moving energy initiative

clean energy for refugees

Research Paper

Cooking in Displacement Settings

Engaging the Private Sector in Non-wood-based Fuel Supply

Laura Patel and Katie Gross (Energy 4 Impact)

January 2019

Contents

	Preface	3
	Executive Summary	4
1	Introduction	6
2	Cooking in a Displacement Setting	8
3	Designing a Non-wood Cooking Concession	14
4	Lessons Learnt from the MEI's Work	18
5	Conclusion and Recommendations	22
	Annex 1: Establishing Community-owned Ethanol Business Cooperatives	24
	Annex 2: Increasing Purchasing Power for Pellets	29
	Annex 3: Jump-starting LPG Markets for Integrated Communities	33
	Annex 4: Developing Refugee-oriented Markets for LPG	37
	Annex 5: Method of Calculating the Proposed Price Cap for the Non-wood Cooking Concession	42
	About the Authors	45
	Acknowledgments	46

About the Moving Energy Initiative

The Moving Energy Initiative (MEI) is working to achieve access to clean, affordable and reliable energy among displaced populations by:

- **Working with humanitarian agencies and donors** to change policies and practices based on evidence from practical projects;
- **Working with the private sector** to design and implement innovative market-based solutions;
- **Improving the evidence base** through original research and the demonstration of new approaches tried and tested in camps and host communities; and
- **Cooperating with host governments and national NGOs** to improve energy security among both local and refugee communities.

The MEI is a collaboration between Energy 4 Impact, Chatham House, Practical Action, the Norwegian Refugee Council (NRC) and the Office of the United Nations High Commissioner for Refugees (UNHCR), with funding from the UK Department for International Development (DFID).

Preface

The Moving Energy Initiative (MEI) is an international consortium seeking to sustainably increase access to energy for displaced people and to improve how energy is dealt with in humanitarian situations. It was formally inaugurated in 2015 as a partnership between Energy 4 Impact, Practical Action, the UN Refugee Agency (UNHCR), the Norwegian Refugee Council and Chatham House. Funding for this publication, and for the wider activities of the MEI, has come from the UK Department for International Development (DFID).

When the MEI published the report *Heat, Light and Power for Refugees* in 2015,[1] the consortium felt it had addressed a fundamental gap in analysis about energy needs in humanitarian settings. This was the first publication that attempted to establish the amount of energy used by forcibly displaced people around the world and the amount that they paid for it. Since then, much has been achieved. The consortium is actively enabling market-based energy provision, and improving energy access in refugee camps in Burkina Faso and Kenya, as well as in areas affected by large-scale migration in northern Jordan. This work – and the 'learning by doing' that is fundamental to this process – remains the central piece of the MEI.

One area that the MEI chose to consider was creating market opportunities for the sales and distribution of non-wood-based fuels in and around the Kakuma refugee camp (and nearby Kalobeyei settlement) in Kenya. This was done by presenting the private sector with the challenge of designing a non-wood cooking concession. Findings from this process are presented in this research paper, alongside a series of case studies that highlight examples of cooking interventions taking place in other displacement contexts. The aim of this paper is to inform practitioners, policymakers and private-sector companies interested in better serving this market with improved cooking solutions.

Other research resources and publications in this series are available online at www.movingenergy.earth.

[1] Lahn, G. and Grafham, O. (2015), *Heat, Light and Power for Refugees: Saving Lives, Reducing Costs,* Chatham House Report for the Moving Energy Initiative, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/publications/research/2015-11-17-heat-light-power-refugees-lahn-grafham-final.pdf (accessed 15 Oct. 2018).

Executive Summary

Providing adequate cooking fuel and clean-burning, fuel-efficient stoves in displacement settings has long been a major challenge for local authorities, humanitarian agencies, non-governmental organizations (NGOs), local communities and refugees themselves. Refugees generally have limited access to modern cooking solutions. Most either depend on insufficient humanitarian agency handouts of 'in-kind' firewood[2] or have to travel long distances to collect firewood (in the latter case, exposing themselves to the risk of attack and/or sparking conflict with host communities). In many displacement settings, such as in Tanzania and Bangladesh, a crisis point is being reached in which firewood from the local environment is no longer available and no alternatives exist. In many cases, host governments are recognizing the environmental damage and are now pushing for change, banning in-kind firewood distribution or requesting humanitarian agency support to transition refugees to alternative fuels. All these issues are present in the Kakuma refugee camp complex in Kenya,[3] which prompted the Moving Energy Initiative (MEI) to explore alternative solutions to meeting residents' cooking energy needs.

There is significant potential for private-sector engagement in this context – which, though largely overlooked to date, could result in win-win scenarios for all stakeholders. Refugee camps and other displacement settings present opportunities for private-sector cooking fuel companies to expand their customer bases, with the added advantage for vendors of offering concentrated demand and scope for economies of scale. Studies show that refugees are already engaging with existing suppliers, using what little income they have to purchase traditional cooking fuels (i.e. firewood and charcoal). On a global scale, however, private-sector investment in the supply of alternative fuels to these markets has been limited to date.

There are several reasons for this, including in most cases a large degree of uncertainty surrounding refugees' legal status and unclear government policies regarding their economic integration. For the Kakuma complex, the MEI decided to engage with the private sector directly. It asked firms to propose creative solutions for overcoming the obstacles to private investment in alternative fuels for refugee and host-community populations. This research paper records that process, and reviews lessons from the MEI's experience in Kenya. It also includes relevant examples from other countries, to provide insights and lessons for future private-sector engagement in refugee cooking energy markets.

The results of the MEI's 2016 survey of households in Kakuma I camp in Kenya[4] showed a gap between user demand and ability to pay for cleaner alternative fuels. Based on these results, the MEI set out to establish a concession system that would subsidize the provision of alternative fuels to the consumer, with prices capped at a level deemed affordable to a majority of households in the overall Kakuma complex. The MEI requested expressions of interest (EOIs) from local private-sector companies for expanding sales and distribution of fuels in the camp complex through the concession. One of the parameters was that the difference

[2] In-kind firewood refers to the distribution of firewood itself, as opposed to the distribution of cash for the purchase of firewood.
[3] Kakuma refugee camp consists of four sub-camps or zones (Kakuma I–IV). In the context of this paper, the term 'Kakuma complex' also includes the nearby Kalobeyei integrated settlement.
[4] Corbyn, D. and Vianello, M. (2018), *Prices, Products and Priorities: Meeting Refugees' Energy Needs in Burkina Faso and Kenya*, Research Paper for the Moving Energy Initiative, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/publications/research/2018-01-30-meeting-refugees-energy-needs-burkina-faso-kenya-mei-corbyn-vianello-final.pdf.

between the true cost of the fuel and the subsidized price to the consumer would be paid to the concession-holder upon proof of sales. Companies shortlisted during the EOI phase were invited to submit detailed proposals for the concession, with one of the design challenges being to integrate the concession into a sustainable business model.

The winning company – National Oil Corporation of Kenya (NOCK) – is to receive a prize of $50,000 for its proposed concession to supply liquefied petroleum gas (LPG) both to refugees in the Kakuma complex and to the surrounding host community. NOCK's proposal included income-generation opportunities and entrepreneurship training for women and youth inside and outside the complex, with participants offered roles in the distribution and exchange of LPG cylinders through local retail shops. In addition to the impact for income generation, NOCK anticipates that its proposed concession will result in improved health among LPG users and reduce forest degradation.

The MEI also conducted interviews with various stakeholders in other contexts and countries who are engaged in efforts to develop market-based approaches to providing clean, fuel-efficient cooking solutions to refugees. The findings were developed into a series of case studies that are presented in the annexes to this research paper. Lessons from the concession competition and the case studies are elaborated, including a comparison of subsidy-based and commercial approaches (or, perhaps more accurately, an analysis of how various initiatives have transitioned along the spectrum from fully subsidized to fully commercial). Also discussed are strategies for building on existing local market dynamics and incentivizing greater private-sector engagement, such as how donor support and government policies can influence private company appetite for, and success in, fuel markets in refugee camps.

Based on these lessons, the MEI recommends greater donor investment and longer-term guaranteed funding for cooking interventions. This is needed to allow sufficient time to build sustainable markets and secure the requisite engagement and investments from the private sector. This is especially worthwhile where refugee income is constrained (due to legal status or lack of income opportunities), and where alternative fuels are new to the market. Interventions should be done at scale, once sufficient data have been gathered on user preferences and ability or willingness to pay, rather than through pilot-only schemes. The interventions should also be integrated as much as possible with the host community and larger region, rather than set up as standalone markets for refugees. Larger, longer-term investments by the private sector – supported through partnerships with donors and humanitarian agencies – in infrastructure and demand creation (both in and outside the refugee community) can reduce the price of alternative solutions and support a gradual transition away from subsidies. The lessons and recommendations in this paper provide guidance for designing interventions in the future, and for scaling up existing activities to secure refugee access to modern cooking solutions that protect health and the environment.

1. Introduction

Providing adequate fuel for household and institutional use in displacement settings is a significant challenge for local authorities, humanitarian agencies, local communities and refugees. The Moving Energy Initiative (MEI) estimates that forcibly displaced families living in camps are burning 64,700 acres of forest (equivalent to 49,000 football pitches) each year.[5] In many displacement settings, a crisis point is being reached in which firewood from the local environment is no longer available and no alternatives exist. There are also significant health risks associated with household air pollution from cooking with solid-biomass fuels (e.g. wood and charcoal); in nearly all cases, these risks are not addressed by the introduction of fuel-efficient stoves. People living in and around refugee camps and settlements often have little income, and the remote nature of these settings limits access to more modern energy products and services. At the same time, people in these settings are engaging in markets and using what little income they have to purchase traditional fuels for cooking. The MEI survey in Kakuma I estimated that 17 per cent of refugees' median income is spent on cooking, amounting to $4.99 per month, or more than is spent on lighting and phone-charging combined. A study by the Technical University of Denmark (DTU) found that 53 per cent of refugees in Nyarugusu, Tanzania, were spending nearly half their monthly capped income ($12 out of $27 legally allowed employment income) on cooking fuel.[6]

Within this context, the MEI set out to investigate innovative models that could be used to scale up the distribution and consumption of non-wood cooking fuels, focusing in particular on the Kakuma complex in north-west Kenya. Research from the MEI's first phase noted the failure to create opportunities for business in displacement contexts, and that little was being done to take advantage of the local economies of scale and concentration of demand that camps can offer. Significant cost and operational efficiencies may be achievable only by optimizing at scale – this would create opportunities for ensuring the profitability of suppliers and retailers, and would in itself be an incentive for efficiencies. Such an approach would also facilitate the creation of platforms that could extend the reach of fuel supply services beyond refugees and surrounding host communities, thus supporting development of the general market.

Reflecting these factors, during the second phase of the programme the MEI proposed the idea of a non-wood cooking concession under which the price of a more modern cooking solution would be capped at an amount determined as affordable to a large percentage of the population in the Kakuma complex. A fuel supplier would be awarded the concession and would sell fuel at the capped price. The supplier would be paid the difference between the capped price and the true cost of the solution upon providing proof of sales. It would be up to the fuel supplier to invest upfront and set up sufficient and appropriate sales and distribution channels for the product. The MEI challenged private-sector operators to develop strategies for integrating such a concession into a sustainable business model.

---

[5] Lahn, G. and Grafham, O. (2015), *Heat, Light and Power for Refugees: Saving Lives, Reducing Costs,* Chatham House Report for the Moving Energy Initiative, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/publications/research/2015-11-17-heat-light-power-refugees-lahn-grafham-final.pdf (accessed 15 Oct. 2018).

[6] Rivoal, M. and Haselip, J. (2017), *The true cost of using traditional fuels in a humanitarian setting. Case study of the Nyarugusu refugee camp, Kigoma region, Tanzania*, UNEP DTU Working Paper Series 2017: 3, UNEP DTU Partnership, Technical University of Denmark, http://orbit.dtu.dk/files/145751864/LD_2017_TheTrueCostOfUsingTraditionalFuels_Rivoal_Haselip.pdf (accessed 15 Oct. 2018).

This paper presents the findings from that process, as well as background information on the cooking situation in Kakuma. It examines the challenges for refugees in accessing modern cooking solutions, and for those supporting or seeking to improve cooking practices among refugee populations and host communities. The paper is accompanied by a series of case studies that highlight examples of interventions taking place in other displacement contexts (see Annexes 1 to 4), to illustrate what can be learnt from such interventions and what additional support is needed to increase the uptake of alternatives to firewood and charcoal. This paper is based on work completed by the MEI in designing the non-wood cooking concession, as well as on interviews with a range of stakeholders in the sector. It aims to inform practitioners, policymakers and private-sector companies interested in better serving this market.

2. Cooking in a Displacement Setting

2.1 Differentiating features of a displacement setting

In displacement settings, people are often forced to settle in remote areas with limited infrastructure. When they arrive at camps for refugees and internally displaced people (IDP), most are dependent on fuel handouts from humanitarian agencies or on fuels that can be collected for free to cook their food and heat their homes. It has been well documented that fuel collection creates conflict with local communities and increases the exposure of those who collect the fuel, primarily women and children, to risks of attack or other dangers, as well as having potentially long-term negative impacts on the natural environment.

During its first phase, the MEI completed an assessment of the types of improved cooking systems available, experiences in their promotion, the unique features of the humanitarian setting, and potential approaches to designing a response package. The findings of this work are presented in the MEI 'toolkit' publication *A Review of Cooking Systems for Humanitarian Settings.*[7]

The toolkit notes that many of the challenges and opportunities that drive the cookstoves sector in stable developing markets are equally relevant in displacement situations. However, the displacement context presents a number of additional factors that differentiate it and add to existing challenges. These differences, as noted in that publication, are presented in Table 1.

Table 1: Factors differentiating cooking in displacement situations[8]

Difference	Implication	Possible approaches
Displaced people have limited access to finance because they often are not allowed to work, cannot find work or are paid less.	Limited spending power constrains purchase of better stoves and fuel (e.g. in South Sudan, refugees were selling firewood and charcoal for cash, but not buying efficient stoves because of cost).	• Investigate bulk stove purchase to cut costs, perhaps providing credit to incentivize distributors. • Explore carbon finance to reduce stove costs. • Distribute cash or vouchers for acquisition of goods in the open market.
Displaced people may be restricted from accessing local energy sources by host communities or government regulations.	Reliance on purchase of fuel or risky self-sourcing negatively affects fuel affordability and quality.	• Establish or strengthen community management structures that permit access to resources within a controlled framework (specific days, locations and harvesting methods).

[7] Vianello, M. (2016), *A Review of Cooking Systems for Humanitarian Settings,* Toolkit for the Moving Energy Initiative, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/publications/research/2016-05-19-mei-review-of-cooking-systems-vianello.pdf (accessed 15 Oct. 2018).
[8] Reused with permission from Vianello (2016), *A Review of Cooking Systems for Humanitarian Settings.*

Difference	Implication	Possible approaches
Displaced people may feel dependent on humanitarian agencies for meeting basic needs, a feeling perpetuated by handouts. Refugees have the potential to create diverse economic opportunities.[i]	Dependency means solutions are constrained by humanitarian budgets. This results in low prioritization of modern cooking methods.	• Encourage commercial activities by displaced people and interaction with the host country's economy. • Reassess cooking in the humanitarian context as an integrated package involving food and fuel, with budgets to match.
Encampment policies prevent displaced people from moving to procure materials and merchandise or sell their products, undermining commercial and productive activities.	Dependence on external support is increased and opportunities for self-reliance are reduced.	• Engage in high-level dialogue with host governments to highlight missed opportunities from encampment policies and movement controls.
Local people and host governments resent efforts that result in displaced people receiving better stoves and fuels than hosts.	Where local people use solid fuel in inefficient appliances, it may be insensitive and politically difficult to leapfrog to high-tech solutions for the displaced population.	• Develop integrated programmes supporting both displaced people and host communities. • Avoid high-tech solutions unless equally accessible to local people.
Relief agencies seem reluctant to develop market dynamics in their projects.[ii] Recognizing displaced people as a potential resource and market opportunity might indicate an unwelcome sense of permanence that governments do not wish to convey to citizens.	Without market dynamics, humanitarian operations will remain dependent indefinitely on donation and subsidy.	• Market-led solutions such as pay-as-you-go (PAYG), micro-enterprise and outsourcing labour from camps offer a stronger basis for energy sustainability.
Multiple agencies operate in displacement settings, particularly in the emergency phase, often outside mainstream government structures.	Complex mix of agencies, NGOs and donors makes coordination and consistency of approach challenging.	• Ensure early-stage coordination of humanitarian actors, ideally led within government, for consistency of approach and to avoid duplication. • Possibly designate a single agency to handle improved cooking.

Notes:
[i] Betts, A., Bloom, L., Kaplan, J. and Omata, N. (2014), *Refugee economies. Rethinking popular assumptions*, University of Oxford Humanitarian Innovation Project, June 2014, http://www.rsc.ox.ac.uk/files/publications/other/refugee-economies-2014.pdf (accessed 15 Oct. 2018).
[ii] Bellanca, R. (2014), *Sustainable Energy Provision Among Displaced Populations: Policy and Practice,* Research Paper, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/field/field_document/20141201EnergyDisplacedPopulationsPolicyPracticeBellanca.pdf (accessed 15 Oct. 2018).

2.2 Cooking in Kakuma

Several of the challenges noted above apply to Kakuma, in particular the constraints on refugee movement, dependence on overstretched humanitarian agency budgets, and lack of access to modern stoves and fuels. According to a survey of 231 households conducted by the MEI in the Kakuma I camp in 2016, roughly a quarter of residents cook on what are known as 'three-stone fires' (i.e. placing a pot on top of three stones over an open fire), while two-thirds cook on rudimentary wood or charcoal stoves. There is an established market for cookstoves, but most are basic wood and charcoal stoves that are polluting, hazardous to health and inefficient in their fuel consumption. A popular model of stove is the Mandeleo improved cookstove (ICS), which is produced inside the camp and distributed free to new arrivals. Around 77 per cent of households list wood as their primary cooking fuel, with the other 23 per cent primarily using charcoal. LPG and alternative fuel briquettes are available in the area but are used by a small percentage of households, and only as a secondary fuel, due to high prices and lack of availability. Fuel stacking[9] is common, depending on the type of meal being cooked and the cash available to refugees at a given moment. There is no grid connection to the camp complex or surrounding community – although a diesel-powered mini-grid is available in Kakuma town.[10]

Women are responsible for cooking, which consumes a substantial part of their day. Primary stoves are lit for an average of nine hours daily. More than half of the families cook indoors, usually in a separate building with insufficient ventilation. This causes eye and respiratory illness for women and children exposed to smoke. Three-fifths of respondents reported health issues due to cookstove smoke. The type of food cooked and cooking style vary throughout the complex according to ethnicity (the full Kakuma camp is home to residents from Burundi, the Democratic Republic of the Congo, Ethiopia, Somalia and South Sudan), but all households engage in both high-heat fast cooking and low-heat slow cooking.[11]

UNHCR provides 10 kg of firewood per person every two months for the entire Kakuma complex (approximately 185,000 people). For 2018, a budget of around $900,000 was allocated for this.[12] However, the allocation covered only a fraction of household cooking needs. The average household in Kakuma I camp spends $4.99 a month – equivalent to 17 per cent of the median monthly income of $29 – on cooking fuel to supplement the 10-kg-per-person ration received every two months from UNHCR. Those using charcoal as their primary cooking fuel spend an average of $9.78 monthly. The MEI estimates that the roughly 15,000 households in Kakuma I camp spend a combined $861,210 annually on procuring cooking fuel (in addition to the firewood provided to them by UNCHR). This sum excludes the implied value of any fuel collected (firewood collection is prohibited around the camp but still widely practised) or of food rations traded for cooking fuel. Since Kakuma is in a semi-arid region of Kenya, wood for fuel is scarce and cannot be easily obtained through collection. This requires women and girls, who are the primary fuel collectors, to travel long distances at risk of sexual and gender-based violence. Survey results show that women spend an average of four hours per week collecting firewood. Fuel collection causes tension with the host community. This is because the host community is also very poor, competes for scarce resources, and runs the local wood and charcoal markets. The

[9] Fuel stacking is the practice of using multiple fuels for cooking in parallel.
[10] Corbyn, D. and Vianello, M. (2018), *Prices, Products and Priorities: Meeting Refugees' Energy Needs in Burkina Faso and Kenya,* Moving Energy Initiative Research Paper, London: Royal Institute of International Affairs, https://www.chathamhouse.org/sites/default/files/publications/research/2018-01-30-meeting-refugees-energy-needs-burkina-faso-kenya-mei-corbyn-vianello-final.pdf (accessed 15 Oct. 2018).
[11] Ibid.
[12] Information provided by UNHCR's energy adviser. This equates to a price of approximately $81 per metric tonne of firewood or a spend of approximately $4.9 per person.

charcoal market inside Kakuma alone (all zones) has an estimated value of $2 million annually, representing a significant source of income for the host community.[13]

A number of cooking interventions have taken place in Kakuma over the years, each with its own set of primary objectives, motivations and challenges. Improved cooking has several different facets, and the nature of the intervention often depends on the objective of the programme. For example, if the primary objective is to improve health by reducing household air pollution, then only stoves and fuels – such as LPG and ethanol – that meet high standards for emissions are needed.[14] In Kakuma, however, such fuels and associated stoves are relatively expensive. The German development agency GIZ,[15] in partnership with UNHCR, piloted the use of ethanol stoves with 70 households in 2011, but the project never progressed past the pilot phase due to the high cost of the ethanol gel and difficulty in sustaining supply.[16] More recently Samsung Electronics, in partnership with Rural Development Solutions, has started efforts to distribute subsidized ethanol stoves within the Kakuma complex.[17]

If the primary objective is to reduce environmental degradation, then improved biomass stoves that reduce firewood or charcoal consumption can be used. In Kenya, GIZ managed a 20-year energy and environment programme that included the distribution of Mandeleo portable firewood stoves to 68 per cent of refugee households, made at production units within the camps.[18] However, these improved fuel-efficient technologies, while more affordable, do not meet World Health Organization (WHO) standards of truly 'clean' cooking that protects health. Some interventions aimed at protecting Kakuma's surrounding environment have also explored more sustainable sourcing of traditional fuels through the promotion of woodlots and sustainable charcoal production.[19] Other recent notable projects include those being undertaken by Sanivation turning treated human waste into fuel briquettes for use in cooking;[20] and support to fuel and stove supply chains under SNV's Market Based Energy Access project in Kakuma.[21] In addition, many cooking interventions are focused primarily on creating livelihood opportunities through the manufacturing, distribution and retail of stoves and fuels. It is challenging to address these various priorities through a single stove/fuel solution.

2.3 Willingness to pay and user preferences

No matter what the objectives, the success of any stove/fuel intervention hinges on its ability to meet users' specific cooking needs and preferences. The MEI survey of residents in Kakuma I included identification of user preferences and willingness to pay for various stove and fuel

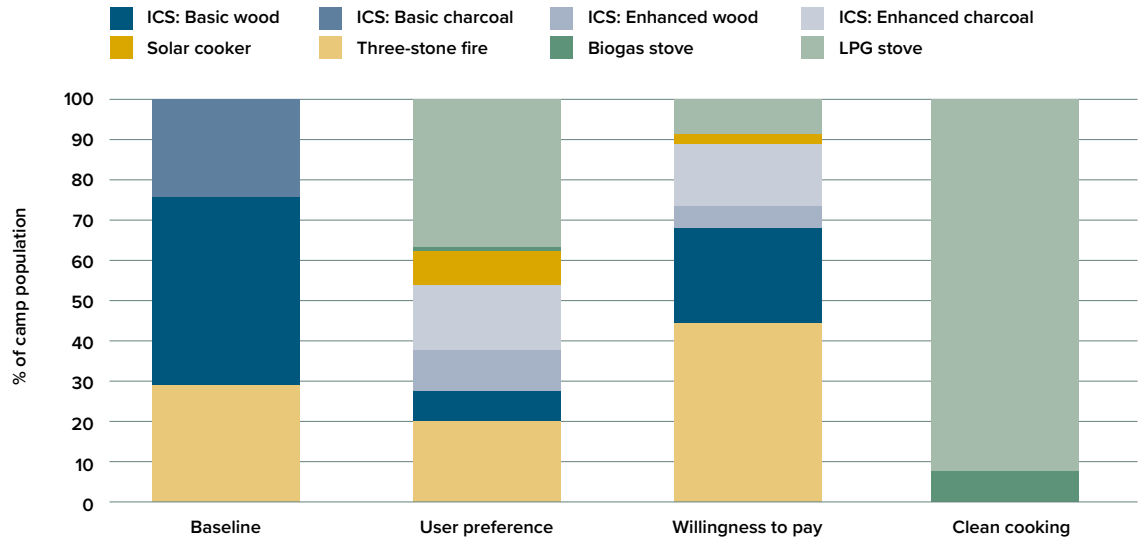
[13] Corbyn and Vianello (2018), *Prices, Products and Priorities.*
[14] Solar cooking creates zero emissions, but it has several limitations that have hindered uptake. These mainly relate to behaviour change and limitations over when cooking can be done. Solar Cookers International's first and largest refugee project reportedly served more than 15,000 families in the Kakuma complex. However, during the MEI survey, no respondents listed a solar cooker as their primary or secondary stove. See ENERGYCoP (2017), 'Solar Cooker Distribution' webpage, http://energycop.safefuelandenergy.org/web/energycop/projects/-/project/48859?_it_polimi_metid_energycop_projtech_web_portlet_ProjectPortlet_redirect=%2Fweb%2Fenergycop%2Fprojects%3Fzx%3Dxvi6rmxqngnj (accessed 15 Oct. 2018).
[15] Deutsche Gesellschaft für Internationale Zusammenarbeit.
[16] GIZ Partnership Programme (2011), *Piloting of ethanol stove in Kakuma refugee camp: Project report (August–November 2011).*
[17] For more details, see Samsung Newsroom (2018), 'Why Samsung Electronics Is Delivering Eco-Friendly Stoves to Kakuma Refugee Camp in Kenya', 1 February 2018, https://news.samsung.com/global/why-samsung-electronics-is-delivering-eco-friendly-stoves-to-kakuma-refugee-camp-in-kenya (accessed 9 Jan. 2019).
[18] Vianello (2016), *A Review of Cooking Systems for Humanitarian Settings.*
[19] The Food and Agriculture Organization (FAO) has promoted the uptake of sustainable charcoal in Kakuma. For more details, see FAO (2016), *Building Economic Ties between Refugees and Kenyan Host Communities,* http://www.fao.org/3/a-bt455e.pdf (accessed 15 Oct. 2018).
[20] Sanivation (2013), 'Kakuma Refugee Camp Project', 11 June 2013, http://sanivation.com/blog/2013/06/kakuma-refugee-camp-project/.
[21] For more details, see SNV (undated), 'Market Based Energy Access (MBEA) project - Kakuma Turkana County', http://www.snv.org/project/market-based-energy-access-mbea-project-kakuma-turkana-county (accessed 14 Jan. 2019).

options. The options were as follows: basic wood improved cookstove (ICS); basic charcoal ICS; enhanced wood ICS; enhanced charcoal ICS; solar cooker; three-stone fire; biogas stove; and LPG stove. More than a third of respondents ranked LPG stove as their preferred option, with roughly another third preferring some form of ICS (basic/enhanced wood or enhanced charcoal). About one-fifth of households preferred a three-stone fire to all other options.

Only 55 per cent of respondents expressed a willingness to pay for at least a $5 basic stove – lower than the 75 per cent of residents currently using a basic ICS. The producers of the survey note this could be a case of 'dependency syndrome' – an unwillingness to pay for something that respondents believe should be provided for free – but may also show that stove distribution encouraged an additional 20 per cent of families to use a basic ICS when they would not otherwise have done so. A quarter of the families that stated a preference for LPG were willing to pay the full $2.10 per day (a levelized cost that combines the purchase price of the stove, cylinder and recurring refills), representing around 1,400 households. One-fifth of respondents showed a willingness to pay for enhanced wood or charcoal stoves. Some 45 per cent of respondents expressed a willingness to pay only for a three-stone fire; this was the default response for those unwilling to pay for any ICS or other alternative stove/fuel combination.

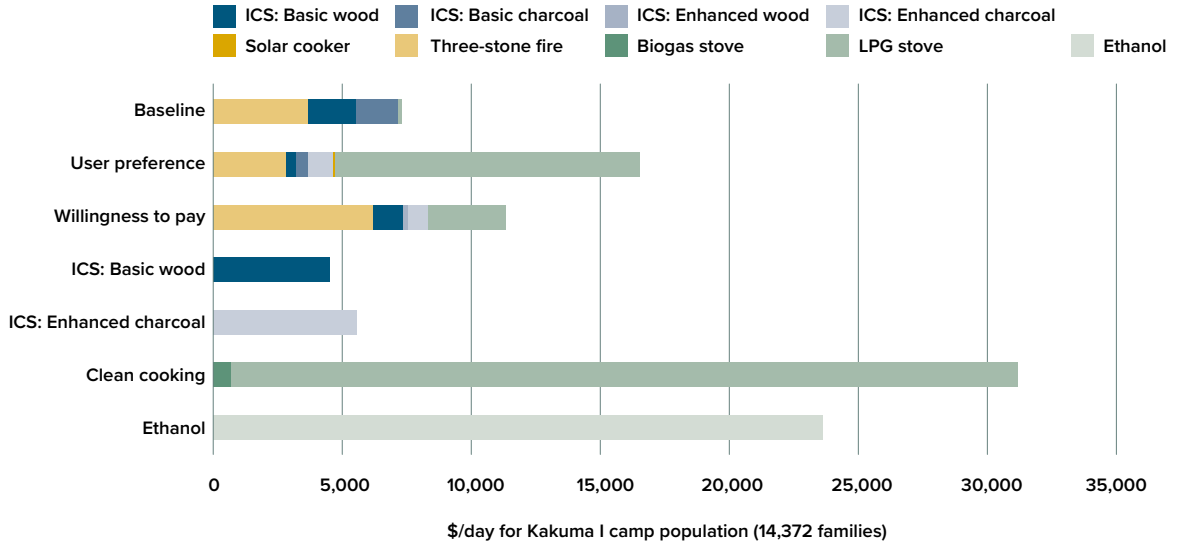
The total expressed willingness to pay for cookstoves and fuels, when applied across all camp residents in Kakuma I, represents a levelized cost[22] (daily equivalent cost, including capital and operating costs) of $5,500 per day. This is significantly higher (by nearly $2,000 per day) than in the baseline scenario. Meeting user-stated preferences for all Kakuma I residents would cost $16,500 per day. Of the stove options presented, only LPG and biogas meet global health standards for truly 'clean' cooking. Universal adoption of these clean options would cost $31,000 per day. Ethanol, which also achieves clean cooking but was not included in the survey due to lack of availability, would cost $24,000 per day.[23] The data outlined above are summarized in Figures 1 and 2.

Figure 1: Cooking energy scenarios for Kakuma I – stove and fuel preferences[24]



[22] Levelized cost for cooking consists of fuel use ($/day) plus stove cost ($), divided by stove life (days).
[23] Note that the costs include a proxy for heating energy needed per day per family, plus the annualized cost of the stove, and provide an indicative figure for comparing different fuels.
[24] ICS refers to the term 'improved cookstove'.

Figure 2: Daily levelized cost of cooking energy scenarios in Kakuma I



The survey results show that while camp residents are willing to pay a certain amount for improved cooking technologies, a gap still remains between what they are willing to pay, what they would prefer to use and what would be clean. For these reasons, it was determined that some form of smart subsidy or incentive would be needed to encourage the use of cleaner, alternative stoves/fuels. Additional investment is required to meet the demand for cleaner, more efficient cooking options.[25]

2.4 Case studies of cooking interventions

A number of interventions and organizations are trying to engage the private sector and look at non-wood alternatives for cooking in humanitarian settings. The case studies presented in Annexes 1 to 4 of this paper highlight examples of current efforts to better engage private-sector actors and integrate more market-based approaches. The countries covered are Ethiopia, Rwanda, Niger, Tanzania and Bangladesh. Information for these case studies was sourced in August and September of 2018 and was current as of that period. The case studies are also referred to in the 'lessons learnt' and recommendations chapters of this paper.

[25] A full presentation of the results from the MEI's survey in Kakuma I can be found in Corbyn and Vianello (2018), *Prices, Products and Priorities.*

3. Designing a Non-wood Cooking Concession

3.1 Background to the non-wood cooking prize

The goal of the non-wood cooking concession was to take advantage of the market scale available in a camp – given the high population density – to design a viable market solution for deployment of a non-wood-based cooking alternative at the household level. The MEI proposed a fuel concession that would subsidize the price of a cooking solution, bringing the price in line with what camp residents already paid while incentivizing the private sector to view the camp setting as a viable market (thus reducing barriers to market entry). The proposed concession would cap the retail price of fuel for local residents at a price established as affordable to a large segment of the market. A private-sector supplier would then sell and distribute stoves and set up a fuel sales operation in the area. It would sell fuel at the capped price, with the cost of the subsidy recovered from the concession mechanism on proof of sales. A results-based framework would be established detailing the subsidy required per unit, as well as an expectation for total units of sales. Ideally, this would allow the private sector to establish a local market for the fuel, so that the subsidy could be phased out in time. It was anticipated that the concession should run for at least three years to allow for a sustainable market to develop.

The aim of the non-wood cooking prize was to present this challenge to private-sector firms, which have the necessary experience and expertise in establishing supply chains and venturing into new markets, to see what solutions they could design. Ideally, private-sector fuel providers should see these markets as a business opportunity in which they could potentially invest and share the risk of the venture, with support from a concession and partners on the ground. By designing such a concession, the MEI aimed to demonstrate the options for alternative cooking solutions – with a view to stimulating private-sector engagement and market-building activities.

3.1.1 How the concession evolved

The initial plan under the MEI was not only to design a viable concession but also to award the concession to a company through a competitive process, with the value of the award totalling approximately £300,000. The MEI requested expressions of interest (EOIs) in May 2017 from private-sector fuel companies for the supply and retail of cooking fuel to customers in and around the Kakuma complex.

Information collected from the EOIs would help the MEI to further structure the concession, and to determine any additional support required from the MEI or other partners on the ground. If it was feasible to design a viable concession, companies shortlisted during the EOI phase would be invited to proceed to a full proposal or tendering stage. Nineteen organizations responded to the EOI request, and 15 companies were shortlisted against defined criteria to participate in further rounds.

Following these initial activities, discussions were held on how best to run the concession proposal process. During these discussions it became apparent that, due to the current end

date of the MEI's second phase (November 2018) and the longer period of time required to run a successful fuel concession, the MEI would not be able to fund a long-term concession from its current phase. As a result, the MEI had to change the design of the workstream and create a prize-based competition, wherein shortlisted companies would be tasked with developing the best design for a non-wood fuel concession. Instead of the £300,000 tender, a single prize of $50,000 was made available for the winning organization.

The competition was open to the 15 companies shortlisted from the EOI stage, and seven of these submitted applications for the prize. An internal MEI panel reviewed the seven applications and created a shortlist of three. These three applicants were offered a further round of technical assistance before the final proposal for each was submitted to an external panel of independent experts who jointly decided the winner. This panel judged National Oil Corporation of Kenya (NOCK) as the prizewinner with the best concession design.

3.2 The concession proposed

Applicants were provided with guidelines for designing their proposed concession, which included a request for details about the delivery, business model, sustainability and impact of their design. Table 2 summarizes the concession design guidelines.

Table 2: Summary of the concession proposed

The proposed concession will be disbursed using a payment-by-results methodology.
A price cap of KES 19 per day per household must be applied – the cap represents the maximum price that a household can be expected to pay for the solution, and will be used to calculate the product's subsidized price. The concessionaire should calculate the cost of the solution based on providing the household with 9.05 MJ/day.
Subsidy payments will be made on the difference between the full price of the product and the product's subsidized price per household or per unit sold.
The total value of the concession is £300,000. Applicants should use this as a guide in their budgets and show what sales volumes could be achieved within this amount.
The concession should be designed so that the subsidy can be phased out over time (around three years) to allow for a sustainable market to be established once the concession is used up.

The KES 19 ($0.19)[26] price cap for the concession represents the weighted average household cost of cooking energy, as calculated from data from the MEI household survey and the levelized cost of energy (LCOE) within the context of the refugee camp. Further details on how this cap was calculated can be found in Annex 5. This price cap was calculated to provide a benchmark against which to compare the subsidy required by different stove and fuel combinations. Of course, within the camp complex itself different market segments exist,

[26] At an exchange rate of KES 1=$0.00982488 on 21 December 2018, data from www.xe.com.

and the amount of energy that people require for cooking will vary, as will the amount they can afford to pay. The aim of the price cap was for the cooking solution to reach the greatest number of users, while also supporting a market-based approach that entailed users contributing towards the cost of the solution. This approach will have limitations, and there may exist alternative ways of calculating a benchmark for the purposes of such a concession that merit further exploration.

3.3 Summary of the winning concession

The prize was awarded to National Oil Corporation of Kenya (NOCK), which has been serving the Kenyan market with LPG for cooking since 2008. NOCK proposed a concession that would bring LPG to refugees in the Kakuma complex, and also serve the surrounding host community. The proposal envisaged income-generation opportunities and entrepreneurship training for women and youth, from both inside and outside the complex, who would participate in the distribution and exchange of LPG cylinders through local retail shops. NOCK's winning concession also proposed integrating existing firewood sellers by enabling them to become LPG retailers, thus mitigating potential conflict due to loss of income from the displacement of firewood use. The proposal also envisaged the inclusion of local leaders in planning and implementation, and the launch of a marketing campaign to develop the LPG market through branding and promotional activities. In addition to the income-generation impacts, it was anticipated that bringing LPG to the Kakuma complex would improve health among LPG users and reduce forest degradation. The concession would run for 24 months, by the end of which 5,400 households would be converted to LPG.

NOCK's proposed plan for establishing LPG distribution in Kakuma and Kalobeyei included establishing a storage facility on site; this would be managed by NOCK's local distribution partner, which already has a presence in the complex. NOCK would also set up 50 to 60 local retail shops (operated by a mix of refugees and members of the host community), which would maintain a continuous stock of at least 15 to 20 cylinders that customers could exchange for their empty cylinders. Cylinders would be refilled in the city of Eldoret, approximately 500 km away. The local distribution partner would manage the initial distribution of LPG kits, which would include a grill, burner and associated accessories, along with an initial 6-kg cylinder of LPG. The partner would also help to identify and register beneficiaries of the concession. Beneficiaries would be assigned unique ID numbers, and all hardware would have serial numbers.

The proposed pricing scheme included an initial payment of KES 5,225 (approximately $52) for the LPG kit, with refills priced at KES 1,425 each (for 6 kg of LPG). Using the MEI estimates of an average of 9.05 MJ of energy required for cooking each day, and a conversion rate of 1 MJ to 0.02 kg of LPG, NOCK anticipated the average household would require one 6-kg cylinder per month. That would require a subsidy of KES 855 per month per household, with households paying KES 570 per month (KES 19 per day for 30 days). The distribution partner would collect stock and sales data from the retail locations daily, and invoice monthly for subsidy repayment based on verified sales. Usage monitoring would be conducted through regular refill monitoring as well as quarterly user surveys and random data accuracy checks. The local distributor and retailer would each make a margin of KES 18 per kilogramme of LPG sold.

Recognizing that the upfront purchase price of the LPG kit was a barrier to product take-up, NOCK also proposed setting up a revolving fund of KES 5 million ($50,000) for households to finance purchase of the kits over a three-month period, with a 25 per cent down-payment. This revolving fund could support the purchase of LPG kits by 1,200 households in the first three months, and by an additional 200 households per month for a further 21-month period, in order to reach the target of 5,400 households. Assuming an average household size of six members, this would translate into 32,400 refugees displacing firewood with clean, fast, affordable and reliable cooking energy, improving health and preserving local forests. Additional households outside the subsidy programme, including from the wider host community, would also have greater access to LPG through this programme. NOCK intends to use the $50,000 prize money to set up the revolving fund proposed in its concession design.

4. Lessons Learnt from the MEI's Work

This chapter summarizes some of the lessons that emerged during the work to design the non-wood cooking concession. Several of the lessons are echoed by the additional case studies. An important point to note upfront is that refugee markets are very context-specific. What works in one displacement setting may not work in another. This can reflect a range of factors: differences in the cost-competitiveness of alternative fuels relative to traditional fuels; refugees' legal status; cooking styles and needs; the security situation; the existence of functioning remittance systems and camp markets; and the requirements of crisis situations versus those of protracted refugee situations.

4.1 Subsidies vs commercial approaches

Subsidizing a product in the short to medium term can make the product more accessible and support market creation. However, it presents challenges in terms of how and when to phase out the subsidy and transition to a purely commercial market. Several of the concession designs struggled to adequately address this issue. Some, for example, proposed moving production of the fuel and stove within the locality of Kakuma (e.g. for briquettes or pellets). The rationale behind this was that once the concession established a market for the product, it could prove the case for local production, which could lower the price of the cooking solution and allow the subsidy to be phased out. However, in a setting such as Kakuma (and likely in other displacement settings), sourcing raw materials locally for production of the stove and the fuel could make this challenging.

In certain cases, an initial short-term subsidy covering upfront costs that are a barrier to fuel switching may allow a large enough market to be built, and economies of scale to be created, to reduce the price of the alternative fuel – bringing it in line with or making it cheaper than traditional fuels. In the case of Niger (see Annex 3), LPG was initially cheaper than firewood, and the scaled, subsidized extension of LPG use to new UNHCR beneficiaries lowered the price further. This made it easier for displaced and other vulnerable households to sustain LPG use in the long term, and also persuaded between 4,000 and 5,000 new non-beneficiary households to adopt LPG. This type of short-term, market-creation subsidy can also attract private-sector partners, as it guarantees a large enough customer base to encourage investment in additional infrastructure. The plan for subsidy phase-out remains an unknown in the case of NOCK's concession design, and it is likely that some form of donor-supported subsidy may need to be continued for a period of time, as in other displacement settings such as Bangladesh. One approach is to phase out subsidies based on household vulnerability status. Throughout all the case studies a consistent message came through that, for the most vulnerable displaced households, some form of donor support or subsidy will likely always be required.

In many humanitarian settings, including Kakuma, the cost of cooking is already being subsidized through the distribution of firewood; many humanitarian agencies are looking at applying these

funds to subsidies for alternative, cleaner fuels.[27] This is being done primarily through vouchers or cash transfers. Instead of being given the fuel/stove for free, refugees are given cash or a voucher to cover all or part of the purchase cost of a cleaner alternative in the market. Such cash transfers allow refugees to choose the fuel/stove they use, and increase refugees' sense of ownership over the solution. However, where there is evidence of an existing fuel market and willingness to pay for alternative fuels, such subsidies should take these factors into consideration when determining the levels of funds provided – as indeed the MEI concession tries to do. Likewise, in Tanzania (see Annex 4), the UNEP DTU Partnership's business plan for scaled-up LPG access for refugees in the Kigoma region calls for a partial voucher subsidy – accounting for no more than 50 per cent of the cost – on cylinder deposits and refills to encourage uptake and expand access, with considerations made for vulnerability status. Further consideration should also be given to the precise point in the transaction chain at which the subsidy applies, to avoid disrupting existing or future markets for the same fuel outside a given camp. While the MEI concession proposed lowering the commercial price for fuel, in several of the case studies the subsidy was provided directly to the customer. In places where commercial prices are charged, and the customer receives the subsidy, it is important to also consider vulnerable host-community households so that potential conflict can be avoided and the local market further stimulated.

In many cases subsidies or grants are needed to de-risk private-sector investment, price the product at an affordable level, and reduce additional costs (e.g. logistics or security costs) associated with displacement settings. However, as highlighted in the Ethiopia case study (see Annex 1), reliance on long-term subsidy and grant funding leaves programmes vulnerable to changes in the funding landscape. In the Rwanda case study (see Annex 2), where the pilot phase charged commercial rates for biomass pellets without subsidy, it was found that refugee fuel purchases were highly sensitive to changes in World Food Programme (WFP) cash transfers for food. Switching from donor-driven to commercial approaches brings its own challenges. One example is that the private sector does not get the same tax exemptions as UN organizations such as UNHCR, making fuel more expensive when switching from donor-driven to commercial approaches.

The Niger case (see Annex 3) is the only intervention identified that has been able to transition from an initial subsidy period to a fully commercial approach. Reasons for this success include the fact that the programme took an integrated approach targeting all vulnerable households in the region (a mix of refugees, IDPs and local community members) rather than carving out subsidies only for refugee or IDP populations, and that it allowed LPG sales to be more integrated in the local economy. It also used the subsidy to remove barrier-to-access costs and clearly communicated to beneficiaries what the subsidy would cover, when it would end, and how switching to gas would save them money. The success of the programme was also helped by local factors, including the ability of refugees to work and move freely and the high cost of traditional fuels (firewood), which made LPG the most affordable option.

The challenges with subsidies highlight the need for long-term support for any cooking initiative – especially in places where refugees have limited legal rights to work or access

[27] In some cases, local governments are seeking to drive change by calling for a ban on firewood distribution due to its environmental impacts. For example, the Ministry of Disaster Management and Refugees in Rwanda made a recommendation to ban firewood in 2017, prompting UNHCR to trial alternative fuels such as LPG. See Sibomana, E. (2017), 'MIDIMAR, UNHCR launch the use of gas to replace firewood for cooking in transit camps receiving Rwandan returnees', UNHCR Rwanda, 5 October 2017, www.unhcr.org/rw/12503-midimar-unhcr-launch-use-gas-replace-firewood-cooking-transit-camps-receiving-rwandan-returnees.html (accessed 15 Oct. 2018).

finance, where households are most vulnerable, and where the alternative fuel is new to the market – to allow sufficient time for a gradual transition to fully commercial models. It is also important to guarantee some longevity in the support offered to private-sector actors when they are being encouraged to invest their own resources in infrastructure (such as filling stations, local production facilities etc.).

4.2 Understanding and building on local market dynamics

There are opportunities to leverage existing displacement-setting markets, as was highlighted by several proposals for the concession in Kakuma. Fuel and stove distribution can be handled through new or existing retail outlets and sales agents. Several proposals also highlighted the need to include people who trade in fuel; fuel trading is an important source of income, particularly for the host community, and any disruption of such business may face resistance. A similar point was highlighted in the Niger case study, which showed UNHCR working with local officials to identify last-mile firewood sellers and providing the latter with in-kind resources or cash to convert to LPG sales or delivery. Better solutions in the camps have the ability to drive development in the wider community and local markets, thereby helping to make new technologies and products available.

Several proposals highlighted the need to partner with organizations already operating in displacement settings, using them as potential distribution partners. Displacement settings, particularly camps, have unique dynamics that differ from traditional markets due to the high presence of aid agencies and specific regulations in respect of refugees' rights. Camp settings are also more regulated. Operating within them requires obtaining permission from multiple sources (UNHCR, government, etc.), which can be challenging and time-consuming for private-sector firms. This is where partnerships come in, as organizations already operating in displacement settings can provide private-sector firms with support in navigating camp systems and establishing a commercial foothold, particularly in areas such as community engagement, selection of beneficiaries/retailers and logistics. However, conflicts may arise as a result of differences in objectives and working style between one party and the other (the private sector typically emphasizes commercial objectives, whereas for humanitarian organizations protection is the priority). The private sector could benefit from partnering with local organizations that can take a similar commercial view (potentially earning a profit from their role) while promoting the concept of 'do no harm'. Support may be required (by the MEI or others) in forming these relationships.

Since alternatives to firewood and charcoal are relatively new in displacement settings, and data on willingness to pay are limited, it is likely that any intervention would need some period of market verification and dedicated funds for market creation and awareness-raising. Several of the financial plans for the concession were based heavily on assumptions that were untested, particularly in respect of demand-side factors. This is not to suggest that standalone pilot schemes should be encouraged, but it emphasizes the imperative of ensuring that scale-up of an intervention can quickly take place following market verification. Market verification may also be necessary before the private sector is willing to make significant investments of its own. In Tanzania (see Annex 4), a willingness-to-pay study provided assurances to relevant stakeholders that LPG use could be scaled up.

4.3 Appetite of the private sector

In Kenya, for companies selling fuel such as ethanol or biomass pellets, the challenge is that the products are still relatively new to the market. The companies are working to establish feedstock supply chains and last-mile distribution routes. As such, some of these companies do not view Kakuma as 'low-hanging fruit' and would rather concentrate their efforts on Nairobi or other urban centres where the price of charcoal is much higher and the market less remote. That said, some of these companies see Kakuma as potentially easier to penetrate due to its market density and the current lack of alternatives to firewood.

In addition, a lot of companies offering alternative fuels (such as briquettes and ethanol) are small, early-stage firms, not operating at scale or making profits. Such companies may be interested in the opportunity presented by new markets but lack their own funds to invest; they would need financial and operational support to scale up their business in displacement settings. LPG companies are sometimes in a better position because they are often already profitable and have extensive distribution channels, allowing them to take more risks. The financial challenges were reflected in the concession designs received, with many companies viewing the concession more as a grant than as an opportunity requiring significant upfront investment of their own. More upfront donor investment in alternative (particularly non-LPG) fuels could help private-sector entrants to reach a scale at which they are able to take on the market risks associated with displacement settings.

As reflected in several of the case studies, and in the MEI's experience in Kakuma and elsewhere, interventions will be more likely to incentivize the private sector to invest in displacement settings in the following scenarios:

- Where camps are more established and there is some kind of formal or informal market activity already, or where remittances are high. Alternatively (as in the case of Niger), where refugees are not obliged to stay in camps and can earn income, own land and so on.
- Where fuel sold by private-sector companies is cost-competitive with traditional fuels (wood and charcoal), or where the price can be brought down to a competitive range due to higher sales volumes.
- Where donors can finance some of the longer-term, larger infrastructure requirements. (For example, in Bangladesh, UNHCR is paying for storage depots, with the financing repaid at 10 per cent per year over five years as orders come in.)
- Where favourable government policies are in place and there is acknowledgment of protracted situations (allowing for long-term planning).
- Where markets in the host community and wider region can also be supported. This can provide assurances that, even if refugees go home, infrastructure will remain and a long-term commercial market will exist for host communities.

In the MEI's concession design process, the shift from a concession offering the potential for full implementation over three years to the award of a one-time prize drew less interest from private-sector companies. The number of companies that applied for the prize was significantly lower than the number that responded to the original EOI request. This again highlights the fact that the private sector needs certainty and long-term commitments to justify its investment in such initiatives.

5. Conclusion and Recommendations

In displacement settings, providing cooking solutions that reduce negative impacts on the environment and health remains a challenge for local governments, humanitarian agencies, businesses and refugees. Research by the MEI indicates that people are spending money on fuel, and that vibrant markets exist for firewood and charcoal in Kakuma. While people aspire to use alternative fuels such as LPG, the majority are not willing to pay the full price for it, and a significant funding gap remains an impediment to adoption. Long-term dependence on constrained humanitarian agency budgets is a major challenge in displacement contexts. Typically, humanitarian agencies have focused on the distribution of more efficient stoves rather than committing to purchasing cleaner fuel over the long term, or to funding more comprehensive and integrated stove/fuel solutions that would lock them into long-term funding arrangements.

Creative sources of financing are required to bridge this gap. One such mechanism explored by the MEI is a non-wood cooking concession. A review of other case studies of cooking interventions in humanitarian settings also shows that the majority rely on some form of subsidy – either in the form of a reduction in the price payable by beneficiaries for the fuel and/or hardware, or in the form of a cash transfer to increase the purchasing power of end-users. In addition to funding of the actual products, large-scale fuel switching also requires funds for market creation, awareness-raising and stimulation of changes in consumer behaviour around fuel purchases.

Legal status remains one of the most significant factors preventing refugees from accessing cleaner and more modern forms of cooking energy. Among the problems this presents are prohibitions on working, difficulties in setting up businesses, a lack of access to microfinance, and restrictions on movement. Without an earned income (whether outside the camp or at capped monthly limits), the ability of refugees to pay for cleaner, more modern stoves and fuels in a commercial market is significantly decreased. In some situations, where crises are viewed as temporary and people are not even given official refugee status (such as in Bangladesh), the problem of lack of legal recognition discourages investment and long-term planning by both refugees and the supporting agencies.

Governments have an important role to play in creating a supportive enabling environment for the proliferation of clean, alternative fuels in displacement settings. In addition to creating favourable policies around refugees' legal status, movement and other controls, they can apply pressure and provide evidence to humanitarian agencies and donors of the environmental degradation caused by not fully and consciously addressing refugees' cooking energy needs. The way that governments apply value-added tax (VAT) to alternative fuels also has an impact on such fuels' affordability and potential for commercialization.

Even if major challenges to commercial activities are resolved, some form of donor support will always be needed for the most vulnerable households. Even in Niger, where refugees face fewer restrictions and the price of LPG was brought down and kits distributed free to vulnerable families, 30 per cent of families dropped out of the scheme after the subsidy ended because of limited funds to buy fuel. Cost–benefit analysis and evidence of impacts can support efforts to obtain additional donor funds in these cases. In Tanzania, for example, a social cost–benefit

analysis found that switching to LPG provided a benefit–cost ratio of 1.76. If LPG were to be consumed by all households in the Nyarugusu camp, this would lead to $45 million in net benefits after 10 years (assuming a 3 per cent discount rate). In Rwanda, a social impact assessment by the International Center for Research on Women (ICRW) found positive self-reported health benefits and time savings associated with fuel switching. This attracted additional donor funding to support scale-up of the programme.

The following recommendations are based on what the MEI has learnt from the non-wood cooking concession competition and other interventions in the sector:

- Further investments in cooking interventions in displacement settings need to be made – such as those proposed under the MEI concession – so that additional data can be collected on the ability of refugees to pay for cooking solutions and fuel, and to understand lessons learnt from the implementation process. However, interventions should take a long-term view and aim to create scale rather than focus on pilot stages.
- Cooking interventions should incorporate user preferences and, where possible, build on refugees' and local communities' capacity and willingness to pay so that potential consumers are not completely reliant on donor funding and subsidies. This will help facilitate transition to fully commercial approaches where possible, although exceptions will exist for the most vulnerable households and in emergency response settings.
- In places where refugee income is constrained and alternative fuels are new to the market, cooking interventions need longer-term secured funding to allow sufficient time for sustainable market-building and the necessary engagement and investments by the private sector. Longer-term investments in infrastructure and demand creation (both within and outside the refugee community) can lower the price of alternative solutions and support a gradual transition away from subsidies, hence improving the sustainability of any intervention.
- Cooking interventions should build on existing local markets and integrate existing supply chains into their distribution arrangements where possible. Taking a holistic view of the integration of interventions into the local economy (rather than focusing on refugees only) can also increase the sustainability of a given intervention.

Due to a change in programme design, the MEI was not able to fund the full cooking concession proposed by NOCK, although it awarded a smaller prize to be put towards implementation. However, the lessons learnt from this exercise and from the work of others in the sector can be used to inform the design of interventions in the future, support the scaling up of existing activities and increase funding to this critical area in humanitarian response.

Annex 1: Establishing Community-owned Ethanol Business Cooperatives

Gaia Association's quest to transfer 13 years of ethanol supply chain knowledge to refugee-run social enterprises

For the past 13 years, Gaia Association, a local Ethiopian NGO with support from the US-based Project Gaia and funding from UNHCR, has fine-tuned and scaled up its ethanol distribution programme in three refugee camps in Jijiga. It has supplied more than 8,000 households (100 per cent of residents) with clean-burning ethanol stoves and sustainably sourced fuel to meet their cooking energy needs.[28]

Through a donor-driven model, UNHCR covered the full cost of in-kind provision of all stoves and fuel for these families up until March 2018. This equates to more than 4 million family cooking days, which translates into time savings during cooking and fuel collection/procurement, reductions in wood fuel use, reduced tensions with the host community, and cleaner indoor and ambient air. Gaia Association has also provided income-generating opportunities in these camps, employing 46 refugees as incentive workers (full employment is not legal for refugees in Ethiopia). When asked about their successes, Gaia Association officials Wubshet Tadele Tsehayu and Desalegn Getaneh were quick to point out the high acceptance rates among refugee households, showing ethanol's ability to meet the cooking needs of the primarily Somali refugee population in Jijiga. User acceptance has been documented in surveys and evidenced through consistent use of the stoves over 13 years of implementation in the Jijiga camps.[29] In 2014, Gaia Association also began operations in Assosa, serving Sudanese refugees with ethanol stoves and fuel, later adding carbonized beehive briquettes used in larger, locally produced stoves that satisfy the additional needs of Sudanese cooking styles. To date, operations in Assosa have been at a pilot level (around 300 households).

Gaia Association has been managing a full-service ethanol supply chain and distribution system in the camps. This includes facilitating the purchase, loading, transportation, unloading, storage and distribution of fuel, as well as teaching safety awareness and distributing and maintaining stoves. Now, with grant funding from Grand Challenges Canada, the Clean Cooking Alliance (formerly Global Alliance for Clean Cookstoves) and UNHCR, Gaia Association is moving to a more commercial model, transferring its skills and knowledge to three local business cooperatives owned and managed by a mix of refugees and host-community members.

[28] Ethanol for cooking in Ethiopia is 100 per cent sourced from sugar factories' waste molasses, a byproduct of sugar production.
[29] For a review of the existing literature on Gaia Association's interventions in humanitarian settings, see Benka-Coker, M. L., Tadele, W., Milano, A., Getaneh, D. and Stokes, H. (2018), 'A case study of the ethanol CleanCook stove intervention and potential scale-up in Ethiopia', *Energy Sustain Dev*, 46 (Oct 2018): pp. 53–64, https://doi.org/10.1016/j.esd.2018.06.009 (accessed 15 Oct. 2018).

Laying the groundwork

Roughly two years ago, UNHCR, which has been procuring stoves and fuel from Gaia Association for the past 13 years, began discussing a new strategy for shifting from in-kind provision of goods to the distribution of vouchers (equivalent in value to what was previously spent) to refugees to purchase fuel and non-food items. This was based on a successful WFP cash-for-food system already in place, and was intended to stimulate the local camp economy and provide refugees with a greater choice of goods and services. The fuel vouchers are expected to cover most, but not all, of each refugee family's cooking energy needs.

> **We are very ready to transfer our knowledge to locally owned businesses … and work side by side with them to take on that knowledge and run the business successfully. We are convinced that there is enough money in the fuel sales for these businesses to be profitable.**
> Harry Stokes, Project Gaia

This change in UNHCR strategy inspired Gaia Association to shift its approach from a donor-driven model to a market-based one. It resulted in the creation of refugee and host-community cooperatives in three camps – one in Jijiga (Kebribeyah) and two in Assosa (Sherkole and Tsore). Each cooperative has 20 members, with priority membership afforded to individuals already involved in the fuel sector, primarily in firewood or charcoal sales. In Kebribeyah, where commercial stove sales will focus primarily on the host community (with fuel sales also to refugees), 70 per cent of members of the cooperative come from the host community and 30 per cent are refugees. In Assosa, where most refugees have not yet received ethanol stoves, the businesses will focus their efforts more inside the camps. The composition of the cooperatives there is reversed, with refugees comprising 70 per cent of members and the host community 30 per cent. In Assosa, vouchers for refugee households will increase recipients' ability to pay market rates for both stoves and fuel, with the exact level of voucher subsidy still being determined by UNHCR. Host-community members will pay commercial rates, with no subsidy planned. Throughout its 13 years of operation in the Jijiga camps, Gaia received repeated requests from the host community to make ethanol stoves and fuel available in the local market. It was this push from the host community that led to the development of the commercial model. Each cooperative is being subsidized with an initial inventory of stoves and fuel thanks to support from Grand Challenges Canada and the Clean Cooking Alliance.

This new market-based approach required the establishment of an entirely new fuel distribution system, as well as training of members of the cooperatives in fuel distribution, stove and briquette production (in Assosa only), and entrepreneurship – the latter via an 'Empowered Entrepreneur Training' curriculum that includes business, empowerment and leadership skills development. For this new phase, Gaia Association has procured 20,000 litres of ethanol for the cooperatives to sell. Sugar companies and government regulators have guaranteed a one-year supply, reserved specifically for these new cooperatives. Previously, all fuel procurement and sales agreements were made through UNHCR. At the time of writing, an initial batch of ethanol stoves, to be sold to host-community members in Kebribeyah and additional refugee families in Assosa, was waiting to clear customs. Locally produced briquette-burning stoves were designed

to address the needs of Sudanese refugees, who require larger pots and stoves for certain cooking tasks that cannot be done on an ethanol stove. The initial goals are to sell 500 ethanol stoves to host-community customers in Kebribeyah and a combined 4,000 ethanol and briquette-burning stoves through the two Assosa cooperatives. All permissions and clearances have been received from the Ethiopian Administration for Refugee and Returnee Affairs.

Meeting disparate customer needs

Critical to this new approach was the need to develop site-specific plans for different camp settings with significantly divergent levels of purchasing power. Kebribeyah was established in 1989 for Somali refugees, with opportunities for resettlement to the US (since 2008) resulting in a steady inflow of remittances and therefore a more active cash economy. Kebribeyah camp is quite interwoven with Kebribeyah town. The camp already has a charcoal market (albeit a costly one, due to the fact that supplies are transported in by camel from a location 30 kilometres away). Refugees purchase charcoal from the market to supplement their cooking needs during downturns in funding and fuel supply from UNHCR. The ethanol supplied to this market will be fairly cost-competitive with charcoal: a daily supply of ethanol for an average family is expected to cost the equivalent of $0.51, compared with $0.48 for charcoal. Gaia has been working in Kebribeyah since 2005, and all the refugee households have already been supplied with ethanol stoves.

In Assosa, in contrast, potential consumers' purchasing power is much lower. These are newer camps and there is no overseas resettlement programme. While refugees have little access to 'found fuel' in arid Kebribeyah, in Assosa there are cheaper, low-grade cooking fuel options available around the camps. At the time of writing, Gaia Association had distributed only 300 ethanol stoves in Assosa, meaning that most of the 7,000–8,000 households in the two target camps will need to purchase a stove in addition to fuel. For those reasons, the market-based approach in Assosa will be much more dependent on the UNHCR voucher system. Also, although ethanol can meet most cooking needs, Sudanese cooking styles require a second, larger stove for certain tasks. To meet this need, and because of the availability of appropriate abandoned biomass resources around the camps, Gaia has also introduced a briquette-burning stove and briquette production workshop. Briquette production has the added benefits of clearing fire-hazard grasses, and of creating a supply chain for the local host community to provide feedstock. User acceptance of the briquette stove was assessed through surveys conducted in late 2017 by Gaia Association and local UNHCR field offices.

A new set of challenges

Over the past 13 years, Gaia Association has met and overcome numerous challenges. These have included essentially establishing a supply chain and market for ethanol from scratch; and dealing with inconsistent production supply, which locked the NGO out of large-scale carbon financing and threatened previous attempts at demand creation for a sustainable commercial ethanol market outside the camps. However, having had excess ethanol supply for the past three years, Gaia no longer worries about the scale of its programme exceeding that of production. It has built storage facilities in the camps, with 500,000 litres of storage capacity. This consistent

supply of ethanol has enabled the establishment of a UNFCCC Programme of Activities that will support Gaia's commercialization strategy through advanced carbon credit purchases – at $5 to $10 per tonne and roughly six tonnes of carbon saved per stove annually.

At the time of writing, Gaia Association faced a new set of challenges. One of the biggest was that the fuel voucher programme had not yet started. This limits the potential purchasing power of refugees in terms of paying commercial rates. Gaia is working with UNHCR to finalize some of the key modalities for the programme, including the exact level of subsidy. Currently there is no in-kind distribution of fuel in either Jijiga or Assosa, except for a firewood distribution programme for refugees from the Gambella region resettled to one camp in Assosa. Because Assosa refugees will be very reliant on vouchers, it is not possible for Gaia to launch commercial activities there until the voucher programme starts. In Kebribeyah, it is planning to launch operations once the initial batch of stoves arrives and a cooperative bank account is established, although fuel sales will be strengthened once voucher distribution begins.

Another challenge specific to the new market-based approach is the additional cost of VAT applied to ethanol purchased by the local business cooperatives. UNHCR is tax-exempt, so ethanol purchased by UNHCR for in-kind provision is VAT-free. However, because it is being procured for commercial sale, the ethanol purchased by Gaia for the local cooperatives has VAT applied and is therefore more expensive. Gaia Association's break-even numbers for long-term commercial viability of the programme would benefit greatly from a guaranteed supply of VAT-free ethanol. It would be up to the government to provide either a blanket or case-specific tax exemption.

A third issue anticipated is the eventual need for additional working capital to purchase bulk orders of new inventory (stoves) and fuel. This will have to be in place before the current batch of stoves and fuel on hand is sold out. While grant funding covered the initial batch of stoves and fuel, and income from sales will be reinvested in additional stock, upfront financing will still be needed to purchase stoves from Durban, South Africa to avoid risk of stock outages and ensure a consistent supply of fuel. Such financing could be facilitated by working-capital loans or other types of financial support. Local financial institutions, however, cannot fill this gap, since the legal status of refugees does not allow them to receive loans through the formal banking sector. Instead, loans would need to be facilitated through an implementing agency such as Gaia Association. Currently refugees are not allowed to work outside the camps, open bank accounts, or access other financial services. Gaia Association was granted special permission by the Ethiopian government to allow refugees to join the cooperatives, which sell and procure ethanol outside each camp and access basic financial services. But large-scale working-capital loans are still not an option. Although the government is working on a solution for these issues, this will not be immediate.

> **We are convinced that commercializing these things can succeed, providing the start-ups have enough capital to get to that tipping point of sustainability.**
> Harry Stokes

Sourcing solutions with an eye to long-term sustainability

Gaia Association has found a key solution-oriented ally in the Ethiopian Administration for Refugee and Returnee Affairs, and continues working closely with this agency to support the establishment of locally owned and operated social enterprises. Alleviating VAT costs and providing refugee cooperatives with the ability to access business loans are two ways in which the government could further support the expansion and sustainability of these efforts.

Another important area for future support is helping to increase the purchasing power of refugees. More long-term solutions are needed because of budget and timing uncertainties associated with reliance on aid handouts, especially given the protracted nature of many displacement situations. Increasing refugee purchasing power through the creation of additional income-generating opportunities would lessen dependence on aid budgets in the future. But achieving this will require significant investment in livelihood-focused programming in the camps. This can be further supported by changes to refugees' legal status, which would allow for greater access to work outside the camps. Gaia Association sees both these areas – improving refugees' access to finance and increasing their income-generating opportunities – as high priorities for ensuring the continued success of its work and the sustainability of these new business cooperatives for many years to come.

For more information, contact Harry Stokes at hstokes@projectgaia.com.

Annex 2: Increasing Purchasing Power for Pellets

Inyenyeri's proof of concept in Kigeme, Rwanda

The question of how best to provide displaced people with clean, affordable cooking fuel was already a priority for Inyenyeri, a Rwandan social enterprise, when it was approached by a member of UNHCR Rwanda's Livelihoods programme. That intervention seeks to provide economic opportunities for refugees by shifting approaches for displaced populations from crisis models to development models. The problem was how to do so through a market-based approach that fit with Inyenyeri's existing business model.

A previous attempt at free distribution of cookstoves in Kigeme refugee camp had seen upwards of 80 per cent of stoves in disuse – primarily being sold outside the camp. In-kind distribution of goods meant there was limited cash available for stove and fuel purchases. Yet firewood distributed by UNHCR accounted for only about 25 per cent of a household's monthly cooking energy needs, and the presence of charcoal sellers in Rwandan camps was a sign for Inyenyeri that some degree of willingness and ability to pay for fuel already existed to cover the remaining 75 per cent. What it needed was to pinpoint the extent of that willingness to pay, and how best to mitigate risks such as losing stoves. A crucial grant from the US Bureau of Population, Refugees and Migration (PRM) in 2016 provided that opportunity.

Discovering what works

Kigeme refugee camp, home to 3,900 Congolese refugee households, presented the best option for piloting a market-based fuel solution, due to a cash-based food allowance provided by WFP and the stated near-term intention of UNHCR to switch from in-kind provision to cash transfers for fuel and non-food items. Some 100 households, out of a randomly selected sample provided by UNHCR, were included in Inyenyeri's initial three-month pilot scheme. During an in-person stove demonstration – at which, to avoid the appearance of a donation model, no UNHCR representatives were present – households learned that they would receive a top-of-the-range pellet-burning gasifier stove on lease from Inyenyeri. This was in exchange for an agreed monthly minimum purchase of pellets to the value of 2,000 Rwandan francs (equivalent to roughly $2.50), or 6 per cent of a household's WFP food allowance. Inyenyeri charged the same price per kilogramme of pellets to refugees as it did to its existing clients, but lowered the minimum purchase requirement from 30 kg to 10 kg. That meant, in effect, that households were only required to spend $2.50 per month on pellets to maintain their stove lease. The price for pellets was also on a par with standard rates for charcoal in the camp, which anecdotally were noted at roughly 200 to 300 Rwandan francs for one day's cooking needs. No other incentives were provided to customers in the pilot scheme.

After three months, Inyenyeri had an 83 per cent retention rate (customers still purchasing at least the minimum requirement of pellets). Also, without any marketing or financial incentive, it had a 'spontaneous' waiting list of 500 households interested in joining the programme.

Of critical importance to Inyenyeri, because of its stove-lease operating model, was the fact that not a single stove was lost during those first three months or in the next year of the programme. The company credits this in part to the 'superior' cooking experience offered by the stove, which is cleaner-burning and more efficient. A social impact assessment by the International Center for Research on Women (ICRW) found that 100 per cent of households surveyed reported decreases in eye irritation, among other health benefits; and that all households reported needing less time to cook with their new stove. Inyenyeri also closely tracked each stove against its serial number and provided clear communication to customers that cases of stove theft would be handled by the national police. The households involved in the pilot scheme passed Inyenyeri's biggest tests, and PRM provided additional support to scale the scheme up to 300 households.

> **We were the first private-sector company to open up a shop inside a refugee camp in Rwanda … Without any financial incentive, within three months a spontaneous waitlist appeared.**
> Suzanna Huber, Inyenyeri Refugee Programme Manager

Confronting unique challenges

Inyenyeri encountered a unique set of challenges specific to the refugee context. Unlike typical commercial market environments, refugee camps are highly regulated, with all activities under the coordination of UNHCR and ultimate control over camp access determined by the Rwandan Ministry of Disaster Management and Refugees. A significant investment of time is needed to navigate the necessary administrative steps and manage the relationships required for permission to operate. Finding space to set up a pellet shop, for example, is dependent on UNHCR and the Rwandan government making that space available. Also, camp schedules include numerous training sessions, surveys, mass meetings and community service activities, all of which take time out of the traditional working week.

During the initial pilot phase, many households were only purchasing the minimum monthly pellet requirement (equivalent to one week's supply), and using other fuel sources (such as free firewood from UNHCR) when those pellets ran out. ICRW found through customer surveys that cost concerns were the biggest reason for this, given refugees' limited cash resources.

Indeed, one of the biggest challenges that Inyenyeri has faced over the past 18 months is that the success of the programme hinges on refugees' purchasing power. There is an extreme sensitivity in the refugee market to changes – or even proposed changes – to cash transfer amounts, which are tied to WFP and UNHCR budget availability. Fluctuations in cash allowances cause huge fluctuations in fuel purchases. When, during the pilot phase, WFP announced an upcoming reduction in the food allowance, Inyenyeri saw a sizeable decrease in pellet purchases. Aside from cash allowances, there is very little purchasing power inside the camps. Refugees are legally permitted to work in Rwanda, but with camps located in rural areas, jobs are scarce. Those able to find work in the cities leave the Kigeme camp, so the refugees who remain are generally those less able to access economic opportunities, leaving them dependent on aid handouts.

Solution: Change the purchasing power, not the price

To overcome these issues, Inyenyeri jointly fundraised with UNHCR and secured grant funding from the Belgian government to support a novel change in approach for the next two years: rather than subsidize the price of pellets by providing supplemental funds to Inyenyeri, UNHCR will increase the purchasing power of the Kigeme customers so that they can pay market rates. The pilot phase and ICRW study had provided evidence of user acceptance and refugee customers' willingness to pay market rates for pellets when they had sufficient funds available. UNHCR now provides unconditional cash transfers to refugees who sign on as customers for any clean-fuel alternative, a group that includes Inyenyeri customers. The transfers replace in-kind firewood provision for those households.

Fine-tuning the new arrangement over the past few months has brought key changes and insights. At first, the cash transfer amount was roughly equivalent to Inyenyeri's minimum pellet purchase requirement (one week's supply of pellets). However, given the benefits (as found by ICRW) associated with cooking on an Inyenyeri stove, UNHCR has started using the Belgian government funding to increase cash transfers so that they meet 100 per cent of each household's monthly cooking fuel needs with pellets. Household fuel need was calculated based on the results of a field study by Berkeley Air Monitoring Group. The increase in cash transfers is expected to lead to greater pellet purchases and a significant decline in firewood and charcoal use, with consequent beneficial health impacts. Also, fuel cash transfer payments were initially made quarterly, but Inyenyeri typically recorded a large drop-off in pellet sales in the latter part of each quarter. To encourage more consistent pellet purchases, UNHCR agreed to trial weekly payment of fuel cash transfers.

With these changes in place, Inyenyeri's customer base of 400 households will be expanded over the next several months at a rate of 500 households per month to reach all 3,900 households in Kigeme refugee camp. This major scale-up is expected to present some challenges for fuel supply, since pellets are trucked 200 km from a production facility in the city of Gisenyi. It will require finding sufficient storage in the camp, or trucking in pellets multiple times per week to maintain a consistent supply. However, by the end of the scale-up process, all Kigeme camp households will have transitioned from receiving in-kind firewood that meets 25 per cent of their cooking energy needs to receiving cash transfers from UNHCR that allow them to meet 100 per cent of their cooking energy needs with pellets.

> **Our ambition is to prove that if you give refugees purchasing power, they will choose cleaner alternatives to charcoal and firewood.**
> Suzanna Huber

Keys to long-term success

Inyenyeri is pushing to expand its sales to non-refugees, as this will boost the sustainability of the refugee programme. The company does not yet sell to the host community, but is considering doing so as part of its overall growth planning. After the current funding runs out, the value of fuel cash transfers may decrease, triggering the sensitive refugee market

to reduce spending on pellets. The scale-up phase will help Inyenyeri to determine feasibility and strategies for sustaining the programme in the longer term. As Inyenyeri's entire customer base grows beyond the refugee market, that will provide economies of scale that can support this work. However, it is likely that some form of donor funding will always be required, especially for the most vulnerable households. Based on this pilot experience and the results of the ICRW survey, Suzanna Huber, Inyenyeri Refugee Programme Manager, noted that refugee customers may always require some form of subsidization to buy more than the 10 kg minimum requirement of pellets. Whether that long-term subsidy should continue to be paid to the end-user, as is currently the case, or take some other form, is what everyone is hoping to learn over the next two years. For now, fundraising to sustain increased refugee purchasing power is a high priority.

It is possible that additional funds to sustain this programme and continue meeting 100 per cent of refugees' cooking energy needs will also be found from the very real savings achieved by UNHCR in terms of health and safety spending, among other areas. Johns Hopkins University and Plan International, an NGO, are conducting a randomized controlled trial of the impacts on Inyenyeri customers. Inyenyeri is also interested in a full cost–benefit analysis, the scope of which would include savings to UNHCR as well as the potential increases in refugee purchasing power associated with time savings and improved health. Inyenyeri is optimistic that cost savings associated with the quantifiable benefits of its clean-cooking solution will offset increases in spending by UNHCR on cash transfers for clean-fuel alternatives, and attract the additional support needed to secure long-term success.

For more information, contact Amber Bloomer at amber.bloomer@inyenyeri.com.

Annex 3: Jump-starting LPG Markets for Integrated Communities

Lessons from Niger's fully commercial LPG market, serving refugees and IDPs alongside host communities

Even before economic crisis hit the Diffa region of Niger in 2014, UNHCR Niger had noticed malnutrition rates increasing among the 15,000 Malian refugees it was serving at the time. Its analysis found that refugees were selling WFP-provided food to buy wood to cook. Shortly thereafter, the Islamist militant group Boko Haram forced the displacement of nearly 140,000 refugees and more than 100,000 IDPs to southeastern Niger, and a huge economic crisis followed. Suddenly the Diffa region – an area as large as Belgium, which had been one of the more prosperous in the country – saw a large decline in the average purchasing power of the population, and an increase in the costs of traditional fuels. UNHCR Niger wanted a way to decrease expenses rather than provide cash handouts, to support self-reliance among households in the region and avoid long-term reliance on donor funding. At that time, it realized that LPG – which was being used by only around 1 per cent of households – was cheaper than firewood and could offer a solution for reducing fuel costs for refugees, IDPs and host communities alike, for whom cooking fuel was the second-largest household expense (behind food and before health and education spending). UNHCR Niger developed the SEED programme (Soutien Energétique et Environnemental dans la région de Diffa), with the goal of jump-starting a commercial, regional LPG market that could be self-sustaining. Such a market, if established, would provide a long-term source of clean, affordable fuel and reduce expenses for all crisis-affected households.

A unique refugee context

Unlike many of their counterparts in other displacement situations, the refugees in the Diffa region of Niger have freedom of movement and are not confined to camps. They are fully integrated into blended communities of local hosts, IDPs and refugees. The Niger government has afforded refugees the legal right to work, study, seek healthcare from government health clinics, access finance and open bank accounts. There is an ongoing urbanization programme that provides qualified vulnerable households – refugees included – with their own 200-square-metre parcels of land. For these reasons, the vulnerable households that WFP and UNHCR target in Niger include refugees, IDPs *and* host-community members; the agencies do not serve or develop programmes for refugees in isolation.

For the SEED programme, with funding from the EU, UNHCR agreed to support the same households that were already receiving WFP assistance in the region. The main barrier to LPG access for these households, whose maximum monthly income is around $50, was the upfront purchase expense of the LPG stove, accessories and cylinder – the LPG 'kit' – which cost $40.

UNHCR Niger decided to purchase these kits and distribute them for free to the 25,000 most vulnerable families, together with vouchers for refills of 6-kg cylinders. Each family received eight vouchers, enough to last five months for an average-sized household.

> **We [told] the private sector, we are going to create for you 25,000 new families who are going to use gas. We will create the demand; how can you create the [supply]?**
> Benoit Moreno, UNHCR Niger

Emphasizing the 'win-win' to private-sector and government partners

Of critical importance to the success of the programme was getting government buy-in and a supportive private-sector gas partner on board. Benoit Moreno, UNHCR Niger External Relations Officer, found this was not a challenge once he had explained to both groups that this was a 'win-win' situation for everyone. Refugees, IDPs and other Nigerien citizens living in the region would all benefit from lower energy costs, which would free up income for other needs. The private sector would gain access to a new market, and government would provide an important service to a region hit hard by economic and environmental crises.

Local government leaders were enthusiastic from the start. Getting full government buy-in was essential to UNHCR Niger's approach. The LPG conversion programme was implemented not only by UNHCR or NGOs but by four Nigerien regional government directorates responsible for, respectively, the environment, trade, energy, and protection of women and children. The directorates for trade and energy worked with UNHCR to help identify last-mile firewood sellers in the local market who were negatively affected by the fuel-switching programme, in order to provide compensation through cash or in-kind support for conversion to the LPG supply chain. Some recipients chose to open small retail shops, while others were provided with carts and donkeys to support LPG delivery. Working through the regional government, and with the full support of local leaders, mitigated potential conflict with the larger wood market dealers and producers. Local elected officials also helped to identify appropriate locations for LPG filling stations and retail shops.

To attract a private-sector LPG supplier, UNHCR Niger released a nationwide tender request offering to initiate demand for LPG from 25,000 new customers and asking the private sector to manage the supply. From the tender request, UNHCR received multiple applications and selected one partner, SONIHY, a Nigerien gas company with sufficient capacity and experience to expand into the Diffa market. SONIHY then invested its own money in five new 10-tonne filling stations, each set up to serve five to six selling points, for a total of 30 new selling points regionally. In addition to purchasing 25,000 LPG kits and initial refills to secure new customers for SONIHY, UNHCR Niger acted as a reference to provide assurances of the strength of the partnership in SONIHY's negotiations with a local bank to obtain loans for the required infrastructure expansion.

Key results and strategies

By recruiting 25,000 new households as LPG customers, UNHCR Niger was able to achieve better economies of scale in the region and lower the price of LPG dramatically, from approximately $10 (CFA 6,000) to $3 per 6-kg cylinder. The result was that the average family now pays between $3 and $5 per month for its energy needs, compared to $14 for firewood (which, before the SEED programme, was even higher at $24 per month). This has helped the sustainability of the market beyond the initial SEED refills, with 70 per cent of the 25,000 UNHCR-supported households continuing to purchase LPG with no subsidy or other support. The low price of LPG, which did not increase after the UNHCR refill subsidies ended, has also attracted between 4,000 and 5,000 new LPG customers in the region who were not SEED beneficiaries.

According to a UNHCR Niger survey of participating households, the reported time saving when switching from wood to gas is around 72 hours per month, including time saved on cooking and fuel collection. Since women are the primary cooks and fuel collectors, switching to LPG saves women three days per month. UNHCR also saw a decrease in sexual and gender-based violence (SGBV) incidents due to fewer firewood collection trips, confirmed through ongoing protection monitoring and in fewer reported cases. When surveyed, households responded that they most valued the cost savings associated with LPG, followed closely by time savings.

The primary factors behind the success of this programme were its commitment to an integrated approach that included refugees, IDPs and host communities; and the fact that it enjoyed full buy-in and support from local communities, leaders and government officials. Some 100 youth community workers were hired to go from door to door explaining the programme to make sure everyone understood the cost savings and other benefits. Families understood that by using other fuels they were losing money over time. A hotline was also set up, which was advertised on local community radio stations, for anyone in the region to call at any time of day to report a problem with their stove or cylinder.

Challenges during and post-implementation

One of the main challenges during implementation was insecurity in the region. Of primary concern was the potential for Boko Haram attacks on LPG facilities. A joint analysis by UNHCR, SONIHY and local officials determined that in some locations it was better to build LPG filling stations underground. The decision as to exactly where to place filling stations was made together with all relevant stakeholders. One of the originally planned locations was moved entirely due to security concerns.

> **You have to understand the rationale of refugees. You cannot speak about the environment to people when you do not offer them alternatives. You have to show 'how am I going to improve my everyday life?'**
> Benoit Moreno, UNHCR Niger

Another challenge, discovered post-implementation, was that for the most vulnerable households, paying even $3 for a cylinder refill was too difficult. Those households would have benefited from a smaller, 2.5-kg cylinder bottle, also available in Niger, instead of the 6-kg bottles that were distributed. UNHCR Niger realized that many of the 30 per cent of households that stopped using LPG after the SEED programme refills ran out did so because they were forced to sell their cylinders to pay for food. For these households, any offer of cash from non-beneficiaries to purchase their cylinder at a discounted rate provided critical income that they could use to buy food.

One unintended consequence of the programme was an increase in charcoal production in the region. In some parts of the Diffa region, the price of charcoal is now comparable to that of gas. Moreno explained that this phenomenon is the result of LPG's transformation of the market. When firewood sales decreased, wood sellers sought a competing fuel that was cheaper and easier to transport than firewood, and that could compete with gas in terms of ease of use. However, users surveyed by UNHCR still rated gas as their preferred fuel.

Potential for replication

In the first 15 months alone, the full amount of EU funding for SEED (around €2 million) was recovered in savings from fuel purchases by people living in the region. This income boost to Diffa supports other donor investments in livelihood-improvement activities. The programme has also drawn interest from other donors and NGOs, including the International Rescue Committee and Action Contre la Faim, which are now working with SONIHY to introduce the same model to other parts of Niger. The model has been established and fine-tuned through SEED and can be directly transferred to other regions of the country.

Beyond Niger, Moreno explains that 'you can implement this in any context … where wood is more expensive than gas' and that it is critical to understand the economic calculus of vulnerable households. Where life expectancy is low, it is difficult to make long-term arguments around environmental damage, so it is better to focus on the immediate value and impact that these programmes can have on people's income and livelihoods. The Niger example has already influenced UNHCR fuel provision initiatives in other countries, such as Burkina Faso, Tanzania and Bangladesh, where LPG conversion is being piloted or expanded to refugee and host-community populations. UNHCR Niger is very keen to see the SEED programme, and its 'win-win' approach, replicated in as many countries as possible.

For more information, contact Benoit Moreno, UNHCR Niger, at morenob@unhcr.org.

Annex 4: Developing Refugee-oriented Markets for LPG

Examples of private-sector partnerships to supply LPG in crises and protracted refugee situations

This case study provides a comparison of two recent independent efforts – in Bangladesh and Tanzania – to promote and distribute LPG for refugee cooking energy needs. While the Bangladesh context is still in crisis mode, the Tanzania context offers a contrast in terms of how LPG has been piloted in a more protracted refugee setting. Both offer lessons for engaging the private sector to achieve greater refugee access to LPG.

In just four months in late 2017, more than 600,000 Rohingya refugees arrived in the Cox's Bazar region of Bangladesh. Their arrival overwhelmed the available supply of sustainably produced compressed rice husk (CRH) briquettes that UNHCR had been distributing to 95,000 existing refugee households in camps, and which had been covering only 20 per cent of those households' daily cooking needs. The camps took on a population density three times that of Dhaka, the Bangladeshi capital. The result, according to estimates by the UN Food and Agriculture Organization (FAO), was a staggering three to five football fields of forest being cleared per day for firewood for cooking. 'Before and after' aerial photographs, as well as large clouds of smoke around meal times in camps, provided visual evidence of the need for an urgent and drastic shift in fuel strategy.

Nyarugusu camp in Kigoma, Tanzania, has hosted Congolese refugees since 1996, but in 2015 it saw a large influx of 85,000 people from Burundi in just six months. A survey by the UNEP DTU Partnership[30] in 2017 found the average family spending 19 hours per week collecting firewood, with 52 per cent of respondents saying that they had experienced violence during firewood collection in the previous week. At that time, the Tanzanian government deemed the level of conflict with host communities and extent of environmental damage caused by firewood collection by the now 144,000-plus camp residents to be untenable. It requested urgent action by UNHCR to find an alternative solution.

In both the Bangladesh and Tanzania cases, the proposed solution was to supply LPG.

Benefits of switching to LPG

In Cox's Bazar, a review of cooking practices revealed that around 10 per cent of refugees were already using LPG purchased from local markets to cook, making this the second-most-used fuel after firewood. An extensive review of all potential cooking solutions found LPG to be the most likely to succeed in terms of affordability, impact on deforestation, availability of supply, ability to scale, impact on health and ease of use, among other metrics. The review found that LPG

[30] The UNEP DTU Partnership is an international research and advisory institution on energy, climate and sustainable development. It operates under a tripartite agreement between the Ministry of Foreign Affairs of Denmark, the Technical University of Denmark (DTU) and the UN Environment Programme (UNEP). For more information, see http://www.unepdtu.org/ (accessed 23 Oct. 2018).

was the cleanest and cheapest fuel option available, cheaper even compared with purchasing firewood for use in improved fuel-efficient cookstoves. Existing users found LPG easier, faster and cleaner to cook with than firewood, with the biggest barrier being the initial cost of around $50 for purchasing the starter kit (stove, cylinder and accessories). The UNHCR review found that families were spending an average of $12 per month on cooking fuel (on top of fuel received and collected for free), slightly more than the $11 estimated to be the cost of an average family's monthly LPG needs. Because of the substantial price increases for firewood and CRH briquettes after the Rohingyas' arrival in 2017, LPG was found to be the most affordable fuel available. Based on this analysis, UNHCR decided to distribute LPG kits and fully subsidized cylinder refills for at least the next six months to all 200,000 refugee households in the Cox's Bazar camps, as well as to the 40,000 most vulnerable host-community households.

In Tanzania, where there was no commercial supply of LPG within the camp, a social cost–benefit analysis showed a benefit–cost ratio of 1.76 from switching to LPG. If LPG were to be consumed by all households in the Nyarugusu camp, this would lead to $45 million in net benefits after 10 years (applying a 3 per cent discount rate). This was calculated based on conservative estimates of time savings for cooking and fuel collection, savings on fuel expenditure by refugees, savings to UNHCR from health benefits (reduced spending on doctors' salaries, medicine and supplies), carbon emission reductions and forest preservation. In addition to time saved from reduced fuel collection, survey respondents said that on average LPG saved them around four hours per day in cooking time alone (as they spent an average of two hours per day cooking with LPG, compared with six hours using firewood). Some 26 per cent said that they used the time saved for income-generating activities. The analysis also found that environmental destruction carried high monetary costs, and suggested carbon financing as a source of potential funding to support long-term sustainability of the LPG market.

Two pilot phases were completed in 2016 and 2017, in which 3,000 Nyarugusu refugee households received free LPG kits and two refills of 6-kg LPG cylinders per month over a three-month period. After those pilots, UNEP DTU and UNHCR developed a market creation plan with a target to supply LPG to 20,000 families in three Kigoma region camps, plus an additional 5,000 vulnerable families from the host communities. The plan proposes applying a 50 per cent subsidy for the kits and cylinder refills using targeted donor funding. The plan is considered to be realistic given survey results showing that more than 50 per cent of households in Nyarugusu already spend an average of $12 a month on firewood and/or charcoal. In comparison, it costs $18 to supply the same amount of energy from LPG. Significant demand for LPG is also indicated by the fact that 95 per cent of respondents expressed a willingness to pay for LPG. However, the stated amount they were willing to pay was lower than their reported spending on traditional fuels (which could be due to concern on the part of respondents that any figure they provided would then be translated into the actual end-user charge). Subsidies could be delivered directly to beneficiaries in the form of vouchers, based on family size and vulnerability status.

Incentivizing and securing private-sector LPG partners

A critical step for both programmes was lining up private-sector LPG partners with sufficient capacity and experience to invest in and supply the refugee and host-community markets. In Bangladesh, LPG conversion requires the supply of LPG to be increased to five times the current levels in just a six-month period (from 50,000 recipient households to 250,000). For this, multiple high-quality private-sector partners are needed. UNHCR released a tender for interested

suppliers to submit proposals outlining their entire proposed supply chain, any additional infrastructure required and associated costs, and the anticipated payback period. UNHCR agreed to invest in some of the required infrastructure (storage depots), with private companies paying back 50 per cent of that investment as they get refill orders, at a rate of 10 per cent per year over five years. Companies agreed to pay for their own increased staffing capacity, delivery trucks, larger fuel imports and a 2:1 match of UNHCR cylinder purchases. Agreements will be set up for three years. However, UNHCR only guarantees an initial six-month purchase order (covering 100 per cent of recipients' fuel needs). Additional rounds are likely, but contingent on securing donor funding.

In Tanzania, two key assurances were required for securing private-sector partnerships. The first was to demonstrate that the commercial cost of LPG was affordable to a sufficiently large population within the camps. The second was to show the potential for high uptake/usage rates. In Nyarugusu, this was done through a willingness-to-pay study that showed strong potential for uptake by refugees, combined with high levels of satisfaction among households involved in the LPG pilot schemes. Research showed that 53 per cent of refugees were already paying an average of close to 50 per cent of their monthly capped income on fuel purchases (around $12 out of $27 in legally allowed employment income). Funds for fuel purchases came from a mix of sources, including WFP cash transfers (which were ended just prior to the second LPG pilot), remittances, and formal and informal employment. These assurances, together with enforcement measures against the theft or resale of subsidized cylinders, secured a partnership with ORYX Gas. The company is one of the largest private distributors of LPG in Africa, with a long history in the region, a high share of the Tanzanian market, and an interest in expanding distribution in the Kigoma region. If the government of Tanzania approves the LPG market creation plan, then ORYX will extend its existing distribution model to the Kigoma camps. It has agreed to manage its sales through a female-only group of refugee resellers. ORYX, which was involved in the pilot stages, estimates that it will need to sell 8,000 cylinder refills per month within the camps for its operations there to be profitable. Based on demand estimates derived from the research, this is a viable target.

Challenges with scaling up the LPG market in refugee contexts

In Bangladesh, the response rate to the UNHCR tender request was lower than anticipated. Some of the larger market players did not submit bids. Those that did tended to have the backing of major international oil companies, which were not as concerned with the required investment size. Although there was no official follow-up with the firms that did not bid, it is likely that uncertainty in the Cox's Bazar camps was a deterrent. Whereas an informal economy already exists in the Kigoma camps in Tanzania, the Rohingya refugee situation is still in 'crisis' mode, with both the government and refugees seeing their situation as temporary. Recently arrived Rohingya families have not been given official refugee status and are considered 'undocumented Myanmar nationals'. This uncertainty makes it impossible for a private company to apply a normal long-term business model. Couple that with the complete inability of refugees to earn income, and it becomes impossible to introduce anything other than a fully subsidized donor-driven model for fuel at this time.

In Tanzania, due to the strict encampment policy, government buy-in and authorization are critical for long-term infrastructure in what are seen as 'temporary' camps. Government acknowledgment of a protracted situation can help to support longer-term investments, something that remains a challenge in Tanzania where in early 2018 the government withdrew from the Comprehensive Refugee Response Plan agreed with the UN. Government support is critical to opening the door to a potential shift in refugees' legal status – as in Uganda and Niger – and thus to removing the major hurdles to a commercial approach, namely limits on refugee employment, access to land and finance. A truly commercial fuel market would require steady refugee income. Customer financing is needed to support larger upfront payments for cylinder refills, as compared with the small as-needed payments currently made for firewood. Also, a commercial fuel-switching programme requires interventions to increase awareness of LPG (benefits and proper use) and boost market creation efforts; this involves significant donor funding. Donor support is needed for the first phase, for the scale-up phase, and to provide continued support for vulnerable families after the market is established.

> **Based on the pilot programmes and our research, we know that there exists a commercial market for LPG in the Nyarugusu camp; households like it and many are able and willing to pay for it.**
> James Haselip, DTU

Viability of a long-term commercial approach

Later in 2019, after families are converted to LPG, UNHCR will complete a targeting exercise in the Cox's Bazar camps to see who should continue to receive fully subsidized LPG, and who partially subsidized LPG, in the future. The goal is to switch eventually to a cash-based subsidy rather than in-kind provision. However, according to Paul Quigley, UNHCR Energy Specialist, any decrease in subsidy 'hinges on people's ability to earn an income'. Right now, not even an informal economy exists, and refugees are still worried that they may be sent back to Myanmar. That limits refugees' willingness to invest in goods that they might be forced to leave behind. Their legal status also seriously limits any type of income-earning potential. UNHCR is hoping that clear evidence of positive environmental impacts from the fuel-switching programme will be enough to secure donor support through this crisis phase until things are more stable and a more commercial approach can be trialled.

For the Kigoma camps, UNEP DTU and UNHCR developed a market creation plan that outlines strategies to support LPG expansion. These include encouraging the use of time savings from the switch to LPG for more income-generation activities, and providing entrepreneurial training and expanded employment opportunities for refugees within and beyond the LPG supply chain. The plan also includes the development of financing strategies to support monthly purchases of LPG refills. Because refugees cannot legally access formal microfinance, the UNEP DTU and UNHCR market creation plan proposes the establishment of several zone-specific revolving funds, from which refugees will be able to borrow up to five times the value of their down-payment, up to a maximum of 50 per cent of the cylinder refill cost, with incentives to encourage repayment within one month. UNEP DTU and UNHCR also see mobile pay-as-you-go technology, which is being piloted for the LPG market by several companies in East Africa, as a potential

future mechanism for use in the sale of LPG to refugees. Donor funding can also be used to invest in small-scale factories in the camps, where refugees can be employed in the manufacture of stove-top trivets.

Although still in the early stages, both these LPG programmes provide useful lessons for partnering with private companies to deliver clean and affordable fuel options to refugees, thus limiting host-community conflict and protecting natural resources.[31]

For more information on the Tanzania LPG pilot schemes, contact James Haselip, DTU at jhas@dtu.dk.

[31] Information for this case study came from an interview with Paul Quigley, UNHCR Energy Specialist, as well as existing literature including: Rivoal and Haselip (2017), *The true cost of using traditional fuels in a humanitarian setting*; Rivoal, M. and Haselip, J. A. (2018), *Delivering market-based access to clean cooking fuel for displaced populations in the Kigoma region, Tanzania: a business plan*, UNEP DTU Partnership, Technical University of Denmark; and Quigley, P. (2017, unpublished), *Review of Clean Cooking Options for Refugee Settings Cox's Bazar Bangladesh*, December 2017, UNHCR.

Annex 5: Method of Calculating the Proposed Price Cap for the Non-wood Cooking Concession

To calculate the weighted average household cost of cooking energy (to be used as the concession price cap), data from a household energy survey conducted by the MEI were used alongside the calculated levelized cost of energy (LCOE) within the context of the refugee camp.

The household energy survey was completed in December 2016 by the MEI, covering 231 households within Kakuma I camp (estimated population of 14,910 households, with an average of six members per household). The survey included a wide range of energy use questions covering areas such as type of cooking/lighting solutions used, quantity of fuel consumed, where fuel is sourced, typical cost per fuel source, other types of expenditure and amount, and so on.

Levelized cost of energy

The levelized cost of energy (LCOE) is often taken as a proxy for the average price that a generating asset must receive in a market to break even over its operational lifetime. The LCOE was calculated for each of the available cooking stove technologies in Kakuma I to allow for a fair comparative cost to be shown.

The LCOE was calculated based on the following factors:

- An assessment of the range of energy outputs, in megajoules (MJ), that households are currently using for cooking each day, as a baseline. This range was assessed to be from 1 MJ to 18 MJ[32] per day.
- The amount of fuel required per day (kg/day) for a given energy output (in MJ) – based on the calorific value of the fuel and efficiency of the stove.
- The total fuel cost per day ($/day) to produce a given energy output for each stove/fuel combination, based on locally confirmed fuel prices where possible.
- Stove capital and installation cost (where relevant).
- Ongoing annual operation and maintenance (O&M) cost during stove lifespan.

Note that no discount rate was applied to the LCOE calculation, as inflation was not factored into fuel prices.

[32] This range is assumed to adequately cover the majority of household cooking needs, based on industry understanding and past project experience. A standard MJ per household value in a refugee setting does not exist, due to the varying needs of refugees and environmental factors.

Methodology

Using the key inputs mentioned above, we took the following steps to calculate the weighted average household energy cooking cost:

1. **Identify current cooking solutions being used in the camp – traditional three-stone fire, improved cookstove (ICS) with wood or charcoal, LPG – and what percentage of overall usage each represents.** This took into account the fact that a proportion of households have a secondary cookstove.

2. **Identify the fuel type (wood, charcoal and LPG) and reported amount used for cooking each day (kg – collected, donated, bought).** The energy produced per stove type using a certain amount of fuel was calculated in megajoules, based on the kilogramme amount of fuel used per day, the calorific value of the fuel (MJ/kg) and the conversion efficiency of the stove used (%). The amount of fuel (kg) required for the range of desired megajoules (1 MJ to 18 MJ) could also be calculated at this point.

   Applying the camp distribution (%) for each cookstove and fuel type, the total camp and weighted average household cooking energy produced per day was then calculated. This megajoule value (9.05 MJ) was taken to be Scenario 1 – 'the base case' – and was used as the concession price cap against which to tender.

3. **To determine the end-user's ability to pay, the cost of current cooking solutions was analysed.** To make a fair comparison across the varying fuel costs per kilogramme, stove costs, lifespans, O&M costs and so on, the LCOE (based on locally confirmed prices where possible) was calculated for each solution. Then, applying the percentage distribution of cooking solutions, a weighted average cost was calculated. This amount (KES 19) was taken as the Scenario 1 base case.

4. **The Scenario 1 weighted average cost of energy produced was then compared with the income and expenditure survey data to confirm that it was accessible to all camp users.** The calculated cost was found to be very similar to the reported energy expenditure within the camp. However, it should be noted that this calculated cost needs to be compared to monitored income/expenditure data for further verification, as provision of monetary data is a sensitive topic and users may not accurately report on this.

Based on the estimated weighted average cost of cooking energy for Scenario 1, the value of KES 19 per day was taken to be the maximum price cap (P) that companies could charge for their cooking solution under the proposed concession. This value implies reaching the greatest number of users possible while aiming to support a market-based approach in which users contribute towards the cost of implementation.

It should be noted that this approach has a number of limitations, including the following:

- Households verbally reported the amount of fuel they used – no measurements of actual fuel usage were taken. It should also be noted that in many cases fuel is not sold by kilogramme, but per bundle in the case of firewood or per *debe* (Kiswahili for 'tin') in the case of charcoal. Hence there may be some inaccuracy in the amounts of fuel that people reported using.

- The calculation was based on what people were reported to be using, which is not to say that 9.05 MJ per day is adequate for households to meet all their cooking and nutritional

needs. It is likely that the figure for average energy usage calculated here is low, since in a displacement setting people are constrained by resources and cook less than they would like to.

- The survey was conducted in Kakuma I, which is the oldest and most established sub-camp within the Kakuma complex. The results seen in Kakuma I may not be fully reflective of the stove type, fuel use, cooking spend, income and general expenditures seen across the remaining camp areas. Projections across the full camp complex are provided as estimations only.

About the Authors

Laura Patel is the programme manager for the Moving Energy Initiative with Energy 4 Impact, providing overall management of the programme as well leading on-the-ground activities in Kenya and developing learning content from the programme. She is an energy specialist, having worked in private-sector development, capacity-building and social enterprise in East Africa for the past eight years with a range of businesses, both providing technical advisory services and leading business units and programmes. Laura started her career in the UK, working in the transmission and distribution of electricity, before moving to Kenya where she has focused her career in the energy access sector. Her initial focus was on micro-enterprise and technology development, particularly in the area of clean cooking and fuels. In addition to her work at Energy 4 Impact, Laura worked as the operations director for EcoZoom, a social enterprise selling ecological products in East Africa. She graduated from the University of Birmingham with a master's degree in mathematical engineering.

Katie Gross is an independent household energy consultant and experienced project manager. She has over 10 years of experience in international development, focused primarily on implementing clean household energy interventions globally. She has led and managed household energy projects related to improved access, innovative financing and entrepreneur empowerment, working with financial institutions, energy enterprises, NGOs and other relevant stakeholders, primarily in East Africa and South Asia. She co-authored an online toolkit for the U.S. Agency for International Development on clean and efficient cooking technologies and fuels, and was lead author for a global study on advanced biomass cookstove distribution. She holds an MA in international development from American University in Washington, DC and was an environmental health volunteer with the U.S. Peace Corps in Panama.

Acknowledgments

The authors would like to thank members of the MEI team who contributed significantly to the non-wood cooking concession prize process. This includes William Mulehi (Energy 4 Impact), who interacted extensively with private-sector stakeholders; Joe Attwood (Energy 4 Impact) for providing continued guidance; and Mattia Vianello (Practical Action) and the wider Practical Action team for supporting this work through their provision of data and analysis. Thanks also go to Faisal Razzaq (Energy 4 Impact) for his work on calculating a price cap for the proposed concession in Kakuma. Thanks to the peer reviewers who provided valuable feedback and input on the content: Benoit Moreno (UNHCR Niger), Harry Stokes (Gaia Association) and James Haselip (UNEP DTU Partnership).

The authors would like to thank the following organizations and individuals that took part in the case studies:

- Project Gaia and Gaia Association, in particular Harry Stokes, Desalegn Getaneh, Wubshet Tsehayu, and Chido Munangagwa, in relation to their work establishing cooperatives to increase the uptake of ethanol in displacement settings in Ethiopia;
- Inyenyeri, in particular Suzanna Huber and Amber Bloomer, regarding its work expanding access to biomass pellets for Rwandan refugee customers;
- UNHCR Niger, in particular Benoit Moreno, in relation to its efforts to catalyse LPG markets in displacement settings in Niger;
- UNHCR Bangladesh, in particular Paul Quigley, regarding its work distributing LPG at scale to people displaced by crises in Bangladesh; and
- The UNEP DTU Partnership, in particular James Haselip, in relation to efforts to create market opportunities for LPG in displacement settings in Tanzania.

The authors would like to thank Anna Brown and Jake Statham (Chatham House) for their editing work.

Finally, our thanks go to all of the stakeholders who participated in the MEI's non-wood cooking prize and gave up their time to engage and provide valuable insights into this topic.

Independent thinking since 1920

Chatham House, the Royal Institute of International Affairs, is a world-leading policy institute based in London. Our mission is to help governments and societies build a sustainably secure, prosperous and just world.

Cover image: A user of LPG distributed through UNHCR's SEED programme in the Diffa region of Niger.

ISBN 978 1 78413 315 3

Typeset by Soapbox, www.soapbox.co.uk

The Royal Institute of International Affairs
Chatham House
10 St James's Square, London SW1Y 4LE
T +44 (0)20 7957 5700 F +44 (0)20 7957 5710
contact@chathamhouse.org www.chathamhouse.org

Charity Registration Number: 208223