure impactor), approximate cost: $83,000.

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- $PM_{2.5}$ (particulate matter with an aerodynamic diameter less that 2.5 µm) – integrated samples collected on filters and mass measured with an electronic microbalance, approximate cost of microbalance: $24,000. A temperature- and humidity-controlled room is also required – costs vary.
- EC (elemental carbon) and OC (organic carbon) – integrated samples collected on filters and measured with a thermal-optical carbon analyzer following NIOSH Method 5040, approximate cost of analyzer: $45,000.

Stove testing in emissions hood

The most recent solid-fuel cook stove testing evaluated 14 stove/fuel combinations including four types of rocket stoves, two charcoal stoves, VITA stove, Philips stove, New Lao Stove, and a 3-stone fire. Stoves were selected based on their use in the field by PCIA Partners. Fuels included two species of wood, charcoal, garment waste, and high-resin pine used for fire starting.

Results from the testing showed that some stoves currently used in the field have improved fuel efficiency and lower pollutant emissions compared with traditional cooking methods. Stoves with smaller-mass components exposed to the heat of fuel combustion tended to take lesser time to boil, have better fuel efficiency, and lower pollutant emissions. The challenge is to design stoves with smaller-mass components that also have acceptable durability, affordable cost, and meet user needs. Results from this study provide stove performance and emissions information to PCIA Partners disseminating stove technology in the field. This information may be useful for improving the design of existing stoves and for developing new stove designs. Comparison of results between laboratories shows that results can be replicated between labs when the same stove and fuel are tested using the WBT protocol. Recommendations were provided to improve the ability to replicate results between labs. Further details can be found in a published paper available at the PCIA web site: http://www.pciaonline.org/research.

EPA is planning further stove testing to evaluate the effects of fuel moisture content on pollutant emissions, including pollutants that influence global climate. PCIA partner stoves that are currently in widespread use in the field will be tested.

Partner Spotlights — Regional Stove Testing Centers

Stove Testing Center (STC) EnDeV- Bolivia/ GTZ

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Our STC has proved to be key for the successful dissemination of improved stoves

The stove testing center was created to assess the quality of existing stoves. Given the test results of the prefabricated as well as the mud/ adobe stoves, the need for adjustments and further stove development was clear. Our new developments have improved performance significantly in every single indicator. By now, the STC is pivotal in our quality control system and provides input for decisions regarding technical, financial, logistic and operational matters.

How was the STC-Bolivia created?

The creation of the center (April 2007), involved the efforts of our local GTZ staff, the Universities San Simon (UMSS, Cochabamba) and San Andrés (UMSA, La Paz), Delft University, and later those of Nordica MacCarty (Aprovecho). The relationship with Aprovecho is still very important for development of activities, application of protocols and training for the staff in charge.

The goal of the STC is to improve the performance of the stoves, support technology development, document state-of-the-art technologies, and be a reference for the government, NGOs, stove manufacturers and international cooperation agencies.

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Stove testing in Bolivia

Which indicators and protocols are used in the tests?

In the laboratory, the Water Boiling Test (WBT) is performed. Important performance indicators are:

- Energy Consumption to complete WBT
- Time to boil 5 liters of water
- Indoor Air Pollution (IAP) (PM 2.5 and CO)
- Safety

Additionally, Controlled Cooking Tests are performed in the field: Time, IAP and Energy Consumption.

How was the experience? Which types of stoves have been tested?

Throughout three years of work, the STC-Bolivia staff has done approximately 300 tests on more than 20 different stove models all around Bolivia and Peru. Traditional stoves, solar stoves, improved stoves with and without chimney and/or ceramic combustion chambers, clay and metallic stoves have been tested. Fuels used in testing are wood, cow dung, llama dung and phuti (grass mats). Tests were run in the laboratory as well as in the field; most of them were Water Boiling Tests and about 15% were Controlled Cooking Tests; Complementary safety and emissions tests are part of the routine.

What are the advantages of having a testing center?

Having a testing center has allowed us to improve significantly overall performance and choose acceptable stove models. The technical information is complemented by field observation and interviews that show a better acceptance and use of the new models. The STC also has allowed us to figure out the impact on performance of different materials or construction processes. Most important is the possibility of testing new developments and modifications for the different types of fuel and for the diverse geographic and social cultural scenarios in Bolivia.

What are the lessons learned?

The experience has taught us that it is important to thoroughly test stove models, before they are financed and especially before they are disseminated and used by families.

It is necessary to have a budget for testing activities (time, trained staff, and field schedules).

Changes to stove parts, designs and models can be made in a more practical and efficient ways if they are supported by tests to measure the effects of these adjustments.

What are the future plans for STC?

Until 2008 the facilities were located in San Simon University in Cochabamba, but have now been transferred to the city of La Paz. Due to an interinstitutional agreement in which the students will be able to conduct tests and research on the subject, the STC is being built in the premises of the department of Architecture at San Andrés University.

The STC will be located in a model ecological house with passive heating. Every stove type will be mounted on a wheeled platform in order to move it to a standard room for testing, thus having equal conditions for IAP. We are currently working on a stove for a variety of pot sizes and types, based on our standard mud/ adobe MALENA stove. Along with this, field testing (CCT and WBT) by the STC staff is performed nationwide.

Bolivian girls with improved cookstove

What does the STC model offer to other Partners of PCIA?

The STC has already given support to GTZ Peru, and it continuously provides support to other stove projects in Bolivia. At the same time it would be a great pleasure for us to share information, protocols in Spanish and counseling to PCIA projects that request them.

Stove Testing: Improved Stoves Certification Center at Zamorano

Gracia M. Lanza Castillo, Panamerican School of Agriculture, Zamorano, glanza@zamorano.edu

The Panamerican School of Agriculture, Zamorano, is establishing an Improved Stoves Certification Center with the support from the Philantrophy Energy Warehouse -TPW Energy Collaborative. The project is located in the Yeguare Valley, 30 km east from Tegucigalpa. The aim of the project is to identify the most effective and desirable stove for a specific economic context. Work has begun in the Yeguare Valley where seven types of stoves are being built in coordination with the Honduran Association for Development (AHDESA), in seven community houses were the cook is willing to substitute their traditional stove for an improved one. The stoves that are being evaluated are Justa, Justa 2x3 (Proyecto Mirador), Eco-fogón, Onil, Malena, Patsari and the Incahuasi.

Portable Emissions Measurement System (PEMS) El Llano- El Ocotal

The stoves are being evaluated using the updated version of the Water Boiling Test (WBT), the Controlled Cooking Test (CCT) and the Kitchen Performance Test (KPT). These protocols are a useful tool to show reductions in time for cooking, wood used, heat transfer efficiency, etc. Emissions are also being evaluated; Zamorano acquired the Portable Emissions Measurement System (PEMS) to measure CO2, CO and PM emissions; and the Indoor Air Pollution (IAP) Meter to measure indoor concentrations of CO and PM. Both instruments were acquired from Aprovecho Research Center, which has been assisting the Center in Zamorano since March 2009.

Zamorano is currently collecting baseline information in each house; the meals that are being cooked are beans and rice, these are consumed daily by people in the Yeguare Valley. One of the main difficulties when working with beans is that the time for cooking depends on the hardness of the bean. In the communities there are many variables that cannot be controlled by the tester, such as the ability of the cook to light the fire and the homogeneity of the wood (type and moisture). These variables can affect the results so it is necessary to increase the number of repetitions per test. For indoor measurements the cook wears an IAP Meter to quantify reductions in health-harming emissions by measuring indoor concentrations of CO and PM (see picture right).

Cook wearing IAP meter

When selecting houses it is very important to obtain permission and commitment from the cook. Zamorano had the experience that some cooks decide to leave the project because it is time consuming. This represents a challenge because Zamorano will monitor the seven types of stoves for a period of at least one year. It is important that the cook is convinced that this information will be useful for future projects that would like to promote improved stoves. In this sense, as part of the evaluation process, it is being considered that all the cooks from the houses evaluated will be present when sharing the results with key actors.

Zamorano has been testing stoves since August 2009 to help in the selection of appropriate improved stoves for the natural conditions of each region. In several Central American countries the installation of improved stoves is a way to reduce indoor air pollution and deforestation, and increase productive time within a family. An improved stove can use 60% less firewood, has an outside chimney and can improve cooking times. Regardless of the efficiency of some improved stoves there is not a clear policy of how to duplicate these projects or what stove specifications to use. Currently many NGOs and Government programs are supporting the use of improved stoves, but there is no certification of

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the quality of them. Improved stoves are used by indigenous populations and very poor people, so it is a moral issue to secure the quality and assure spare parts and replacements in case of failures. Therefore there is a need for improved stoves to be certified in order to assure their benefits are fully realized.

For the process of Certification, Zamorano is working closely with the National Standard Organization (OHN) which has indicated that two norms should be developed. The first one includes the requirements for each type of stove and the protocols to evaluate them. For the latter, the WBT, CCT and KPT protocols will be used. It is important to mention that the norm for stove requirements will be focused on the seven most commonly used stoves in Latin-American (Justa, Justa 2 x3, Eco-fogón, Onil, Malena, Patsari and the Incahuasi).

At this moment Zamorano is analyzing and documenting the results of tests carried out in the community houses and in the lab. This information will contribute to the development of certification standards for improved stove programs, and NGOs will be able to recommend the correct type of stove for project conditions.

If other Partners are interested in visiting Zamorano or to have their stoves tested in the Certification Center, please contact: Gracia M. Lanza (glanza@zamorano.edu). Zamorano believes in the establishment of strategic alliances to generate new information that will contribute to a better quality of life and sustainable development. Zamorano is willing to receive professors, students, researchers, and NGOs, and exchange information among all key actors. The vision of Zamorano is to become a Regional Evaluation Center for Latin America.

A New Certification Laboratory for Improved Stoves in Peru

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In order to improve the quality of life of Peruvians in economic, social and environmental issues, the Office of the First Lady, the Presidency of the Council of Ministers, the Alliance CRECER-JUNTOS, OPS-GTZ, through their project Energy, Development and Life (EnDev Peru), launched the campaign "Half a million ***certified*** improved stoves for a smokeless Peru."

The focus on certification is due to the fact that in the last decades Peru implemented a number of improved stove models, however none met the required technical features to improve the performance or efficiency of the stove.

With the purpose of guaranteeing the effectiveness of the various types of improved stoves, the Peruvian Government, by Executive Decree No. 015-2009-VIVIENDA dated August 15, 2009, appointed SENCICO – National Training Service for Industry and Construction, as the agency in charge of their evaluation and certification. This means that any institution that has developed systems or alternatives for improved stoves, must obtain a Certificate of Validation of the Stove granted by SENCICO, prior to its use in any place in the territory of the Republic.

In order to be able to provide this certification service, SENCICO, with the technical assistance of GTZ and Aprovecho Research Center of Oregon, has established a Certification laboratory for improved stoves. This service will focus on determining the levels of emission of main pollutants inside the house, particularly CO emissions, and determining the concentration of particulate material, level of energy efficiency through a water-boiling test, and the safety levels of the tested stove, (for instance, the types of surfaces, borders, sharp areas, stability, and the possibility of causing burns, among others).

We expect that the certification of improved stoves will mean the improvement of technical standards of built stoves, guaranteeing their energy efficiency, and the safety and health of the people exposed to combustion, so as to achieve better health conditions and levels of nutrition for the Peruvian Andean population.

Topic and Deadline for Bulletin 22

We are pleased to announce that PCIA Bulletin #22 will focus on the topic of **solar cooking**. Organizations and individuals with experience in this field should submit proposed topics for articles to moderator@pciaonline.org no later than **November 16, 2009**.

☼ OVERVIEW OF INTERNATIONAL PROTOCOLS AND STANDARDS

Toward International Consensus on Stove Testing Protocols: Progress and next steps

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Everyone wants better cooking stoves. Everyone agrees that measurements are needed to confirm whether stoves are "better." Everyone agrees that the international community should agree, as far as possible, on better measurements. This article describes a few small steps toward that agreement, especially the process leading to Water Boiling Test Version 4 (WBT). A draft version of that test is now posted at www.pciaonline.org/testing/wbtcomment**. The final step in the process is accepting public comments until December 18, 2009.** We hope that PCIA Partners will contribute their thoughts, experiences and technical expertise to finalize and adopt the WBT.

The series of tests that begins with the Water Boiling Test was initiated by Samuel Baldwin and Volunteers in Technical Assistance in the early 1980s. About 20 years later, the University of California at Berkeley and Aprovecho Research Center (Aprovecho) collaborated to update the tests. They reviewed equations, evaluated national protocols to determine best practices, and developed spreadsheets to perform data analysis. The publication of the new tests triggered two events: more organizations began using them because of training workshops and internet dissemination, and technically-inclined people could criticize the testing procedures and outcomes. The "right" answer to these critiques was not always clear, as the tests were used for multiple purposes. Disagreements over acceptable testing simmered and sometimes boiled. All the discussion was rooted in good intentions: people cared about delivering better stoves to households that need clean energy.

An important factor distinguishing the stove testing community is the need for a test that serves both laboratory technicians and field workers. The Engineers in Technical and Humanitarian Opportunities of Service (ETHOS) has become a home for international technical discussions about cookstoves, engaging participants with a wide range of backgrounds. We proposed that it could house a committee to resolve some of the testing challenges, and discussed that committee's structure at a half-day workshop before the 2007 ETHOS conference. During the following year, we sought international participants beyond ETHOS through electronic communication. Twenty-two people from 11 countries agreed to participate. At the next year's conference, the committee set up three sub-tasks: one for safety issues, one to focus on the Water Boiling Test, and one to recommend emission testing procedures. The latter two tasks ultimately merged into a single committee, because efficiency and emissions must be tested together. In the rest of this article, we describe the new WBT protocol ("Emissions and Efficiency in a Controlled Laboratory Setting"); the safety committee is proceeding separately.

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HISTORICAL PROFILES IN TESTING PROTOCOLS

Prasad, Verhaart and Visser:

During the 1970s and 1980s there were several key individuals, including **Dr. Krishna Prasad**, **Dr. Peter Verhaart** and **Dr. Piet Visser,** from Eindhoven University, who were instrumental in designing the first stove testing protocols (known as the VITA protocols) that are used globally in revised form today.

Dr. Samuel Baldwin

In addition to important technological design information, Dr. Samuel Baldwin's 1987 work, *Biomass Cookstoves: Engineering Design, Development and Dissemination*, provided detailed, revised stove testing protocols that became standard practice for more than a decade.

Shell Foundation HEH Project

After nearly two decades of use, the VITA protocols were updated (2003-2007) thanks to the Household Energy and Health (HEH) Project, supported by a Shell Foundation grant. These efforts were headed up by Dr. Kirk Smith of UC Berkeley, Dr. Rob Bailis of Yale University, Dr. Rufus Edwards from UC Irvine, and Dean Still, Damon Ogle and Nordica MacCarty from Aprovecho Research Center, among others.

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We began with the UC Berkeley/Aprovecho WBT (Version 3). With the participation of Christoph Roden (University of Illinois) and Nordica MacCarty (Aprovecho), we added detailed recommendations for emission testing based on field and laboratory experience. For that reason, the suggested equipment looks very much like Aprovecho's "emission hood." Penn Taylor (Iowa State University) reworked all the equations for clarity and conformity with engineering practice. Cory Kreutzer and Morgan DeFoort (Colorado State University) developed their own Water Boiling Test, optimized for repeatability, and freely shared their protocol. Jim Jetter (U.S. EPA) also provided guidance for laboratory testing. We examined the differences between those documents and the present WBT, incorporating several of them. Finally, Dean Still and Nordica (Aprovecho), co-authors of the earlier WBT, commented with field perspective. After the major structural changes to the WBT, we looked at about 40 issues that had been introduced via the Methods mailing list (methods.bioenergylists.org), supported by Tom Miles and Erin Rasmussen. Many of these comments resulted from a very careful examination by Crispin Pemberton-Pigott (New Dawn Engineering), although there were several other contributors as well.

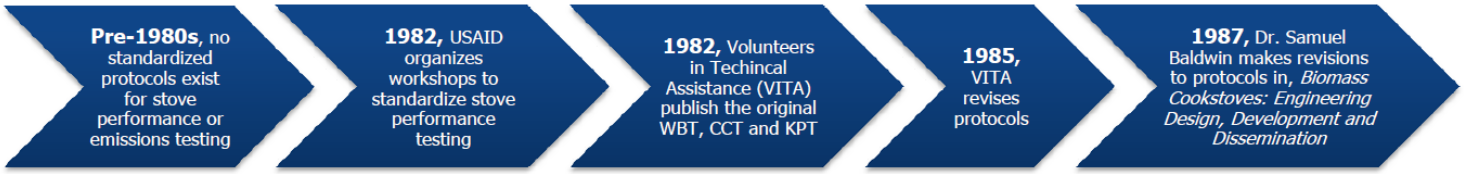
The criticisms of the WBT fell into three groups. (1) *Some of the equations yielding key performance criteria were inaccurate*. These were evaluated according to engineering principles. (2) *More guidance for testers was needed* to explain the uses of the test. The revised protocol now begins with such a discussion. (3) *The test procedure either yielded widely varying results, or did not mimic actual cooking practice.* This is one of the main challenges of any testing protocol. There is a natural tension between the reproducibility that is so important in design testing, and representing the diversity of actual practice. We incorporated some of the changes that were suggested to enhance reproducibility. Others were identified as key differences between lab and field tests so that testers could make their own decisions. Finally, some discussions were relegated to an Appendix, because there isn't enough technical understanding to support recommendations. We sent the semi-final document to the 22 committee participants and addressed their comments. The next phase involves receiving and addressing public comments on WBT Version 4.

The Water Boiling Test is only a beginning. The test provides an initial assessment of stove performance, can evaluate stove changes during development, and serves as an important check on manufacturing quality. However, it is the most controlled of the tests that assess stove performance, and the least like local cooking. In order to confirm that stove projects conserve fuel and reduce smoke, the stoves must be measured under actual use. Expanding the toolbox of tests needs to be the next step in the process. Are the Controlled Cooking Test and the Kitchen Performance Test satisfactory to the international community? Is an intermediate test necessary? Other suggestions for next steps include: (1) *Explore causes of variability*, and differences between laboratory and in-use tests, using well-designed experiments that resolve the remaining technical issues. (2) *Ensure that the tests are equally useful for all stoves*, including batch-fed appliances. (3) *Work toward international agreement* on a limited number of tests by governments and multi-national organizations. It is difficult to evaluate results from the existing variety of "Water Boiling Tests."

Support for the process is also critical. A minimum amount of financial support is sometimes needed for basic technical tasks. Even more important is commitment from the affected parties. If people fear that the work will be supplanted by some other endeavor, they lack motivation and the effort drags. When the outcomes are clear and progress is imminent, participation grows. Such a positive escalation will enable further progress toward international consensus.

Please participate in the process to finalize and adopt the WBT by providing your comments at www.pciaonline.org/testing/wbtcomment.

TIMELINE OF STOVE TESTING PROTOCOL DEVELOPMENT



News on Development of National Indoor Air Quality Standards and Guidelines for Nepal

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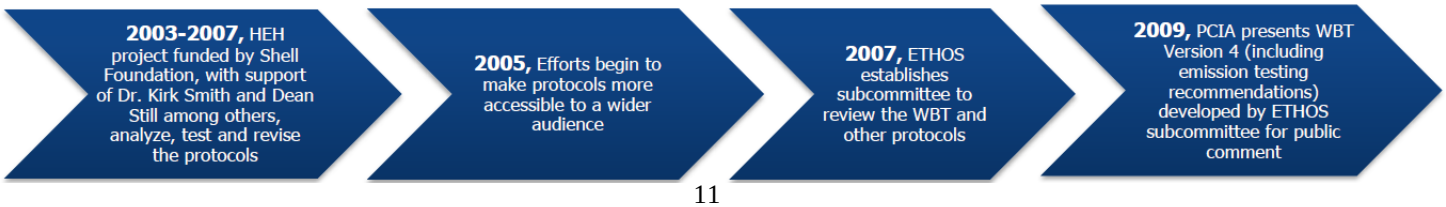
Indoor air pollution (IAP), once a neglected environmental health problem has now become the focus of a national policy debate in Nepal. The formulation of NIAQSG, technically backstopped by Practical Action and the National Forum of Indoor Air Pollution and Health, exhibits the evidence-based policy thrust from the local to national level. Practical Action in Nepal started working on reducing indoor air pollution in Rasuwa district in 2001 by helping local people adopt improved cooking stoves and chimney hoods. Later, from 2005-2007, Practical Action in Nepal conducted a research study on the "Burden of Indoor Air Pollution and Viability of its Mitigation Efforts: A Case Study of Rural Nepal." The research revealed many dark sides of IAP, which compels women and children to compromise to their rights to a healthy life. The research findings show that the indoor air pollution level is very high (15 times the WHO recommended safe level) in households in rural Nepal where biomass fuel is used extensively for cooking/heating in traditional inefficient stoves (3 stone fires/iron tripods). The research proved once again that IAP contributes greatly to health problems (ALRI and upper respiratory infections) leading to high expenditures for treatment and loss of productivity.

As the research revealed the vast difference between household levels of IAP for ICS and smoke hood users vs. non users, it rationalizes the need for increased investment in IAP reducing interventions and technology based on cost benefit analysis. It recommends mass awareness campaigns and argues for a policy intervention to address the issue of IAP from the top end of the State. Along with many endeavours to tackle the problem, Practical Action also undertook a Policy Gap Study on Household Energy, Health and IAP in South Asian countries (Bangladesh, India, Nepal, Pakistan and Sri Lanka) to assess how policymakers are trying to address the problem of IAP in the region. The recommendations from the above studies were fundamental to further advocate for policy interventions for protecting the rights of people to live in a healthy environment as guaranteed by state constitutions and laws.

Subsequently, a national workshop on "Clean Indoor Air: The Right to a Healthy Life" in February, 2008 was instrumental to give continuous push towards policy advocacy on IAP. The workshop refined and validated many policy and rights-based issues that have strong connections with IAP. These were then taken forward by the National Forum for IAP and Health as the 'Kathmandu Declaration' after the workshop. These have compelled the state to work on state standards for IAP levels, which can be used as a tool for creating massive awareness campaigns at lower tiers of local government. Due to a lack of state standards, even though there was massive investment and commitment by Alternative Energy Promotion Centre (AEPC) - a subsidiary of Ministry of Environment, Science and Technology (MoEST) in promoting ICS and other renewable energy technologies, the impact is still less visible. A study recently undertaken by Practical Action on Energy Poverty Reduction reveals that there were about 285,286 HHs using ICS in 2006, and for the proposed energy poverty reduction scenario, by 2025/26, a total of 2,170,933 HHs will need to use ICS (including high altitude ICS) and 50,079 HHs will need to use gassifiers. A total investment of 31.43 million EUR is needed in biomass stoves/gassifiers to reach these targets. This will not happen if the issue is not addressed at a policy level.

Considering this, Practical Action has supported the MoEST to develop and formulate National Indoor Air Quality Standards and Guidelines (NIAQSG). The process of formulation of NIAQSG followed a participatory mechanism that included key ministries and stakeholders in the National Coordination Committee (NCC). The NCC was chaired by MoEST while other members in the NCC were from Ministry of Health and Population (MoHP), Ministry of Physical Planning and Works (MoPPW), Ministry of Women, Children and Social Welfare (MoWCSW), National Bureau of Standards and Metrology (NSBM), World Health Organization

TIMELINE OF STOVE TESTING PROTOCOL DEVELOPMENT



(Continued from page 11)
(WHO), Practical Action Nepal Office and Indoor Air Pollution and Health Forum Nepal. The NCC drafted the standards and guidelines with the assistance of a national consultant who was experienced in developing environmental standards in Nepal. For wider public consultation, the draft NIAQSG was uploaded to the MoEST website (www.most.gov.np) and views and comments were solicited from the public at large, who were also informed through a published notice in the national newspapers.

To incorporate views and feedback from local levels, three regional workshops were organized in Nepalgunj (mid-western), Pokhara (western) and Biratnagar (eastern), which were attended by key regional stakeholders and user HHs. The NCC members also travelled to the project sites in Rasuwa to consult with the representatives of local government, and learn the views of beneficiaries first hand. The feedback collected was then incorporated in the final draft NIAQSG which was presented to the national level stakeholders' consultative workshop organized in Kathmandu. After addressing the comments from the national stakeholders' workshop, the NCC members presented the final NIAQSG to MoEST. The NIAQSG was endorsed by the Ministry and the standards were forwarded to the Ministry of Law and Justice and Constitutional Assembly for approval. Apparently the NIAQSG has come out as a National Gazette on 4th May 2009 after being approved by the Ministry of Law and Justice. It is too early to predict the results of this policy achievement unless this has been well translated into all the operational levels to increase poor HHs' access to clean cooking energy. The MoEST has sent the directives to AEPC to refer to the standards and guidelines in implementation of its biomass and HH energy related programmes. Similarly, AEPC has adopted indoor air pollution levels as one of its indicators to test the performance of the stoves before standardizing and disseminating the technology by AEPC. The Ministry of Health has also committed to disseminate knowledge on these standards to the general public through its programme of awareness raising on non-communicable diseases in the districts.

Taking Stock of Existing Biomass Stove Standards

David Kaisel, Independent Consultant with assistance from Dana Charron, Berkeley Air Monitoring Group, dkaisel@gmail.com & dcharron@berkeleyair.com

Gather a group of cookstove enthusiasts in a room, and sooner or later, someone is sure to lament the lack of consensus regarding internationally acceptable test protocols and compatible national standards for these technologies, especially in developing countries. And, as this issue of the Bulletin demonstrates, much critical work remains to be done to provide a standards framework to stimulate cookstove innovation, meet efficiency and emissions targets, and promote the emergence of competitive commercial markets for stoves.

At the same time, however, those trying to develop harmonized standards frameworks aren't starting from scratch: standards affecting biomass cookstoves already exist or are under discussion in a handful of developed and developing nations. Collectively, these standards address stove performance (covering both efficiency and emissions) and test methods, as well as safety and design.

The following table offers a brief review of standards related to cookstoves found in key emerging markets. Since few standards address biomass cookstoves specifically, the list includes many governing indoor and ambient air quality as well as other domestic biomass-fueled appliances such as heaters and boilers. These references were collected as part of commercial landscape research done for Shell Foundation from 2005 to 2007. The table neither endorses nor evaluates the standards listed, nor is it intended as an exhaustive list of regional, national and local standards and regulations. The goal was to provide a snapshot of regulatory initiatives already undertaken in critical markets. This list was intended to be an indicative catalog of standards and guidelines that may be relevant to stove developers, producers and policy-makers in emerging markets. It is part of a larger effort to document the standard-setting process as it applies to cookstoves and inform future work in this area.

PCIA encourages its members to contribute to a comprehensive review of stoves standards by sending update information on current or proposed local, national and international standards and guidelines to moderator@pciaonline.org. Thank you for helping us to create a complete record of existing national cookstove standards and guidelines.

Existing Cookstove Standards Worldwide

	Designation (Name)	Topic[1]		Focus[2]		Test method/s	Indicators	Max/min values	Comments
		P	M	Ef	Em				
China	**NY/T 8-2005** Thermal testing method of household firewood stove and firewood kitchen range		X	X		Water boiling test	Rated cooking power (heat energy absorbed per unit time)	N/A	Test method (standard) first issued as GB4363 in 1984
China	**GB/T 16155-1996** Testing method for thermal performance of domestic cooking-water heating coal stoves		X	X		Water-boiling test	Starting rate, cooking power, heating power, thermal efficiency, restart rate after bank-up, CO concentration in smoke	N/A	Method specific to coal-burning stoves
China	**GB/T 1883-2002** National indoor air quality standards	X			X	Not specified	Multiple (over 15) IAP species, including physical, chemical, biological and radiation	CO: < 10 mg/m^3 PM_{10}: < 150µg/m^3	One hour averages, except as noted
China	**GB 3905-1996** Ambient air quality standard	X			X	Not specified	Limits listed, as well as Pb, F and B[a]P (Benzo[a] pyrene)	Class II: TSP <0.3 PM10 < 0.15 SO2 < 0.15 NO2 < 0.08 O3 < 0.16 CO < 4.0 NOx < 0.1	All limits mg/m3, daily average.
China	**GB/T 16157-1996** Determination of fixed source particulates and gaseous pollutant sampling method		X		X	Impinger/filter (particulates), absorption (CO, CO_2, O_2), pitot-tube sampling, balanced velocity tube and balanced static pressure tube sampling	Temperature, pressure, water content and composition of exhaust gas; Exhaust gas density and gas molecular weight; Exhaust gas velocity and flow rate; Particulates in the exhaust gas and discharge rate and concentration; Gaseous pollutants in the exhaust gas and discharge rates and concentrations		
China	**GB/T 17095-1997** Hygienic standard for inhalable particulate matter in indoor air	X			X	Not specified	Particulates	Unknown	Indoor air standard
China	**GB 980488** Air quality- determination of CO		X		X	Non-dispersive infrared spectrometry	CO	Unknown	
China	(No designation) General technical specification for domestic biomass stove/ boiler (Draft)	X		-	-	Unknown	Unknown	Unknown	Beijing Municipal standard- scheduled for publication Q2 2008

[1] P = Performance, M = Method [2] Ef = Efficiency, Em = Emissions

	Designation (Name)	Topic[1]		Focus[2]		Test method/s	Indicators	Max/min values	Comments
		P	M	Ef	Em				
China	(No designation) Standard for Biomass molded fuel (Draft)	X		-	-	Unknown	Unknown	Unknown	Beijing municipal standard for solid fuels-scheduled for publication Q2 2008
India	**IS 13152 (CIS 1315 Z) (Part 1): 1991** Indian Standard on Biomass Chulha-Specification	X	X	X	X	Water boiling test (Thermal Efficiency), stove hood for emissions tests	Thermal efficiency, CO/CO_2 ratio, TSP	None defined	First national test methodology designed specifically for cookstoves
India	**CIS 1315 Z (Part 1): 1991** Indian Specification on Biomass Chulha-Specification		X	X	X	Stove hood, sampling, gas analysis method not specified, TSP using impinger and filter (Handy Sampler)	CO/CO_2 ratio, Total Suspended Particles (TSP)	No limits established	Specifies stove fuel preparation and firing protocol
Uganda	**DUS 761:2007** (Draft)	X	X	X		Water boiling test	PHU (% of heat utilized)	>30% PHU @ 3kW power output, Thermal shock resistance, external temp. ≤ 45o C	Draft standard is based on Kenyan Jiko design. Emissions not included in standard.
Kenya	**KS 1814**	-	-	-	-	Unknown	Unknown	Unknown	Kenyan standard is referenced by several sources, but the document has not been obtained.
South Africa	**SABS 1111-1976** (Coal burning domestic appliances)	X	X	X	X	Water boiling test, kitchen performance test (cooking test), stack measurement (smoke)	Time to reach temperature, heat distribution, obscuration (smoke)	Stovetop: 1L water to 90° in 10-15 minutes. Oven: 200° C in 90 min, 250° C in 120 min. Cooking performance, < 40% obscuration 20 minutes after startup, < 10% obscuration for any 5 minute period otherwise	Standard includes detailed product safety and quality criteria. Performance test based on standardized recipes.
South Africa	**SANS 1243:2007**, Ed. 3 (Pressurized paraffin-fueled appliances)	X	X	X	X	Combustion efficiency test ($CO:CO_2$ ratio), thermal output (kW, calculated from fuel consumption), smoke hood and stack measurements	$CO:CO_2$ ratio (combustion efficiency), Power output (kW) averaged over 600 seconds burn time, (thermal output)	Min. 1kW output after 500 hours operation, $CO:CO_2$ ratio ≤ 1:0.02	Standard includes comprehensive safety and product quality criteria.
South Africa	**SANS 1906:2006** Ed. 2.1 (Non-pressure paraffin stoves and heaters)	X	X	X	X	Fuel consumption (thermal efficiency), smoke hood and stack measurements (emissions)	Power output in kW averaged over 7.5 hours burn time, particulates and $CO:CO_2$ ratio	Test output of 1kW for at least 500 hours operation, ≤ 0.03g/min particulates, 1:0.02 $CO:CO^2$ @ 1.5 kW output	Standard includes comprehensive safety and product quality criteria.

[1] P = Performance, M = Method [2] Ef = Efficiency, Em = Emissions

Global and Organizational Strategies for Improved Stove Performance

The 2009 PCIA Forum in Uganda showed us the motivation and passion our Partners have for their work, and their commitment for improving stove performance. On a global level, an additional effort is needed as well to devise a cohesive approach for improving stove performance. There are two key aims going forward:

1. Systematic testing of stoves throughout the world
2. Systematic improvement to make them better

As explained throughout this edition of the Bulletin, systematic testing is key to systematic improvement, and the development of straightforward, agreed upon protocols and standards is critical for achieving both aims. In order to better understand where we're going, we need to assess where we're at by acknowledging both our current strengths and challenges in this regard. The following diagram lists these in detail.

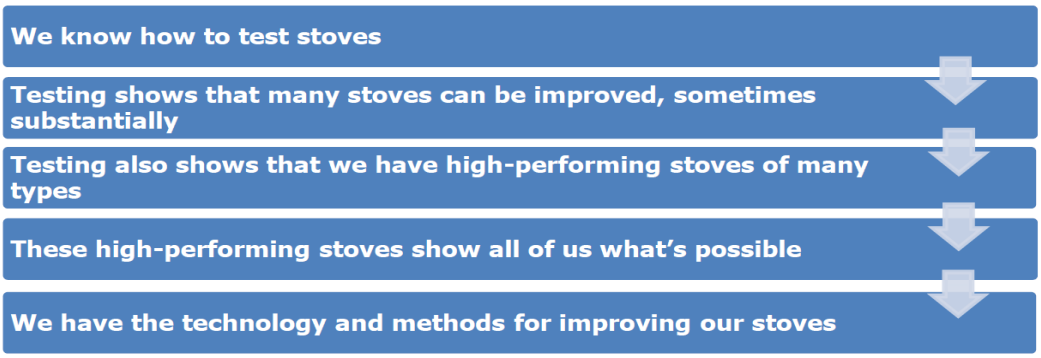
We Don't Have

- An ISO standard
- A single voluntary global standard
- The resources to pay someone to establish a standard
- An ability to enforce a standard
- Uniform testing of stove performance
- Great stoves everywhere

We Do Have

- Effective ways to test stoves
- Solid information about the range of stove performance: Great, Good, Fair, Bad
- Great stoves of different types: Data shows what's possible in each category
- Lots of stoves that can be improved (All of Them!)
- Lots of people making improvements
- Constant innovations and improvements in stove performance

Based on this analysis, and information received both at and after the Forum, we can conclude the following:



Key Conclusion: Each of Us Can Improve Our Stove Performance - No Matter Where We Start

For the future, please take a look at what your organization can and will do to achieve better stove performance. In order to best coordinate efforts, please upload your offers and requests to lead, co-lead and align with others in advancing stove testing and standards development to the PCIA website at: www.pciaonline.org/messageboard.

For our part, to improve stove performance, PCIA is committed to:
- Lead: Help PCIA Partners With Systematic Testing and Improvement of Their Stoves
- Co-Lead With Others: Work Towards Global and/or Regional Voluntary Standards for Stove Performance
- Align With Leadership of Others: Establish an ISO Standard for Stoves

Let us know how we can best support your efforts to promote stove testing and standardization in your community.

☼ PROGRESS SINCE THE 2009 FORUM

Progress since the 2009 Forum is a new addition to the PCIA Bulletin. We will take a quarterly look back on where we were at the 2009 Forum, where we are now, and where we're going. We encourage Partners to submit short articles regarding actions their organization has taken since the Forum, that are related to the theme of each particular Bulletin. This section will be a permanent addition to the PCIA Bulletin, so please keep this in mind as you advance your efforts to reduce exposure to IAP throughout the globe.

Looking at feedback we've received since the Forum, a number of Partners pledged to increase stove testing and many even mentioned they are working on developing stove standards at an organizational or national level. We encourage everyone to maintain this resolve going forward, as the benefits of both have already been enumerated throughout this edition of the Bulletin. Please send information regarding standards development at both the organizational and national levels to moderator@pciaonline.org.

The following chart displays the feedback from a 2009 Forum session where we asked participants to explain where they were at in terms of developing standards:

When polled about the status of stove performance standards, three Forum participants indicated that their organization and/or country currently has such a standard.		
ORGANIZATION/COUNTRY AND STANDARD	**REPORTED BY**	**CONTACT**
GERES has an ICS standard for households and a monitoring protocol to calculate CO_2 emission reductions	Iwan Baskoro	i.baskoro@geres.eu
Malawi Bureau of Standards has a stove standard	Gloria Chaonamwene	gchaonamwene@mbsmw.org
Kenya has a standard on Jiko Kisasa	Pamela Mahela, GTZ Kenya	a.ingwe@gtzpsda.co.ke or anna.ingwe@gtz.de
The following Forum participants indicated that they are currently working on standards		
ORGANIZATION/COUNTRY AND STANDARD	**REPORTED BY**	**CONTACT**
GTZ Bolivia is in action for a national standard for stove performance	Mariana Butrón	mariana.butron@gtz.de
INE will work in Mexico to establish standards for improved wood stoves	Salvador Blanco	sblanco@ine.gob.mx
Practical Action Kenya is in action for a national standard for stove performance	Vincent Okello	Vincent.okello@practicalaction.org.ke
SNV Asia is working on formulating quality standards for biogas stoves	Prakash C. Ghimire	pghimire@snvworld.org
Energy Sector Assistance Programme, Nepal has developed (adapted) standard for testing protocol and modified it in context of Nepal. Also, developed manual in Nepali language	Rojan Kumar Pandey	Rojan.Pandey@aepc.gov.np
GTZ is developing a national testing protocol for the injera stove in Ethiopia by adapting the existing testing protocols	Hiwote Teshome	hiwote.teshome@gtz.de
Rakai Women's Effort to Save the Environment (RAWESE) is working to establish regional resource centers for information dissemination and to lobby government for policy formulation to establish standards	Sserwanga Hadija	sserwangahadija@yahoo.com

☼ HAPPENINGS

Recent Partner Activity…

1st PCIA Latin America Regional Meeting – Bolivia 2009

From September 25th-29th, PCIA Latin America gathered for the first time in La Paz, Bolivia to unite the regional projects to share experiences and organize future meetings. The meeting was sponsored by GTZ Bolivia and coordinated by Mariana Butron. Eighteen representatives from seven projects and six countries, including Brenda Doroski of PCIA and personnel of SENCICO, a construction and stove certification laboratory in Peru came together.

Latin America PCIA Partners at the inauguration of the new stove testing center in Bolivia.

During the meeting participants presented various cook stove implementation strategies and attended the inauguration of the new Stove Testing Center (CPC) of Bolivia. Dr. Roberto Achinelli of Peru, presented the results of an evaluation of various medical issues directly related to indoor air pollution caused by open fires in homes in different regions of Peru. The PCIA committed to having the 2011 Forum in a country of Latin America. We discussed ideas for location and topics.

Friday night, the group enjoyed Bolivian traditional music and dances at the Peña Folklórica. On Monday, several participants went on a field trip to the community of Orurillo, Puerto Acosta on the shore of Lake Titicaca (3900 meter above sea level). There we visited several homes with Malena cook stoves installed where they used both dung and eucalyptus firewood. We also observed the making of a Malena stove in one of the homes, and an institutional stove in the local school. After the home visits, the local women prepared an "ajtapi", a traditional community lunch with a variety of potatoes, fish and lamb dishes at a picnic setting. The local band performed traditional music and invited all participants to dance.

A Bolivian woman shows her Malena stove to PCIA

During this event we saw the value of having country-based stove testing labs to assist government, NGO and donor projects to certify stove performance. We committed to comment on the revised WBT protocol and to invite Latin American government, institutions, universities and stove projects to join the PCIA and participate in future meetings.

You can download the proceedings in Spanish at www.pciaonline.org/proceedings.

PCIA Partners during site visit to local community of Orurillo, Puerto Acosta

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PCIA Presented at Americas Energy & Climate Symposium on June 15 – 16, 2009 in Lima, Peru.

Representing the Partnership for Clean Indoor Air, Partners Richard Grinnell, HELPS International and Marisa Quiñones, Ministry of Environment of Peru presented on clean and efficient household cooking technologies and fuels as part of the session on Energy as a Tool for Poverty Alleviation. The objectives of the session were to:

1) highlight the issue and results of effective programs in Latin America;
2) expand government support and participation; and
3) identify and commit to actions to greatly accelerate the efforts of the 23 Partner organizations currently working in the region, such as: supporting regional stove testing centers (two are currently being established in Honduras and Bolivia); cosponsoring national and/or regional public health awareness campaigns; funding stove projects in the region; and cosponsoring the 5th Biennial PCIA Forum in Latin America in 2011.

Look for updates and opportunities to get involved in future PCIA Bulletins.

Asha Stoves – exciting news!

Marco Peter, Child Welfare Scheme, Nepal, cwsmarco@gmail.com

Research on Asha Stoves is being carried out by CWS to assess the suitability of rocket chimney stoves as a replacement for open wood fires in urban slum homes. It is hoped the this technology will reduce diseases caused by indoor air pollution and help the environment, while at the same time creating extra time for mothers and reducing their carbon footprint.

This week the first two Asha Stoves were successfully installed in homes in the Bus Park slum area of Pokhara. These two pot stoves look like conventional gas stoves, but they burn waste wood, branches or twigs; the cheap, easily available fuels of the urban slums and rural villages of the hills of Nepal.

The Asha Stoves use around 40% less wood, and emit very little smoke or poisonous carbon monoxide gas, and are of a two pot design so the busy mothers can cook all their dishes at once, leaving them more time to look after their kids or work. As the stoves are made of metal, they are durable and need little maintenance.

If trials underway are successful, it is hoped that CWS will be able to apply for funding to support wide dissemination of the stoves, together with its established local partner PCCI.

Nepali woman using her new Asha Stove

The team would also like to say a big thanks to Prakti Design (www.praktidesign.com) of Pondercherry, India, for coming to Nepal and kindly giving their time to create an installation guide.

The following is a quote from Laxmi, a mother who has been using the stove: "I have to leave very early in the morning to work so my kids have to cook their own food on the open wood fire. Nowadays the kids refuse to cook food as the smoke burns their eyes, so they go to school on just a packet of biscuits or nothing at all. I was getting so upset over this. Now look, no smoke at all and two dishes cooking at one time, it's great! I've also noticed how little wood I have to collect now. I'm so happy with my Asha Stove!"

Congratulations!!

To **Dr. Kirk Smith** from UC Berkeley, recipient of the 15th Annual Heinz Awards, recognized by the Heinz Family Foundation.

As explained by the Heinz Foundation, "He has pioneered ways to measure and compare the effects, showing both the tremendous costs of ignoring the problems of indoor air pollution and pointing the way to inexpensive solutions for protecting health and climate."

PCIA is very appreciative of the work he has accomplished and is pleased to congratulate him on this much deserved award. For more information about the Heinz Family Foundation and the recipients, please visit: www.heinzawards.net.

Upcoming Events and Announcements...

22nd International Carbon Markets Conference, Africa

November 10-11, 2009,
Cape Town, South Africa

During the 3rd Annual Carbon Markets Africa conference (22nd international carbon markets conference) participants will gain a better understanding of Africa's carbon markets, including improved financial comprehension of the CDM and information on successful CDM projects. Participants will be able to network with experts and colleagues engaged in carbon projects in the region, as well as discuss and learn about African carbon market advances and opportunities. For more information on this conference, please visit: http://www.hedon.info/692/events.htm or for more information on the carbon markets conference series, please visit: http://www.greenpowerconferences.com/carbonmarkets/index.html.

COP 15: UN Climate Change Conference

December 7 – December 18, 2009,
Copenhagen, Denmark

The 15th annual UN Climate Change Conference will take place this year in Copenhagen, Denmark. The many topics up for discussion include reducing emissions in industrialized countries and identifying the resources required to support developing countries in emission reduction and climate change adaptation. It is hoped that the negotiations will lead to a successor agreement to the Kyoto Protocol. PCIA will hold a side event on December 9. Please join us if you will be attending COP15. For more information about COP 15 please visit: http://en.cop15.dk.

2010 ETHOS Conference

January 29-31, 2010,
Kirkland, Washington, USA

The 2010 ETHOS Conference will include participation of Southern partners, international stoves experts, and development specialists. Themes for the 2010 conference include: Lab research (stove testing, emissions monitoring, and design); Field monitoring of performance, indoor air pollution exposure, health impacts, user satisfaction; Awareness raising; Stove promotion; Involvement of volunteers; Technology standards; and Policy issues. For more information and to register, please visit: http://www.vrac.iastate.edu/ethos/conference.php.

BBC World Challenge 2009

The World Challenge 2009 competition, sponsored by BBC World News and Newsweek, in association with Shell, has been narrowed to 12 finalists, five of which are addressing issues of household energy. To cast a vote for your favorite initiative, go to http://www.theworldchallenge.co.uk/2009-finalists-project01.php.

PCIA Website Update

The posters from the 2009 forum have now been posted on the website at: http://www.pciaonline.org/proceedings/2009Forum/posters.

We've added a new tab from the homepage for Stove Testing: http://www.pciaonline.org/testing.
Here you can find the current testing protocols and data calculations sheets for the WBT, CCT, and KPT.

Version 4 of the WBT, revised by the ETHOS subcommittee led by Tami Bond, is currently available for public comment until December 18, 2009 at: www.pciaonline.org/testing/wbtcomment.

Stove Testing at the 2009 PCIA Forum