Stockholm Environment Institute

# Opening the black pot

**A service design-driven approach to understanding the use of cleaner cookstoves in peri-urban Kenya**


**SEI policy brief**
**June 2020**

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IMAGE (ABOVE): © KARIN LYCKE / EXPEDITION MONDIAL

## Key messages

- **A combination of service design methods, behavioural insights and social-ecological systems thinking has proven helpful in guiding the design of more successful clean-cookstove interventions**
- **By combining service design methods with quantitative methods, researchers can generate more robust and reliable data on cookstove usage and adoption over time.**
- **In our study, we identified two main user archetypes: those motivated by convenience, and those motivated by saving money. We suggest that identifying such archetypes early on can help cookstove programme implementers to tailor their efforts to meet the different needs of key user types**
- **By mapping the roles and capacities of key stakeholders within the Kenyan cookstove sector in relation to the user's experience of the advanced biomass cookstove and fuel, we identified critical gaps in the system and suggest concrete measures for addressing these.**

The health impacts of traditional biomass cooking are well known. An estimated 1.6 million premature deaths per year are attributed to exposure to household air pollution from inefficient biomass stoves, which cause respiratory and other ailments that affect the cooks, their children and other household members. In addition, emissions from stoves and the use of firewood which can cause deforestation also contribute to climate change.

Over 90% of Kenyan households still rely on solid fuels or kerosene for some or all of their cooking needs. As in other biomass-dependent regions, this takes a toll on Kenyans' health. Roughly 5% of premature mortality is attributable to household air pollution exposure. Clean cooking options such as liquefied petroleum gas (LPG) and electricity are growing in popularity, but as in other developing regions, the shift to cleaner cooking options has been slow and only partial. Most households still use wood, charcoal and/or kerosene stoves along with their new stoves.

Recent research has shown that a combination of service design methods, behavioural insights and social-ecological systems thinking can help stove producers and programme implementers to better understand users' needs and thus develop stoves and interventions that will achieve greater success. This policy brief describes a small-scale study on cookstove use and experiences in two peri-urban areas outside Nairobi. The project aimed to identify strengths and weaknesses in the implementation of an intervention, an advanced biomass pellet cookstove, from the perspectives of different user archetypes.

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## Insights from user archetypes

We followed 30 households for six months after they signed up for and purchased the advanced biomass cookstove, a Mimi Moto stove. We applied a mixed methods approach including;

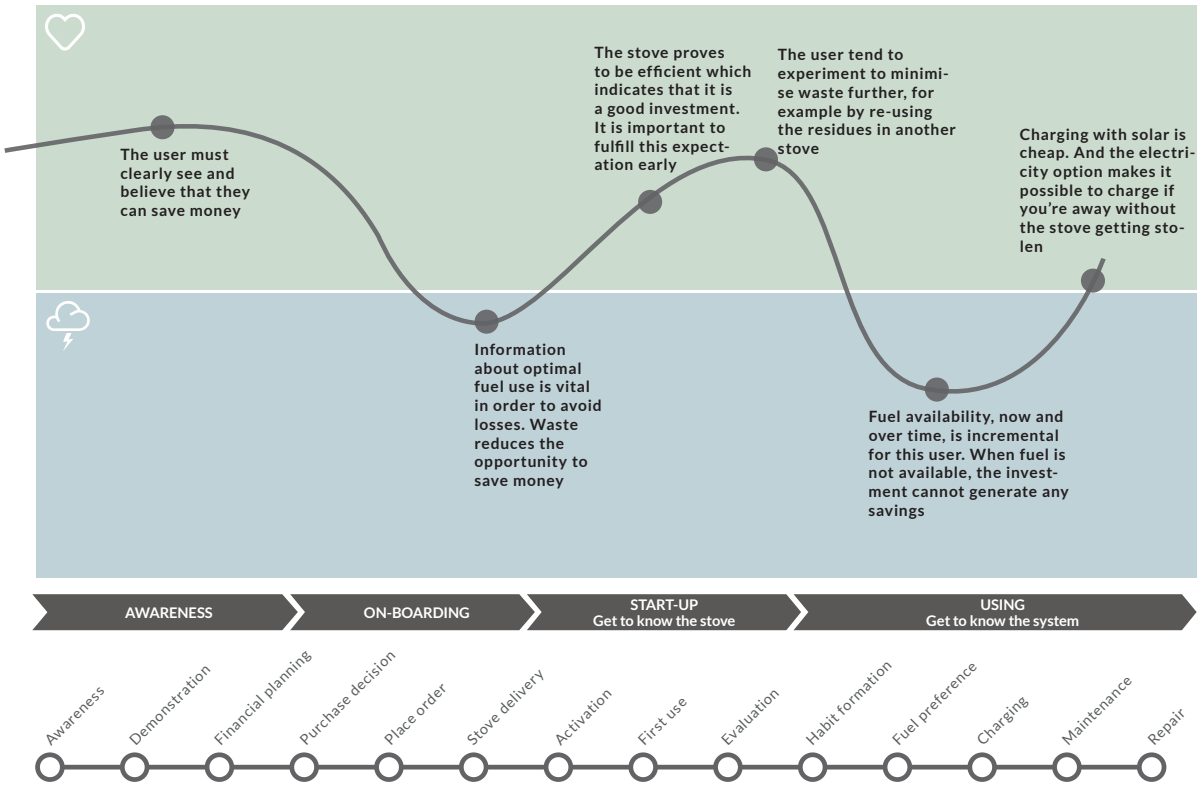
- Qualitative methods derived from service design research – detailed surveys, interviews and group workshops – identifying key "pain and gain points", that is positive and negative experiences associated with using the Mimi moto stove and pellet fuel – map the user experience of the implementation and use of the cookstove, i.e. "the user journey".
- A stakeholder workshop was also organised to understand how different actors in the sector could support uptake of advanced biomass cookstoves and how they related to the users and the user journey of a newly introduced cookstove.
- Quantitative monitoring of cookstove usage through Stove-Use Monitors (SUMS). These were used to monitor all stoves used in a household to capture trends in cooking behaviour after the new intervention was introduced and measure actual usage of the new cookstove.

Based on the primary motivation for households to buy the Mimi Moto stove, we identified two main user archetypes with distinct needs and user experiences: "money savers" (15 households) and "convenience seekers" (6 households).

### Money saving group

The money saving group expressed a strong need for clarity and accuracy in the initial introduction to the MM technology and its benefits (see Figure 1). These users often cited a demonstration of the stove as critical to their purchase decision.

Figure 1. User journey for a money saver using an advanced cookstove.



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True to their goal of saving money, these households went to some lengths to realize fuel savings, by experimenting with the stove, for example, testing different power settings for different dishes and using different quantities of fuel to optimize fuel consumption. The SUMS data show that liquefied petroleum gas declined throughout the study period, as households relied on the Mimi Moto stove (see Figure 2). A key concern for these users was that they might use the stove in a sub-optimal way, and waste fuel.

For this group, the key challenges with the Mimi Moto stove reported during interviews and workshops were inconsistent fuel availability and lack of technical support. The SUMS data confirm the reported difficulties. Stove use was initially steady, but dropped significantly during weeks 8–10, when fuel availability was most unstable. When fuel availability stabilized, Mimi Moto use increased, and households reported benefits such as the low cost of charging with solar power and the ease of maintenance.

Overall, however, the money-savers used the stove less than the convenience seekers, and the money savers expressed a high level of concern about the long-term sustainability of the Mimi Moto cooking system. All money savers said they worried about fluctuations in the supply and price of fuel limiting their future use of the Mimi Moto stove.

### The convenience seekers

The convenience seekers said they were attracted to the Mimi Moto stove from the moment they heard the sales pitch, and they saw it as a relatively low-risk investment that would "make life easier". All respondents in this group mentioned the importance of hearing about the stove from a trusted source. They started out with a high level of optimism about the stove (Figure 3).

Figure 2. Stove use monitoring data for the money savers throughout the study period.
*Key: Mimi Moto stove (MM), Liquefied Petroleum Gas (LPG) stove, Kenya Ceramic Jiko charcoal stove (KCJ) stove and Kerosene (KER).*

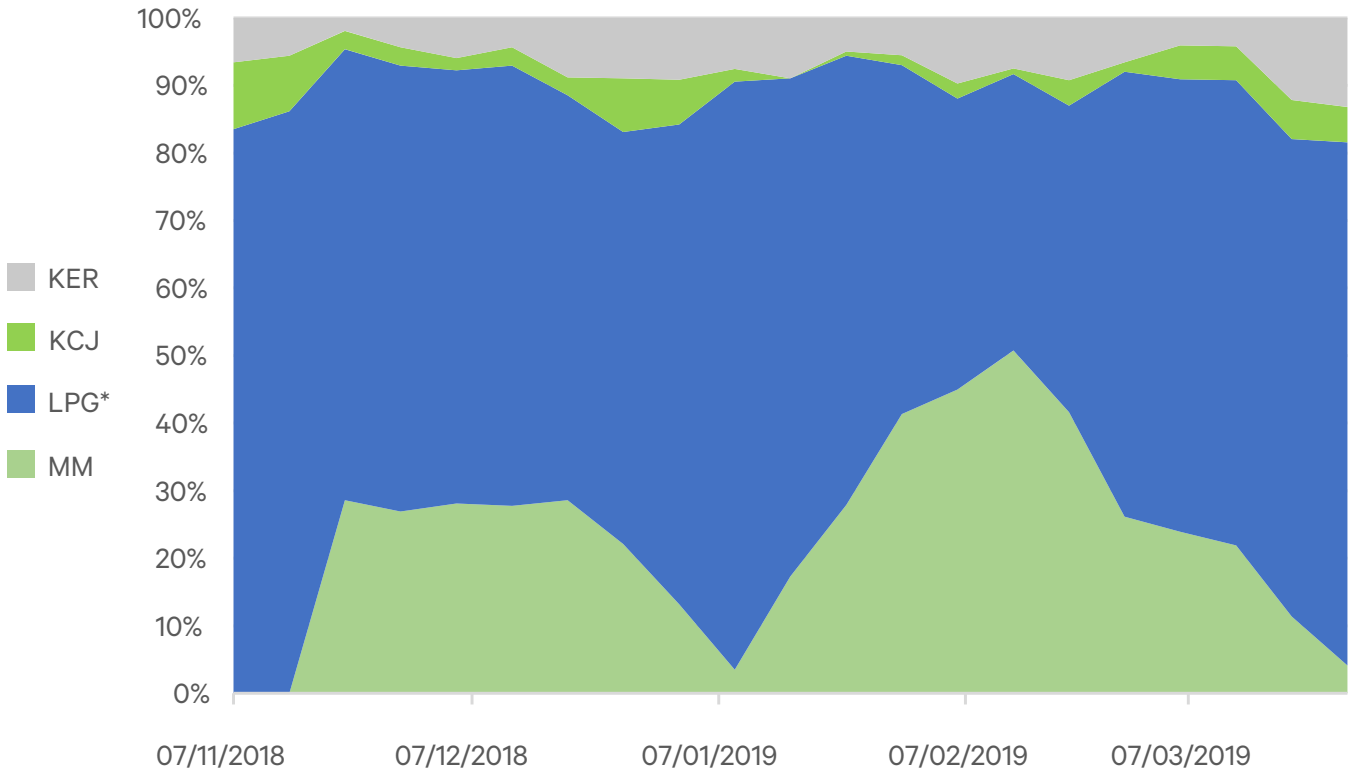
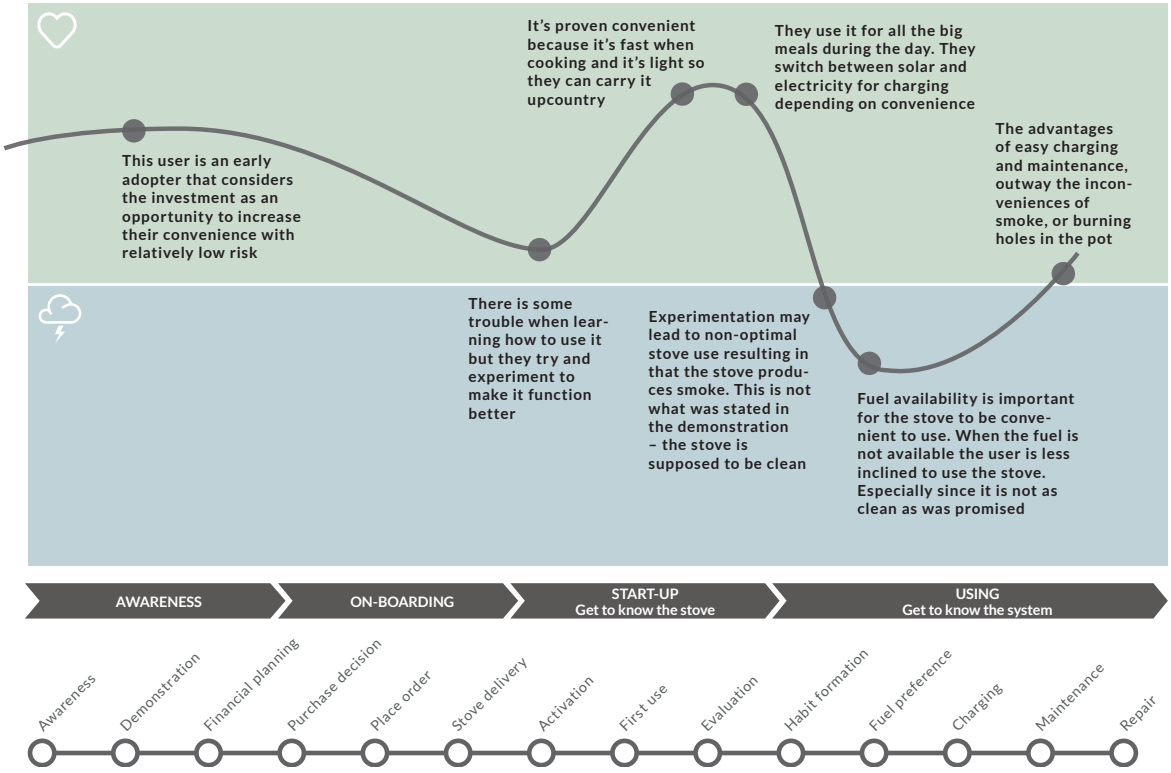


Figure 3. User journey for convenience seekers using an advanced cookstove.




Convenience seekers reported using the stove most days, for cooking all the "big meals". They noted that the stove cooks quickly and it is portable, allowing them to cook in different rooms and take it with them when visiting relatives "upcountry". Several respondents were also pleased that the stove was clean and did not produce soot, so they didn't need to spend as much time cleaning pots and removing soot from the kitchen walls. However, cleanliness depends on using the stove optimally, and some respondents reported problems with smoke and soot, contrary to their expectations.

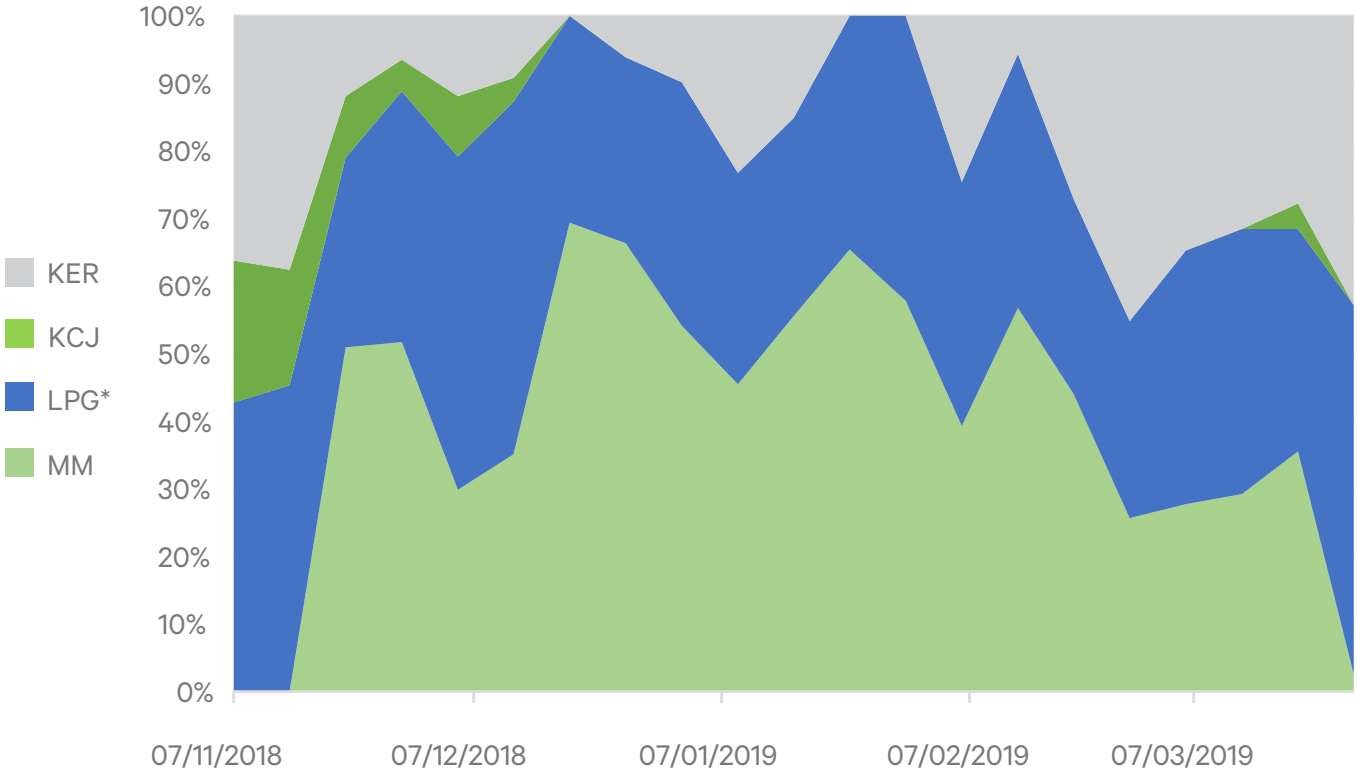
Like the money savers, however, convenience seekers reported a sharp drop in satisfaction as the weeks progressed, mainly due to inconsistent fuel availability (Figure 4).

ll respondents in this group reported dissatisfaction with fuel availability: their preferred fuel was not always available, smaller packages weren't always for sale, and overall, fuel availability was uncertain. This eroded trust in the Mimi Moto cooking system and made it seem less convenient. The SUMS data show a dip in Mimi Moto usage around week 5, and a steady decrease in overall usage from the time when fuel availability started to decrease. However, these users still expressed a high level of satisfaction with the Mimi Moto stove, with all respondents claiming to use the Mimi Moto stove every day, for most meals. The SUMS data (Figure 4) clearly show higher Mimi Moto usage for this group throughout the user journey than in the saving-money group.

### Are key actors positioned to make a difference?

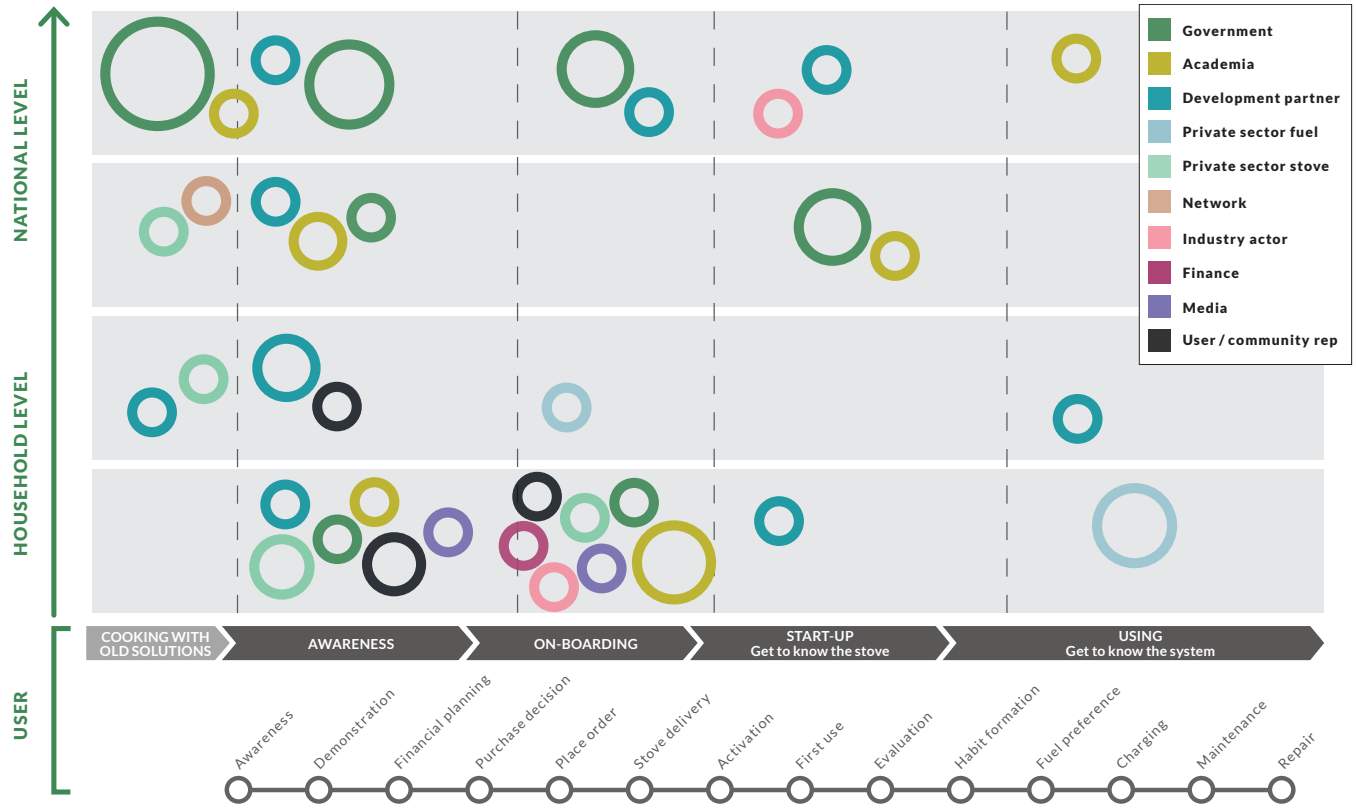
At the stakeholder workshop, including key stakeholders in the Kenyan cookstoves sector, we mapped each actor's proximity to users along the user journey, including private-sector stove and fuel sellers, user and community representatives, academics, finance providers, government and development partners (see Figure 5). Most stakeholders focus on early steps in the user journey – specifically, the steps we labelled as *awareness* and *on-boarding*. Only two workshop attendees placed themselves

Figure 4. Stove use monitoring data for the money savers throughout the study period.




*Key: Mimi Moto stove (MM), Liquefied Petroleum Gas (LPG) stove, Kenya Ceramic Jiko charcoal stove (KCJ) stove and Kerosene (KER).*

Figure 5. Map of stakeholders in the Mimi Moto value chain, and their relationship regarding the user and the user journey.



**ACKNOWLEDGEMENTS**

This research was funded by the Climate and Clean Air Coalition (CCAC) and the Swedish International Development Agency (Sida). We would like to thank Susanne Ringström and Karin Lycke for their service design expertise. We would also like to thank Hannah Wanjiru, Erastus Mwini, Daisy Otieno, Esther Mutheu and Martin Osindi Onyancha for their invaluable support during fieldwork. We are grateful to Marion Davis for her editorial support.

**Published by**
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near users during the *start-up* and *using* phases, which is when most users reported experiencing "pain points" with the Mimi Moto stove and fuels.

## Insights for policymakers

In line with other current research on cookstove and fuel choice and user experience, our study points to the importance of basic considerations in introducing advanced cookstoves that are arguably "low-hanging fruit" for programme implementers (see Figure 5). For example, in the *awareness* phase, cookstove demonstrations in familiar settings (ideally people's homes), convened by trusted community members, seem like a good, low-cost way to build confidence in the new technology.

A successful *using* phase requires basic infrastructure to ensure reliable, convenient and affordable access to fuel supply and technical support as needed. Recruiting cookstove users to manage these key parts of the infrastructure could provide crucial feedback, so problems are immediately identified by those who are also able to address the issues.

Identifying user archetypes early on could also help cookstove implementers to tailor their efforts and direct resources. For example, our study showed that the money savers were in most need of after-sales support, while convenience seekers were the most self-sufficient when it came to overcoming challenges with the new cooking system. Crucially, understanding the needs and drivers of different types of users allows for management of expectations in marketing stoves and fuel. For example, the Mimi Moto stove is marketed as healthy and smoke-free, even though it requires kerosene for lighting, which led to disappointment among users for whom health benefits were a priority.

## Policy recommendations

- There is a need for cookstove developers and programme implementers to better understand user needs and behaviours of key user archetypes and tailor interventions appropriately.
- In terms of resource allocation, cookstove programme implementers could consider investing more in after-sales support for users who are motivated by saving money, rather than those motivated by convenience, since the convenience seekers were shown to the most self-sufficient when it came to overcoming challenges with the new cooking system. To appeal to the convenience seekers, efforts should rather be focused on facilitating the fuel purchase and supply chain.
- If advanced gasifier cookstoves are to be scaled up in Kenya, the biomass pellet fuel supply infrastructure needs to be stabilized to reassure users. This could be achieved by introducing subsidies for biomass pellet fuels, either directly to consumers or upstream, to support research and development within the burgeoning fuel supply side.
- More coordinated efforts are needed to support households and communities as they transition to a new cooking system; such help needs to be available locally, including technical support and repairs and throughout the user journey. Cookstove users themselves could become involved in providing this local support.

This brief is based on the forthcoming publication: Lambe F, Ran Y, Kwamboka E, Holmlid S, Lycke K, Ringström S, Annebäck J, Ghosh E, O'Connor M and Bailis R. 2020. Opening the black pot: a service design-driven approach to understanding the use of cleaner cookstoves in peri-urban Kenya *Energy Res. Soc. Sci.* In review.