Learning from Cooks: a User-Centred Approach to Help Transform Household Energy Use

An estimated 2.7 billion people globally still rely on traditional biomass – wood, charcoal, animal waste and agricultural residues – as their primary energy source, particularly for cooking. These fuels are typically burned inefficiently, either over a three-stone fire or in simple stoves, and in poorly ventilated spaces. Exposure to the resulting smoke greatly increases the risk of acute respiratory infections, leading to an estimated 1.6 million deaths per year.

Traditional biomass fuel use also has significant livelihood impacts. Gathering fuelwood is a laborious and often dangerous task that can take several hours per day, constraining girls' educational opportunities and reducing the time available to women for income generation. For poor households that must purchase these fuels rather than gather them, the expense can be a major burden.

Cookstoves and black carbon

Biomass-burning can have significant repercussions for the environment, in terms of both deforestation and regional and global climate impacts. When used in inefficient cookstoves biomass produces high levels of black carbon or soot, a major short-lived climate forcer estimated to be the second-largest contributor to global warming after carbon dioxide.

Research sponsored by the United Nations Environment Programme, meanwhile, suggests that a large-scale switch to cleaner cookstoves as part of a global effort to reduce short-lived climate forcers could yield significant and immediate benefits: helping to slow climate change, reducing regional warming and precipitation disturbances, improving human health and saving lives.

All photos by Fiona Lambe and Aaron Atteridge

The challenge: improving uptake of clean cookstoves

Efforts to replace traditional cookstoves with more efficient stoves have been ongoing for decades in many countries, with both public and private funding. But while building a cleaner stove is relatively easy, getting communities to use these stoves, especially in the long term, has proven difficult. There are few, if any, real successes in actually transforming stove markets. Various explanations have been offered for this failure; one problem that has become evident is that programmes have too often neglected to understand the market for their stoves – the needs, preferences and constraints of stove users in their unique contexts.

This insight has led SEI, which has been engaged in research on household and small-scale energy supply and demand for more than 20 years, to develop methodologies that can help cookstove programmes – and policy-makers makers aiming to change the way biomass energy is used by households – fill this crucial knowledge gap.

Combining qualitative and quantitative research

One major SEI project, Household Energy Economic Analysis, (HHEA), conducted in 2008-2010, developed a stated-preference survey tool for understanding decision making around household energy in Ethiopia, Tanzania and Mozambique. This methodology can illuminate the trade-offs that individuals make between various cookstove attributes including cost, safety and convenience. Using an economic model, the results help to project the likely uptake of new stoves within different market segments and can thus assist stove programme designers and policy makers to meet local demand.

Yet economics is only part of the picture. Culture and traditions, social norms, household needs and habits, cooking methods, even flavour preferences can all affect users' perceptions of what makes a good stove – and whether a new stove is desirable. Working first in Zambia, and now in northern India, we have begun to utilise more qualitative methodologies to capture this information. These build upon what the industrial design field calls 'generative' research, a suite of ethnographic approaches focused on drawing both overt and tacit knowledge from 'users' (in this case, households) in order to understand their needs and desires. Deconstructing household energy choices and energy use behaviour means we

need to comprehend emotional, cognitive and ergonomic factors along with financial parameters.

The *emotional relations* that individuals have to existing technologies and practices and to available alternatives; *how people interpret and understand* the world around them – and in particular, their daily energy use and cooking practices; *the physical constraints and capabilities* of both the human body and the environment; and people's *willingness and capacity to pay* for alternatives all help determine whether existing practices are perpetuated and what choices about alternatives are made.

Case study: northern India

In 2011 SEI conducted a baseline assessment of household energy options and practices in Haryana State, near New Delhi, conducting interviews with households in several villages and observing cooking practices and the household environment. Our findings suggest a number of opportunities for catalysing change by addressing perceived problems with the traditional clay *chulha* stoves that are now used and by fulfilling unmet needs and desires.

On one hand, chulhas produce a lot of smoke, which the women perceive as an irritant and a health hazard. Women wish to spend less time cooking and gathering fuelwood, would prefer a stove that can accommodate a wider range of pot sizes, and would like to have a more easily portable stove.

Yet there are also perceived advantages to the current way of cooking. For instance, women make their own chulhas from free and locally available materials, which means households can afford to have multiple units. Dung cakes are used as fuel not because people can't afford wood but because it is a valued co-benefit from keeping a buffalo for milk. The combination of dung and wood together allows cooks to regulate heat; dung burns more slowly than wood, allowing for milk and animal feed to be warmed on a low flame that can be left unattended. Families like the taste of *roti* bread baked in these stoves, and finished over an open flame. Box 1 offers examples of how these insights could be applied to improved cookstove design.

Box 1: Stove design parameters drawn from Haryana household interviews

- The ability to regulate temperature is essential, both for preparing different dishes and to provide greater freedom to women to perform other tasks at the same time as cooking.
- It would be advantageous if alternative stoves accommodated both wood and dung as fuel.
- For preparation of *roti* bread, a core part of the local diet, cooks need access to an open flame.
- Portability is desirable, to enable cooking indoors and outdoors.
- Appearance is important. Chulhas have aesthetic appeal and are sometimes painted or decorated, whereas women said they did not like the appearance of metal stoves they have seen.
- Though households say they are willing to pay for an improved stove that meets their needs, stove price will need to take account of the fact that households currently do not spend money on stoves or, in most cases, fuels.

A new way to evaluate improved cookstoves

SEI work to date suggests that the benefits from placing a greater emphasis on the user, rather the cooking technology, in each unique setting would vastly increase the possibility of improved cookstove interventions successfully transforming local markets and practices. To this end we need to deepen our understanding of complex human behaviours, particularly the social, cultural and financial factors that underpin household energy use.

There is a fundamental problem with relying only on technical parameters to evaluate cookstoves intended for real-world use. Although it is crucial that an improved stove reduces indoor air pollution and saves fuel, if a household is not willing or able to switch to the new stove these technical advancements will fail to make an impact. Thus there is a strong case for including 'usability' parameters in test protocols for improved cookstoves.

Recommendations for improving clean-cookstove efforts worldwide

- Although stoves' technical performance is clearly important, there is an equal or greater need to understand the social and cultural factors that influence household energy use and decision-making.
- Household energy use is highly contextualised, which implies enormous variation from region to region, and even district to district. Thus, designing a cookstove programme to shift behaviour on a large scale requires user-focused research at the local level.
- Policies and standards for cookstove programmes should incorporate insights about users' perspectives and social and cultural differences, and 'soft' factors related to stove usability should be considered in the design and evaluation of new cooking technologies.

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