

Keywords

South-south, peer-to-peer learning, preference mapping, human centred design, participatory innovation, local preferences, clean cooking environment

The global pandemic shows the importance of regional and local economy as well as reliable, closer supply chains for meeting daily necessities for a decent quality of life. Energy security and safety for cooking is one of these vital necessities.

For universal access, what we aspire to achieve through SDG7, there is a growing consensus that we need multiple pathways to clean cooking and need to develop new cooking energy systems, using multiple approaches for many different contexts that reflect local realities.

Let's start at the grass-root level and see how the cooking needs and preferences of the users can be met in a way that brings benefits to the user whilst generating the co-benefits (human health, environmental, gender, climate etc.) we all want to see.

Through South-South collaboration without imposing beliefs, interpretation, economics and cultural practices, the centers will have their own bottom-up approach with a broader view on cooking energy systems in their context, acknowledging but not pushing for the international standard-setting agenda focusing mainly on the clean cookstove.

Cleaner Cooking Local Innovation Hubs

New global context: need for local innovation and reliable, closer supply chains

The pandemic has taught us the risk that distant supply chains hold for us. Global imbalances in production and supply resulted from territorial 'lockdowns', re-openings at different times, price hikes, increased transport and diesel costs, as well as issues with ocean freight. Under such circumstances, people revert to using what is available locally to meet their daily requirements. The benefits of shorter supply chains, that can foster local innovation and ingenuity, became more obvious in the last couple of years.

As we enter into an era of coping with an increasingly climate-changed planet, the global supply chains will continue to be stressed by long term as well as sudden disruptions. The global crisis shows the importance of regional and local economy as well as reliable, closer supply chains for meeting daily necessities for a decent quality of life. Cooking energy security and safety is one of these vital needs.

Ethically, we need to support national governments to push for regional innovation and R&D as this is a crucial 'ingredient' in providing integrated solutions for cleaner, reliable, affordable cooking. The international community should invest in fostering such institutional arrangements.

The International Cooking Energy Agenda: Standard Testing and North-South Innovation

The international cooking energy agenda focuses on clean cookstoves and the evaluation of their performance regarding efficiency, emission, safety and durability determined through a set of harmonized laboratory test protocols published by the International Standards Organisation. The ensuing voluntary performance targets push for 'higher-tiered' technologies to regions and populations without attributing the same weighting to the user perspective e.g. their social suitability, acceptability, 'adoptability', affordability, etc. which equates to a form of 'top-down' techno-colonialism.

Funding to support innovation in cleaner cooking is minute, given the scale of the problem, and the little bit

there is currently centred on North-South cooperation, often funding R&D in the North and then moving or just "adapting" the developed technology approaches in the South. This approach has seen only very limited positive impact. We need to centre R&D in the South with an approach to go beyond the technical focus and place equal value on the social component.

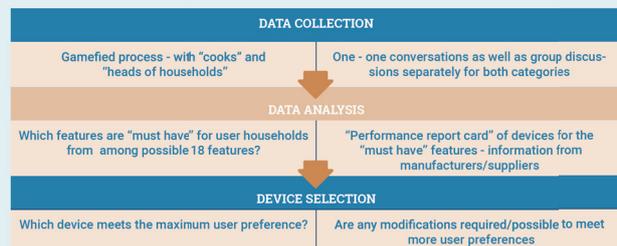
For universal access, what we aspire to achieve through Sustainable Development Goal 7, there is a growing consensus on the need for multiple pathways to clean cooking and to develop new cooking energy systems, using various approaches for many different local realities.

It is crucial to build relationships and interact with the full range of stakeholders, institutions, and disciplines. We need to couple better scientific knowledge, such as an understanding of heat transfer efficiency that has advanced a lot even in the last 5 years, with an empathetic social understanding of needs and preferences.

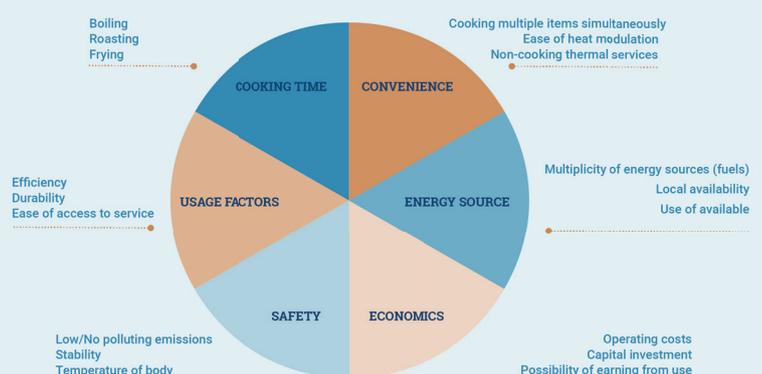
Local context matters

Researchers need to be 'in the field' to talk to people, to learn and see what is happening in people's lives and in their homes, in their world. Researchers need to see the cooking energy realities through the eyes of the users and understand their perspective from real-life connections.

Preference Mapping Methodology



Preference Mapping Tool



Participatory Innovation

The practical user-centred research can generate ideas, techniques and approaches for cleaner cooking initiatives that can be tested and tweaked at home or in institutions where it can be tailored for each specific user. This can speed up feedback from the users and feed into lessons learned mechanisms. A joint ideation process among multiple stakeholders can unleash incredible creativity and lead to 'pathbreaking' solutions. Users will teach us what works and what doesn't and what they would like to use and what not.¹

Let's start at grass-root level and see how the cooking needs and preferences of users can be met in a way that brings benefits to the user whilst generating the co-benefits (human health, environmental, gender, climate etc.) we all want to see.

Meeting peoples' needs

Preference mapping, as outlined in the mapping tool methodology, has been developed in rural India, for example, through a 'gamified' process where people are encouraged to imagine and explain the most important cookstove 'must-haves'. This process, developed originally by The Ashden India Collective, and further refined and extensively used by Samuchit Enviro Tech, identifies needs and preferences. Its application can result in increased and sustained adoption of the technologies selected to match the identified preferences.

The impact of cleaner cooking depends on many factors. A simple but revealing equation, highlights the co-importance of a number of combined factors that generate the desired impact in the 'real world' - Impact = Performance x Adoption x Scale (IPAs)³. A more efficient (than traditional) stove that meets users' needs and is accessible and affordable, for example, can have greater impact, at less cost, than the 'best available technology' that is high performing but is either too limited in meeting cooking needs and/or is too expensive or too difficult to use and maintain to be adopted at scale.

A study in Malawi² reinforces the rationale of the equation above by comparing emissions and fuel savings from advanced, intermediate and baseline technologies, given their relative cost. It concluded that widespread, low-cost, intermediate-quality cleaner cooking programs should be prioritised as an important and realistic first step toward reducing household air pollution and (unsustainable) use of natural resources. This important finding shows us that it is not always the 'best' or highest rated stoves that have the biggest impact.

Human centered design - proximity to the user

Proximity to the user, by having the Cleaner Cooking Innovation Hubs in-country, can facilitate the process of learning, from empathising with the users, joint ideation, prototyping, testing and then going back in the loop of learning, refining and testing until a solution is found that is accepted by the users. Through such iterative processes the research can be more effective.

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The acronym **CLEANER** is an example of a 'human-centred' definition that has been validated in Malawi by key stakeholders, including producers, promoters and the National Cookstove Steering Committee, chaired by the Ministry of Energy. Parameters are clearly set out for broad and inclusive interpretation of cleaner cookstoves that can work for both, the people and the planet.

Researchers can work within the local reality of multiple fuels and devices being used in parallel (stove stacking) and focus on cleaning all elements of the cooking stack without adversely impacting the multiple services that each element of the stack addresses. The researchers can look beyond the fuel-stove combination and focus on the end goal of 'creating a clean cooking environment' rather than 'selling clean cookstoves'. For example, a versatile cleaner fuel-stove stack operated in a well-ventilated kitchen may be far more effective than owning the cleanest cooking technology which is only peripherally used side-by-side a highly polluting stove in a poorly ventilated kitchen.

A Simple Cleaner Stove



Chitetezo Mbaula clay stove



Regional Representation

Inspired by the initial Cleaner Cooking Innovation Hubs on the ground in the three regions of Africa, Asia, Latin America and the Caribbean, regional innovation hubs can grow organically. The network, with orientation from the Cleaner Cooking Coalition, can share similar values and principles while having the flexibility to adjust to their own particular needs and realities.

The approach is to start small in Malawi, Southern Africa; Maharashtra, India; and Michoacán, Mexico; and build gradually. Through South-South collaboration without imposing beliefs, interpretation, models and cultural practices, the centres will have their own bottom-up approach with a broader view on cooking energy systems in their context, acknowledging but not pushing for the international standard-setting agenda focusing mainly on the device, a clean cookstove.

Peer-to-peer learning

Peer-to-peer training and sharing of knowledge and skills among people of an equal standing is a cost effective way of speeding up diffusion of improved technologies and practises. In Malawi, for example, over 300 production groups were mobilised countrywide using this approach. Technical help from outside the village assisted in facilitating the transfer of knowledge between stove producers through local vernacular languages in a more convincing and effective way. This resulted in producers being more knowledgeable and having a more profound understanding of the challenges, needs, resources, skills and 'tricks' than the facilitating technical person.

South-South Collaboration

South-South direct collaboration and engagement can increase efficiency of scaling up technology diffusion within local contexts. The concept of the Chitetezo Mbaula clay stove, for example, was first brought to Malawi in 2000 from Kenya through a consultant with Practical Action. The tools to standardise the size and shape of the stove and an improved kiln technology were refined and locally adapted to become even simpler and more practical to build. Specifications were agreed on in Malawi and were later adopted in Rwanda. South-South communication and 'lessons sharing' can be very effective, given the similar realities in Kenya, Rwanda and Malawi. A mechanical mould to shape the stoves was brought to Malawi from Rwanda resulting in standardisation of cook stoves using African technology, so that regardless of where the stoves are made, they have the same shape and size. This results in a more efficient use of resources, less waste and a better-quality product for the end-user. Similarly, the new illustrated construction manual developed in Malawi for the fuel-efficient kilns to process the stoves has since been translated into French which served to replicate the technology in Madagascar, Benin, Senegal and other countries in West Africa. Recently a kiln was built in Ethiopia, entirely based on the construction manual from Malawi with some remote coaching.

Financial autonomy

Finance for cleaner cooking, including research and development (R&D), was reported to be \$131m globally in 2018⁴, which alarmingly constitutes less than 1% of \$4.5 billion annually required to achieve universal access to clean cooking by 2030. In this context, Hubs need to be financially autonomous and not depend on national government budgets or on international donor funding, with exposure to abrupt changes in policy. Funding sources can be diversified from:

- Bottom-up local funding - providers of cleaner cooking can work in solidarity with global non-profit organisations to deliver cleaner cooking outcomes.
- Crowd-funding to raise funds, for example, to develop prototypes for initial dissemination.
- Strategic alliances with the private sector to reach large numbers of households, institutions and commercial kitchens with cleaner cooking.
- Pro-poor carbon finance can seed finance, for example, costs of reaching households, with follow-up payment on verification of sustained adoption and usage.
- Grants from international development partners.

Self-help initiatives, such as credit unions or microfinance groups, which are often self-managed and self capitalised, can be an effective means of mobilising resources and cooperation at a local level, and can catalyse cleaner cooking investment and enterprises.

Main activities:

Cleaner Cooking Innovation Hubs can facilitate a space for bottom-up, practical research with local people and institutions to proliferate multiple cleaner cooking solutions to meet the needs and preferences for all by 2030.

Main objectives

- A. Facilitate and conduct monitoring, reporting and verification with specific groups over prolonged periods of time. Tests to assess efficiency, emissions and fuel use, (including Water Boiling Tests, Controlled Cooking Tests and Kitchen Performance Tests) can be conducted in peoples homes and in simulated kitchen setups based on the actual kitchen (or cooking space) setups of the region.
- B. Learn of peoples' needs and aspirations to come up with cleaner practices and technologies through preference mapping and human centred design. Practical methodologies can map out which cookstoves match particular cooking tasks. Innovations and local ingenuity, technological or otherwise, can be tried and tested with immediate feedback to fast-track innovative co-creation trying to translate peoples' dreams into usable and affordable technology. Experience in how best to meet specific local preferences and aspirations in many different contexts can enable the hubs to make policy recommendations, with legitimacy and credibility.
- C. Collaborate with all those entities with capacity to promote R&D and to deliver cleaner cooking solutions, be they universities, not-for-profits, social enterprises, local communities, international organisations or agro-industries. Over time, facilities can be developed to attract researchers and universities from abroad, bringing interdisciplinary skills and technical know-how and enabling greater dissemination and outreach for cleaner cooking. An ethos of continuous improvement with an openness to trial new approaches, test inventions and tweak options can detect what really works in peoples' homes, schools, workplaces and so on and what can be disseminated at large scale. The Innovation Hubs must go beyond research and develop relationships with local enterprises that can really deliver locally adapted cleaner cooking solutions at scale.
- D. Test and innovative roll-out and scale-up models for cleaner cooking that don't necessarily follow contemporary 'market based' approaches. In Malawi, for example, locally developed open-sourced (non-patented) stoves some sold at profit, some at cost, some distributed without financial cost, partly financed by carbon credits (a market-based approach to overcome market failure) are partially price controlled by the National Cookstove Steering Committee. Successful models don't necessarily follow a free market competitive approach. As emphasised by Korean economist Ha Joon Chang, there is often a need to invest time, effort and resources in 'infant industries' that aren't immediately profitable but require nurturing and protection over time. Sometimes it is more cost effective to subsidise adoption so people experience (and learn about) the benefits rather than to invest in social marketing drives, for example, that can be expensive and don't directly result in adoption and use.

Cleaner Cooking Innovation Hubs - shared values in regional diversity

The shared values are the core principles that guide the innovation hubs.

- User centred - to meet the needs of local people, where researchers work with users.
- Commitment to scale (and affordability) - Households to be reached by 2030 Malawi (3M), Mexico (5M) & Maharashtra (10M⁵)
- Leave no-one behind - reach everyone by 2030 with proven cleaner cooking
- South-south collaboration and peer-to-peer knowledge sharing is valued and promoted

Openness to improvement and to test new approaches and ideas and to work with the full range of stakeholders.

The Cleaner Cooking Coalition (CCC) promotes universal access to sustainable cooking energy - Our focus now is driving global recognition of the immediate need to transition to cleaner cooking on our journey towards 'clean' renewable solutions - leaving no-one behind.

Contact
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NOTES

1. Adapted from Andrew Burrough's presentation 'Human centered design research' at the ETHOS Conference on January 26, 2022
2. Wilson, D. L. Sensing Change: Measuring Cookstove Adoption with Internet-of-Things Sensors, in Madon, T. Et al. Introduction to Development Engineering, A framework with Applications from the Field, 2022.
3. [Jagger et al., Fuel Efficiency and Air Pollutant Concentrations of Wood-Burning Improved Cookstoves in Malawi: Implications for Scaling-up Cookstove Programs, Energy for Sustainable Development, 2017](#)
4. [Energising Finance: Understanding the Landscape 2020 reported finance of \\$131m for the in 2018 in the 20 high impact countries that represent almost 86% \(i.e. 2.4 billion people\) of those without access to clean cooking - equivalent to less than 1% of the estimated \\$4.5 billion annual requirement to achieve universal access by 2030](#)
5. [IEA estimates that around 650 million people, just under half of India's population, continue to rely primarily on traditional biomass fuels for household cooking and water heating \(Indian Energy Outlook, 2021, IEA page 175\) . Due to the diversity of cooking approaches in India, this first regional hub in Maharashtra can only focus initially on the cooking practices in Maharashtra state, which has a population of about 125 million, so a target of 10 Million rural and urban kitchens is already a very ambitious target.](#)

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