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## THE BOTTOM LINE

All new technologies, including sustainable energy solutions, are introduced into a social context that affects how readily they will be adopted and how they will be used. This brief describes experience integrating technical and social aspects of clean cookstoves in Indonesia and lessons learned in embracing complexity and facing realities in the field.

**Laurent Durix** is an energy specialist at the World Bank and co-task team leader of the Indonesia CSI.

**Helene Carlsson Rex**, a senior social development specialist at the Bank, leads the social team for the Indonesia CSI.

**Veronica Mendizabal** Joffre is a sociologist and gender consultant.

# Contextual Design and Promotion of Clean Biomass Stoves: The Case of the Indonesia Clean Stove Initiative

## Why does context matter in designing and promoting clean stoves?

### Clean stoves that accommodate culturally rooted cooking practices are more likely to catch on, remain in use, and deliver social benefits

In 2012, five years after the start of Indonesia's campaign to convert millions of households to liquefied petroleum gas (LPG), the Indonesia Clean Stove Initiative (CSI) was launched by the country's Ministry of Energy and Mineral Resources and the World Bank. By then, 54 million starter LPG packages (one burner and one cylinder) had been distributed across Indonesia and had already had a significant impact on the market share of this fuel, largely displacing kerosene and reducing the use of firewood, or biomass (figure 1).

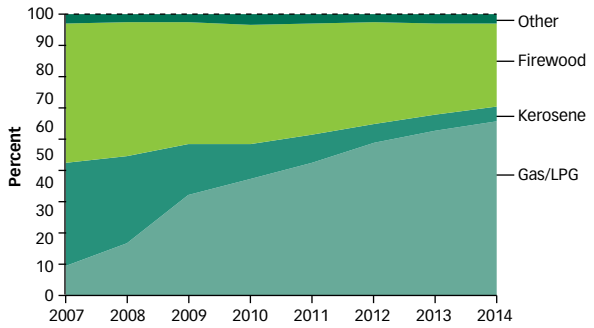
The Indonesia CSI focused on the 25 million households—85 percent of which were living in rural areas—that had not converted to LPG and were still relying on traditional stoves and using biomass as their primary cooking fuel. Such stoves are characterized by high fuel consumption, low combustion efficiency, and high levels of pollutant emissions. Various local initiatives for the diffusion of improved stoves had been undertaken since the 1980s, but these had remained dispersed and small in scale; despite efforts, the rate of adoption of clean biomass stoves remained low.

The Indonesia CSI originally aimed at complete replacement of the traditional (baseline) stove and focused on wood-only users, following the conventional wisdom at the time that clean technologies already available worldwide would be transferable to the Indonesian markets and that LPG users had definitely moved on from wood.

At the time, the team responsible for implementing the initiative had identified barriers to the adoption of clean stoves in four areas that coincidentally also matched those found in a typical power access project. The barriers were (i) technological (insufficient access to existing clean technologies), (ii) financial (limited investment capacity of stove producers and high costs of the clean stoves for households), (iii) institutional (low interest in the topic at higher levels of government; inadequate procurement systems for innovative technologies), and (iv) informational (households unaware of clean alternatives or of harmful side-effects of baseline stoves).

Early field visits and exchanges with local practitioners soon revealed that although these assumptions and barriers, abundantly

**Figure 1.** Evolution of primary cooking fuel in Indonesia, 2007–14




*Source:* Task team using 2015 data from Badan Pusat Statistik Indonesia.

described in the international literature on clean cooking, remained partly valid, other salient factors added complexity to the situation and posed more fundamental challenges:

- **Cooking is not a standard task.** Unlike lighting for reading, where the language of the book or the type of paper matters little, cooking methods have evolved differently over time in every country and subregion based on the available foods and fuels (and combinations thereof).
- **LPG users and wood users are more similar than one might think.** Many households use both LPG and wood for cooking on a regular basis; they may also use electricity (rice cookers). It is as if, in the power sector, electrified households still used kerosene or batteries alongside grid electricity—but not because of power interruptions but rather by choice! This implies (i) that the market for clean biomass stoves also includes LPG users, and (ii) that a clean stove may not be able to completely replace the baseline stove.
- **Biomass stove performance is context variable.** If properly designed and given similar levels of sunlight, the same solar panel should provide a similar amount of electricity (and therefore a similar supply of reliable lumens for lighting) in two different countries. But a clean stove that technically performs well in a dry Sahel environment in which sticks are used as fuel may perform poorly and possibly worse than the baseline stove in a wet tropical environment where thicker pieces of wood are used. A stove that is extremely clean and efficient at simmering may be unable to bring sufficient power for stir-frying or may produce such a high level of emissions at high output that the gain against the baseline stove may not be significant in the end. Unlike electricity or LPG, wood biomass is not a homogenous fuel: Wood's consistency varies dramatically with dryness, size, species, and how it is prepared for use.
- **Cooks are clearly aware of the negative effects of smoke.** But they weigh these disadvantages against other attributes necessary for the stove to perform its central function: preparing food. Few people elect to keep kerosene lamps for reading once they have better and reliable alternatives, but for cooking the picture is not so clear.
- **Gender relations have to be taken into account.** Cooking is a very gender-polarized activity that does not occur in a vacuum or a controlled lab environment. The status of relations between women and men in the communities targeted by clean stove programs can enable or block the adoption of clean cooking alternatives.

"Cooking is a complex activity that depends on achieving an equilibrium between the cook's skills, the available fuel, and the stove technology being used."

## How was context brought to the core of the project?

### Social and gender research yielded "social intelligence" on stove use, strengthening the technical design of the Indonesia CSI

The Indonesia CSI invested in experimental approaches to better understand end users' needs and preferences and to assess the performance of technologies and products in their intended context of use. The goal was to shed light on the social and cultural aspects of technology adoption as complements to technical performance tests on emissions and thermal efficiency. The overall objective was and still is to make the clean stoves available in the Indonesian market more responsive to the preferences and needs of end users, thus increasing the probability that they will be used widely and enduringly.

The CSI team had already decided to use results-based financing[1] (RBF) for a pilot effort to encourage private sector involvement not only in disseminating clean stoves but also in promoting their effective adoption and use by households. For the RBF pilot to succeed, time and money would have to be invested in understanding users' adoption decisions and how these should influence the overall project design. It was also clear that the task team, most of whose members had an energy background, would need reinforcement from other fields to properly understand these dimensions.

In 2013, the Indonesia CSI assembled a team of social scientists that included a sociologist, an anthropologist, and a statistician coordinated by a senior social development specialist. The interdisciplinary composition of the social team and its close collaboration with stove scientists and the CSI task team provided complementary perspectives and concepts that covered all of the project's social and technical aspects. The heterogeneous team brought to bear a variety of tools to interpret the complexity of stove adoption.

1. For more on the Indonesia RBF design, see Livewire 2015/46, "Results-Based Financing to Promote Clean Stoves: Initial Lessons from Pilots in China and Indonesia," listed on the last page of this brief.

"The Indonesia CSI was supported by a team of social scientists that included a sociologist, an anthropologist, and a statistician coordinated by a senior social development specialist to bring context back to the core of the proposed actions."

The social team conducted research and analysis in 2013 and 2014. The qualitative research provided interaction with well over 200 households on Sumba Island and in Central Java, including in-depth interviews with primary users, case studies, detailed ethnographies of households, and focus group discussions that were organized with separate groups of men and women to obtain disaggregated views about stove preferences and use. A survey of more than 1,400 households provided quantitative data that validated and expanded the qualitative findings. This work has been described elsewhere.[2]

The research process resulted in a very detailed understanding of patterns of fuel use, user segments, and household spending on fuel. Data was also obtained on stove inventories, cooking practices and sequences, and gender roles within the household and in the community.

The key lessons from the analysis are as follows:

- **Women, who represent 96 percent of stove users, want direct, immediate, and concrete benefits from new stoves.** They want appliances that cook fast and are powerful (resulting in shorter cooking times), that light quickly and easily, that are easy to operate, that can use wood of variable quality, and that last. The attributes sought by users may be overlooked by the development community and stove developers that are focused more on long-term benefits and common goods such as health outcomes and environmental impact. But women have critical time constraints, because their responsibility as cooks is concomitant and often simultaneous with childcare and other household tasks, not to mention income-producing tasks. If actual adoption and sustained use of clean stoves is the means to broader common goals, women's preferences and needs must be properly integrated into the design and promotion of clean stoves. This in turn depends on a sound understanding of the roles played by women and men in the cooking-fuel system (box 1).
- **A complex segmentation of fuel use appears, in which cooking tasks complement fuel availability and income as key variables.** Unlike what was hinted by earlier (binary) statistics, the CSI survey showed that half of the households use LPG and firewood simultaneously but for different cooking tasks (box 2, first figure). When electricity is added as a third fuel (primarily for rice cooking and warming), only 27 percent of households were single-fuel users, 45 percent used two fuels, and 28 percent used all three fuels every day.

Each household adopts specific fuels for specific cooking tasks depending primarily on their income and location. Nonetheless, most households surveyed perform a similar set of cooking tasks, regardless of the combination of fuel used. Boiling water, cooking rice and soup, and deep frying are common tasks performed by the vast majority of cooks on a daily basis.

This finding indicates broad and diversified markets for clean biomass stoves encompassing 73 percent of households, with specific market niches based on locations, income, and cooking tasks (box 2, second figure).

## How was the accumulated social intelligence put to work?

### Sociocultural data were used to develop a technical stove test that reflects context of use, as well as a social protocol to validate test results

The sociocultural information was analyzed and key variables extracted for use in the development of a pioneering laboratory test of emissions and efficiency that could reflect the context of use and thus be more valid and reliable than prior tests.

Although so-called universal tests may be able to provide certain data (for example, on minimal standards) that could be used in international comparisons, they also mask significant variables that come into play when a stove is used in a real household. The conventional approach is that technical and social testing are not compatible and must be sequenced separately. But because the social science work is less easily reproduced, is less quantifiable, and can be costly, it often ends up being ignored—with the result that significant investment decisions are made on the results of tests that merely show how well a stove boils water.

But what if the laboratory test, while still performed in a controlled and replicable environment, could also give us a realistic approximation of how stoves would perform when used by real people performing their usual cooking tasks?

2. Eight studies and reports are available at http://www.astae.net/social-gender-support-to-indonesia-CSI.

"Indonesian cooks first want a stove that does the job: powerful, fast, and easy to ignite and operate. But durability, efficiency, and comfort during use also matter."

**Box 1.** Focus group results: The top 10 features cooks want in a stove

In Indonesia, the primary users—women—are far more interested in the functional aspects of a stove than in its appearance or technical rating. Power, speed, ignition, and ease of operation all rated at least 90 percent on the scale of importance.

| Stove feature | Share of sample deeming feature important (%) | Comments from focus group discussion |
|---|---|---|
| Powerful/fast | 99 | Speed is a key requirement for women, who have competing household duties and productive activities. |
| Rapid/easy ignition | 99 | The largest amount of smoke is produced at ignition. |
| Durable | 99 | Durability is important in peri-urban areas, where the current baseline is considered fragile, lasting only a year on average. |
| Fuel-efficient | 97 | Although firewood is cheap or freely available, households are interested in efficiency. |
| Convenient, easy to operate | 90 | Women want stoves that are easy to operate, light, and clean. Heat regulation should be easy. The stove should not require constant attention. |
| Less/no smoke | 90 | Women consider smoke uncomfortable but do not perceive it as a major threat and are not aware of the long-term effect of sustained exposure. |
| Uses any type and size of firewood | 90 | Women consider stoves that require wood of good quality less desirable, since hard wood has to be purchased rather than collected. |
| Can operate with humid wood | 59 | Humidity directly affects combustion, ignition times, and smoke. Women want stoves that can burn humid wood with less smoke. The rainy season lasts seven months in Java. |
| Portability | 58 | Fixed stoves are nontransferable and cannot be resold or given away as household assets, reducing their value once purchased/built. |
| Multiple burners | 49 | Multiple burners allow cooks to prepare several dishes simultaneously, saving time and using firewood more efficiently. |

Health aspects were not particularly salient for men or women. Although women cooks did consider smoke to be uncomfortable, they perceived it as an inconvenience rather than a major threat and were unaware of the long-term effects of sustained exposure. Safety concerns centered on the risk of burns to children and the cook, which were seen as more likely with modern metallic stove bodies than with traditional stoves.

Another aspect of interest in context was the capability of stoves to operate with humid wood, as the rainy season can last up to seven months in the region. Humidity directly affects combustion, ignition times, and the amount of smoke produced.

While price did not rank among the top areas of interest for respondents (it was deemed important by 60 percent of the sample), further analysis showed that price points did have a gender component. Baseline stoves are usually cheap and priced at a level that falls within the scope of women's discretionary decision making. Locally made clean stoves, which are slightly more expensive, require joint decision making. Imported stoves are generally expensive enough to be subject to men's veto authority. Wide adoption will not be possible if women are considered passive beneficiaries of improved stoves and if men are not engaged to embrace new technologies.

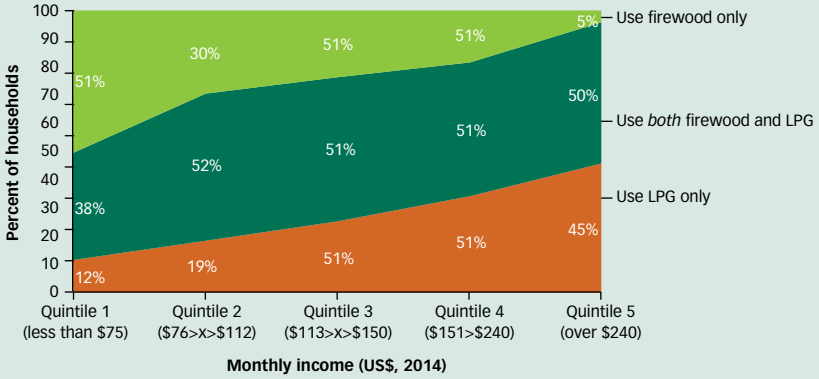
*Source:* Focus Group Discussions in Yogyakarta and Sumba December 2012 and 2013; Peri-urban survey in Sleman and Bantul districts, Yogyakarta Special Region, December 2013.

"Half of the households in Central Java use both wood and LPG, often for different cooking tasks and at different times of day."

## Box 2. "Stove stacking" implies a larger-than-anticipated market for clean biomass stoves

The survey belied previous statistics on primary fuel use that implied that two-thirds of households in Yogyakarta–Central Java used liquefied petroleum gas (LPG) and one-third used firewood. In fact, a strikingly stable half of the households used *both* LPG and firewood simultaneously across all income groups, as the figure shows. Those households using only firewood tend to be poorer, and those using only LPG richer. When electricity is added to the mix (primarily for rice cooking and rice warming), the survey showed that only 27 percent of households use only one fuel, 45 percent use two fuels, and 28 percent use all three.

### Household fuel use by income quintile, 2014

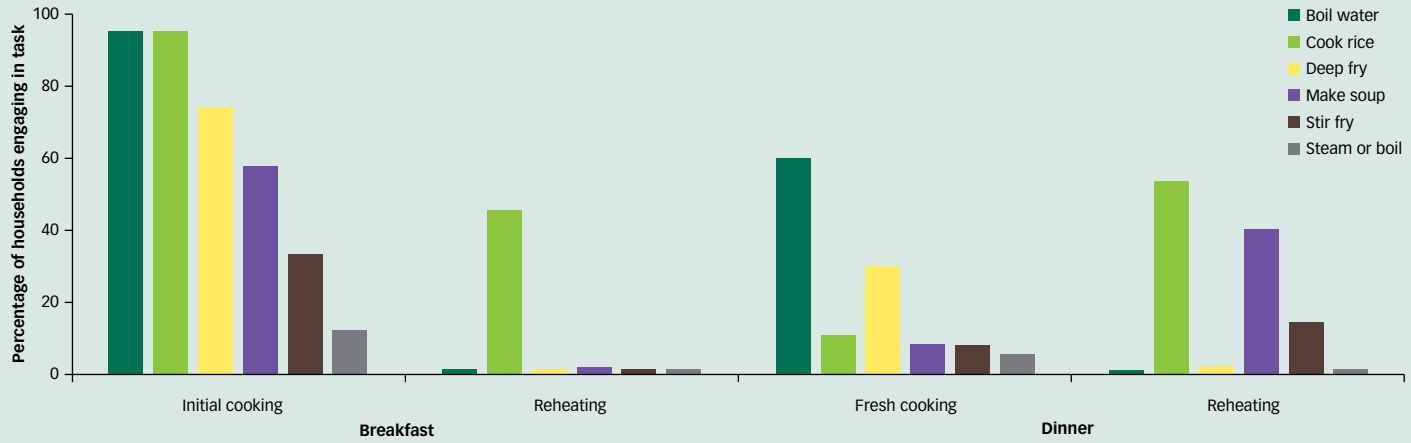



*Source:* Peri-urban Survey, Yogyakarta-Central Java, 2014.

The significance of this finding is that the potential market for clean biomass stoves is rather large, as it covers firewood-only users but also joint LPG/firewood users—or 73 percent of the households in Yogyakarta–Central Java. But these markets can be quite differentiated, as the expectations of a low-income firewood-only user may be very different from those of a high-income combined-fuel user who uses the wood stove as a back-up or for specific tasks such as boiling water, often 10 liters at a time, for which an LPG stove may lack sufficient power.

The social assessment also showed that while patterns of fuel use are quite differentiated, most households in the region nonetheless undertake similar cooking tasks whatever the fuel combination. Breakfast is the most active cooking time (lasting 65 to 80 minutes) with the largest variety of cooking tasks. Boiling water, cooking rice, making soup, and deep frying are the most common tasks. This quantitative information, along with the ethnographic description of each task performed, forms the basis for the typical burn cycle representative of cooking habits in the province (see box 3).

### Main household cooking tasks at breakfast and dinner




*Source:* Peri-urban Survey, Yogyakarta-Central Java, 2014.

"Baseline (or traditional) stoves took hold over decades, even centuries. To displace them, new stoves, however efficient or clean, must offer users at least equivalent performance."

**Box 3.** The Contextual Test: performed in a laboratory yet socially relevant to future users

Designed to evaluate the performance of cooking appliances in a manner that is both technically and culturally reliable, the CSI Water Heating Test (WHT) was developed for the pilot project in Central Java and Yogyakarta provinces.[a] It uses information gathered through ethno-sociological study of household cooking practices and confirmed by a statistically valid survey to identify common cooking tasks in a given area.

To build the technical test, an analysis of how often various cooking tasks are performed (see bar graph in box 2) is combined with household observations to determine the cooking duration and power modulations required for each task using the baseline stove. Two or more representative tasks that involve the maximum and minimum cooking power needed to satisfy local preferences are then mathematically combined to form the technical test, or "burn cycle," that represents common use in that culture and community.[b]

The CSI Water Heating Test is thus a single test that can be performed in a laboratory under controlled conditions (pictured here at the CSI lab in Yogyakarta) and administered in an identical manner for each stove evaluated, while also effectively replicating the range of uses to which cooking appliances are put in the target community.

**Testing stoves using the CSI-WHT protocol at Yayasan Dian Desa's pilot lab in Yogyakarta**

*Source:* Indonesia CSI.

The output of the test can provide a reasonable prediction of each product's average performance in the community whose cooking practices are reflected in the burn cycle. "Community" as used here does not mean a bounded geographic area (village) or ethno-economic subgroup but rather all those who share the predominant cooking practices identified. Here, social analysis led the team to estimate that the community identified could cover most of Yogyakarta and Central Java provinces—a population of 37 million people.

a. The protocol for the CSI Water Heating Test is available from http://cleancookstoves.org/binary-data/DOCUMENT/file/000/000/87-1.pdf.

b. Additional details on converting to contextual tests in Indonesia are available from https://collaboration.worldbank.org/servlet/JiveServlet/downloadBody/15092-102-1-20397/WBT%20to%20WHT.pdf.

To achieve this, the test piloted in Indonesia replicated local cooking cycles and integrated these into a water-heating test that assessed fuel consumption and emissions (box 3). The Indonesia CSI team finalized and used this test in 2014 and 2015 to rate candidate biomass stoves for its first pilot in the country. More than 30 stove technologies were tested. Of these, 14 technologies from 10 manufacturers, half international and half national, became eligible for the RBF pilot. As of early 2016, seven technologies, all locally developed and produced, were being deployed.

But the work of the social team did not stop here. Using information gained in the initial sociocultural exploration, a social protocol was developed to validate the clean stove results under real household conditions. Between December 2014 and May 2015, the protocol was applied in various locations in Central Java to several clean stoves that had passed CSI's technical tests for emissions and efficiency (described in box 3). In this second phase of the social work, the emphasis was on obtaining comprehensive and systematic user feedback on stove performance under their own set of priorities to complement the technical performance tested earlier. Essentially, the social protocol measured actual stove usability and user satisfaction.

"A social test protocol was created and applied to collect the experience of users when confronted with a new technology for cooking their everyday meals."

**Table 2.** Social protocol research questions to gather users' feedback

| Topic | Questions |
|---|---|
| Fit with cooking environment and social and cultural dynamics | Does the stove respond to the context in which it will be used? Does it meet specific needs within that context?<br><br>How well does the stove fit with kitchen types, firewood quality, cooking practices, women's tasks and gender roles, intra-household decision-making, and patterns of fuel and stove use? |
| Functionality and usability | How does the stove perform on a set of requirements of interest and importance to users when operated in the field under natural conditions?<br><br>How do people engage with the stove? Which aspects of its operation are easy? Which are difficult or challenging?<br><br>Are the challenges related to novelty? Need for training? Product design? Or do they stem from the interface between design and context? |
| Emotional resonance and aesthetic response | What is the degree of user satisfaction with specific aspects of operation and design (form, materials, dimensions, end result) and with the overall experience?<br><br>What does the clean stove mean to intended users? |

*Source:* CSI Social Team.

**Moving from indirect to direct integration of user needs and preferences.** Focusing on stove performance using variables directly relevant to users in a given context responds to an important finding of the initial exploration: Stove promoters (such as the CSI program or producers of stoves) and stove users often disagree greatly on what constitutes an improvement. While the critical features for promoters might include public goods such as increased efficiency and reduced emissions, users in studied sites in Indonesia were more interested in improvements with direct short-term benefits, such as faster cooking times, greater ease and comfort, the ability of the stove to operate with varying biomass moisture and quality, and lower household expenditure.

The social approach used in Indonesia gathered feedback from intended users (preponderantly women) on the performance of the stove in areas of interest to them when cooking at home. It focuses on functionality, usability, and emotional response to the product, as exemplified in table 2.

Each tester was asked to cook a set meal with the eligible stoves. All ingredients were predefined, measured, and standardized. The fuel was locally sourced by the households themselves. An effort was made to replicate as far as possible a large-scale market-based promotion, in which no training or demonstration was provided to testers before they used the stove for the first time, although all questions were answered throughout the assessment.

This test design, imitating an off-the-shelf purchase, makes it possible to observe users' first encounter with each stove, identifying specific areas of difficulty and the level of success of users' own problem-solving strategies. The design is also based on the recognition that funding and organizing training or demonstration may not always be possible (or affordable) in large-scale interventions, as is the case of the Indonesian CSI.

**"Do not underestimate the baseline stoves."** The social assessment helped identify specific issues of fit with local contexts. Such issues arose chiefly with clean stove designs originally developed for different settings. The results in Indonesia suggested that compared with the local baseline stove (figure 2), clean stoves might require additional physical effort and time for fuel preparation, owing, for example, to the smaller firewood lengths and diameters required by "rocket" stove designs. The additional burdens fall mainly on women, who are the main cooks.

"Many new clean stoves struggle to match the usability of the not-so-clean but cheap-and-versatile baseline Keren stove."

The assessment also revealed problems with the ignition performance of some clean stoves when used in the field, and with their overall speed compared with baseline stoves. Again, such problems could potentially increase cooking times, thereby overloading women's days and possibly worsening their exposure to emissions, as repeated lightings require close presence to the stove (and, for top-lit stoves, holding one's face above the stove). Furthermore, the test suggested that when used by local cooks with local biomass and under field conditions, some putatively clean stoves still left soot on pots and emitted high levels of smoke during ignition or reignition. In addition, some specific mismatches in fit between burners and local pot sizes were observed, especially as the cuisine of Central Java requires the use of multiple pots and pans of various sizes.

Overall, clean stove designers and sellers need to keep in mind that cooks will compare their products against the baseline stoves with which they are familiar. In Indonesia, the high-end baseline is the LPG stove, with its immediate lighting, easy power control, and ability to burn unattended, but with limitations related to fuel cost and availability. On the low end, the baseline in Central Java is the Keren, which is very cheap and versatile, accommodates available wood with minimal transformation, is easy to light, and can simmer or provide a high burn with simple repositioning of the burning wood. It is also able to handle damp wood once it reaches high temperatures. To be sustained over time, clean stoves must either improve on or at least match the baseline stoves' key attributes or provide a new set of services or conveniences, such as those provided by electric rice cookers.

The method also allowed us to identify ways to increase the usability of stoves. For example, the tests separated those stoves that required only explanation at the point of sale or an improved manual from less-intuitive models that would require training, demonstration, or even retrofitting or redesigning to improve their performance in the Central Java context. This information was shared with stove designers and market aggregators and used as input into a marketing and promotional strategy based on the tested benefits and limitations of stoves.

**Table 3.** Social recommendations emerging from the Indonesia CSI

| | |
|---|---|
| Recommendations on stove design | Integrate the interests of consumers in the design of improved stoves; move from supply- to demand-based stove technology |
| | Address the differentiated preferences of women and men |
| | Assess the level of improvements in areas of interest to users |
| | Ensure functionality |
| | Simplify to increase usability |
| | Use feedback mechanisms to improve design, distribution, and outreach |
| Recommendations for stove testing | Invest in understanding local cooking practices |
| | Determine and define cooking cycles and incorporate these in the lab testing protocol |
| | Conduct social adoption tests and feed the results back into testing protocols |
| | Share results with stove designers and promoters |
| Recommendations on the promotion of clean stoves | Address the differentiated needs of rural and urbanized populations; consider prioritizing areas that have been exposed to a range of fuels and devices |
| | Ensure that the pricing structure responds to the purchasing power of the target groups and to the scope of women's power to make purchasing decisions |
| | Consider conducting a gender audit of selected stoves |
| | Engage community groups in promotion |
| | Conduct awareness-raising campaigns |
| | Involve men/husbands |
| | Target additional consumer groups beyond household consumers |
| Recommendations on holistic approaches to reduce exposure to indoor air pollution | Use mutually enhancing solutions to increase the impact of work on clean stoves |
| | Explore the potential of supporting fuel diversification |
| | Monitor and evaluate impacts |
| | Continue to develop the CSI social testing protocol |

*Source:* CSI Social team

"Social recommendations are being followed closely in the CSI pilot test in Central Java."

**Positive actions resulting from the socio-technical integration: New designs, better manuals, better training.** One outcome has been the development of a new stove that works in a manner similar to that of the baseline Keren (making it intuitive for users) but with specific quality and design features that improve its emissions and efficiency (figure 3). This new stove, dubbed the Keren Super-II to emphasize its continuity with the original Keren, was developed under the auspices of CSI partner GERES and in collaboration with a local nongovernmental organization (YDD). Should its success be proven, its design features will be made available to local manufacturers on an open-source basis.

Based on results of the social protocol, the CSI team became involved in the design of stove manuals, many of which had been put together by stove designers without a typical user in mind. The new manuals (figure 4), with ample pictures aimed at users with low literacy, focus on explaining key differences with the baseline stoves that households are used to.

The social protocol also showed that the stoves would have to be properly introduced to consumers. For this purpose, sales agents would have to be trained. The CSI allocated a significant share of its technical assistance budget to such training to make sure that the primary sales force can properly explain and demonstrate how to operate these new, unfamiliar clean stoves.

**Figure 2.** The traditional "Keren" stove, popular in Central Java: a cheap stove that does not require wood of a set length or diameter

*Source:* Indonesia CSI.

**Figure 3.** The "Keren Super-II" stove, developed as a result of in-context testing: similar in use but stronger and with cleaner results than the baseline Keren

*Source:* Indonesia CSI.

## MAKE FURTHER CONNECTIONS

Live Wire 2014/28 "Tracking Progress Toward Providing Sustainable Energy for All in East Asia and the Pacific," by Elisa Portale and Joeri de Wit.

Live Wire 2015/46. "Results-Based Financing to Promote Clean Stoves: Initial Lessons from Pilots in China and Indonesia," by Yabei Zhang and Norma Adams.

Live Wire 2016/62. "Toward Universal Access to Clean Cooking and Heating: Early Lessons from the East Asia and Pacific Clean Stove Initiative," by Yabei Zhang and Norma Adams.

Live Wire 2016/63. "The Lao Cookstove Experience: Redefining Health through Cleaner Energy Solutions," by Rutu Dave and Rema N. Balasundaram.

**Figure 4.** Excerpt from a new 4-page, user-friendly, illustrated stove manual


*Source:* Indonesia CSI.

## What's next?

### The methods and practices developed by the Indonesia CSI in Central Java are being scaled up for wider application

Through the development of the socially sensitive stove-testing protocol and the background studies, the Indonesian CSI has produced a deeper understanding of how gender and social issues affect the uptake and use of clean stoves and how stoves can be improved to better correspond to users' needs and concerns. The recommendations generated by the program (table 3) are being shared with the international clean stoves community.

The social and contextual approach developed in Indonesia has generated significant debate and interest, and aspects of it are being integrated into global discussions on stove testing within the International Organization for Standardization. Laboratory testing is without doubt critical, but testing stoves in context can provide new information, highlight inconsistencies and gaps, and bring the world a generation of clean biomass stoves that work the way cooks expect a stove to work for their own needs.

Ensuring that stoves in the market have passed through a series of tests in the lab to ensure adherence to standards and in the field to assess user-product interaction can help improve the user experience and encourage adoption. The benefits of improved stoves can be realized only if the stoves are widely adopted and regularly used, which may not happen with one-size-fits-all approaches.

The Indonesia CSI social team is now working on verification of stove sales under the RBF scheme. The project in Central Java is being scaled up, and the tests, social analysis, and RBF mechanisms extended to new provinces. Further development of the social protocol may lead to using social dimensions as conditions for stoves' eligibility for subsidized inclusion in the program.

*The World Bank's Indonesia CSI team is led by Yabei Zhang and Laurent Durix. The social team is composed of Helene Carlsson Rex (leader), Veronica Mendizabal Joffre (sociologist), Cecil Cook (anthropologist), and Tig Tuntivate (statistician). Crispin Pemberton-Pigott is the CSI stove specialist, in collaboration with Iwan Baskoro (GERES).*

*The teams are grateful for support and contributions from the Indonesian organization Yayasan Dian Desa (YDD), led by Christina Aristanti, and to YDD's team, particularly Prianti Utami.*

*Peer reviewers for the CSI social work included Gillian Brown, Jacqueline Devine, Sarah Keener, and Vanessa Lopez.*

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# Contribute to livewire

## Do you have something to say? Say it in *Live Wire!*

Those working on the front lines of energy and extractives development in emerging economies have a wealth of technical knowledge and case experience to share with their colleagues but seldom have the time to write for publication.

*Live Wire* offers prospective authors a support system to make sharing your knowledge as easy as possible:

- Trained writers among our staff will be assigned upon request to draft *Live Wire* stories with staff active in operations.
- A professional series editor ensures that the writing is punchy and accessible.
- A professional graphic designer assures that the final product looks great—a feather in your cap!

*Live Wire* aims to raise the profile of operational staff wherever they are based; those with hands-on knowledge to share. That's your payoff! It's a chance to model good "knowledge citizenship" and participate in the ongoing change process at the Bank, where knowledge management is becoming everybody's business.

If you can't spare the time to contribute to *Live Wire,* but have an idea for a topic, or case we should cover, let us know!

We welcome your ideas through any of the following channels:

Via the Communities of Practice in which you are active

By participating in the Energy and Extractives Global Practice's annual *Live Wire* series review meeting

By communicating directly with the team (contact Morgan Bazilian, mbazilian@worldbank.org)