

clean energy for refugees

Private-sector Energy Provision in Displacement Settings

Jonathan Rouse | March 2019



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 marketbased 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), the Office of the United Nations High Commissioner for Refugees (UNHCR) and the UK Department for International Development (DFID).













Preface

Findings from Phase I of the MEI in 2015, published in the Chatham House research paper *Heat, Light and Power for Refugees: Saving Lives, Reducing Costs*,1 highlight the negative impacts of limited sustainable energy provision on the security of displaced populations. The paper also identified some of the challenges for energy programmes in this sector, such as the lack of robust data on energy access and the priorities of refugee populations.

In Phase II of the MEI, Practical Action led detailed research into the energy needs of refugees in Burkina Faso and Kenya. Chatham House analysed data on global refugee energy use in displacement contexts and produced an interactive map. Energy 4 Impact explored sustainable funding options, private-sector contract models and non-wood cooking concessions. The market development and low-carbon energy initiatives in Burkina Faso, Jordan and Kenya were managed by Practical Action and Energy 4 Impact, with the support of local partners. These partners represented the MEI at multiple conferences and events to share findings and advocate for the inclusion of displaced people in the sustainable energy agenda.

Findings from Phase I of the MEI in 2015 are described in the publication *Heat, Light and Power for Refugees: Saving Lives, Reducing Costs.*This phase identified a range of needs and opportunities for involving the private sector in energy delivery in displacement settings. These included leveraging private-sector investment to bridge donor funding shortfalls and exploring the appetite among businesses to serve markets in displacement settings. It also identified some of the challenges of the conventional funding and project management processes that do not naturally accommodate private-sector involvement, and some of the barriers businesses face in accessing markets.

This 'learning brief' outlines lessons from Phase II of the MEI, which sought to understand the challenges in more depth and test new solutions. It highlights some of the opportunities for enabling and encouraging private-sector engagement in the delivery of energy for refugees and discusses the influence of public perceptions, risks and financing. The paper presents lessons from field activities seeking to improve energy access, manage risk, offer finance, stimulate markets, and structure partnerships and contracts. It is based on project documentation and interviews with project staff. The paper is intended for practitioners and policymakers working in the humanitarian sector.

¹ Lahn, G. and Grafham, O. (2015), *Heat, Light and Power for Refugees: Saving Lives, Reducing Costs*, Research Paper, London: Royal Institute of International Affairs, https://mei.chathamhouse.org/heat-light-and-power-refugees-saving-lives-reducing-costs-summary-page (accessed 13 Dec. 2018).

Summary

- The distribution of free energy products to refugees and displaced people may be unnecessary and a disruption to existing market structures. MEI findings demonstrate that the private sector could directly replace some traditional aid in this area.
- Involving the private sector in energy provision may lead to cost savings, improved sustainability and wider coverage of energy services.
- The MEI consistently found that there is a misperception among energy-related businesses about life, conditions and markets in camps. There is also a perception that credit is not widely available to help fund customer purchases, and that where it is available default rates would be high.
- The MEI established that there are well-developed markets in many camp settings, but it is important to recognize that there are also vulnerable groups with little or no purchasing power.
- There is appetite among businesses to provide solutions in displacement settings, including projects where risk is shared, and for deeper engagement with the market.
- Donors can play an important role in offering grants to reduce upfront risks in order to incentivize shareholders and investors to back businesses.
- In the case of humanitarian agency energy use, carefully structured infrastructure
 management contracts provide an opportunity for agencies to share financial
 burdens and risks with the private sector, making longer-term engagement more
 attractive and secure.

Introduction

Forcibly displaced populations, host communities and relief services all require energy in displacement settings. In these scenarios, energy is used by a wide range of consumers in health facilities, administrative offices, lighting and cooking, mobile phone charging, refrigeration, entertainment, ICT and further diverse businesses.

Conventional approaches to the provision of energy in displacement settings are led by humanitarian organizations, as opposed to government or private-sector entities. Energy is generally supplied to clinics, relief services and compounds using diesel generators shipped in when a displacement emergency begins. Basic energy appliances, such as stoves and lanterns, for displaced populations tend to be provided by traditional aid distribution or purchased from small local businesses. This strategy is inefficient, unsustainable and costly in protracted crises. However, humanitarian agencies rarely have the expertise or resources to design alternatives to break this status quo even while fully recognizing that the approach is not fit for purpose beyond emergency use and the initial stages of a displacement event.

Although access to energy is a priority in a displacement setting, burning fuels for energy can negatively impact the environment and can be expensive. An obvious solution to this is renewable energy, which, delivered in partnership with the private sector, presents an opportunity to supply reliable low-cost energy and help relief agencies meet their commitment to reduce carbon emissions.

On average, a refugee is displaced for 10 years,² yet energy solutions are often short-term due to overstretched budgets. Long-term, sustainable, cost-effective and lower-carbon solutions are urgently required.

There are untapped opportunities for displaced people to benefit from private-sector innovation and technical expertise, but businesses tend to have limited access to displacement settings and relevant data in order to discern market potential. At present, some businesses provide energy products, such as stoves, solar home systems or lanterns, and services to camps within a donor model – either through procurement contracts with humanitarian agencies or through grant-funded pilots. This offers profitable, low-risk opportunities to engage in camps. However, on these terms, businesses often lack ownership of assets and incentives to optimize and maintain solutions. The use of public funds to subsidize pioneering private participation can attract further investment, thus increasing the impact and sustainability of limited resources.

Businesses can independently become involved in displacement settings as active participants in markets, directly selling their own products and services to refugees. The degree to which this is possible depends on the maturity of the market, among other factors such as location and accessibility. To date, this is much less explored as a formal practice and requires a deeper level of commitment and risk-taking by the private sector.

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² Devictor, X. and Do, Q. T. (2016), 'How many years do refugees stay in exile?', World Bank, 15 September 2016, http://blogs.worldbank.org/dev4peace/how-many-years-do-refugees-stay-exile (accessed 7 Dec. 2018).

The focus of the MEI was on facilitating the involvement of larger, formal-sector businesses in energy provision, which are most likely to have a positive impact at scale. However, social enterprises may also play an important role as they tend to be more willing to enter risky markets and are more aligned with donor objectives. Many smaller and informal-sector enterprises already operate in displacement settings, such as those retailing household goods including cooking stoves and solar lanterns, as well as workshops and cafes. These are important stakeholders both as energy consumers and as potential partners for its delivery. Moreover, the general success of smaller enterprises in camps is likely to create livelihoods, which in turn may boost the willingness and ability of displaced persons to pay for energy products and services.

The Case for Private-sector Engagement

There is a robust case for involving the private sector in energy provision to achieve cost savings, improve sustainability and expand coverage of energy services. At the institutional level, involving businesses in the switch to renewable energy solutions, such as solar photovoltaic (PV) systems, may present higher upfront costs. However, MEI research indicates that the return on investment can be rapid: for example, an investment in a 75-kilowatt-peak (kWp) solar PV-diesel hybrid mini-grid system could be repaid in as little as 3.6 years (see Box 4). A system with this capacity would allow power provision to the camp's major buildings along with a surplus for other users.³ The private sector tends to focus on efficiency and minimizing costs, which can benefit the provision of energy in displacement settings which generally exhibit high inefficiencies.⁴ In addition, renewable energy options should also result in lower carbon emissions.

MEI findings demonstrate that the private sector could directly replace some traditional aid in meeting displaced people's energy needs. In Goudoubou refugee camp in Burkina Faso, refugees rely on aid agencies for basic energy products but obtain non-energy products such as smartphones, airtime or clothes from a nearby town. This suggests that the distribution of energy products may not be necessary and may simply be disrupting existing market structures.

The MEI also established that there are well-developed markets in many camp settings.⁵ In the Kakuma camp complex,⁶ Kenya, surveys revealed that residents spend more than \$50 (13 per cent of their income) per annum on inadequate lighting and power. Of the respondents,17 per cent said they would be willing to pay up to \$126 for a solar home system (with multiple lights and a mobile phone charger) to provide electricity,⁷ indicating an estimated solar product market worth up to \$300,000. In Goudoubou, Burkina Faso, two-thirds of residents surveyed expressed a willingness to pay for cooking solutions. This type of data is helpful in demonstrating the potential market opportunities to private-sector investors.

While there are vibrant markets in Kakuma and Goudoubou refugee camps, it is important to recognize that there are also vulnerable groups with little or no purchasing power. The marginalized must not be left behind by market-led solutions and partnerships. Furthermore, concessions must be structured to ensure equitable access to energy products and services across all groups.

⁷ Ibid. p. 47.

³ Patel, L. (forthcoming 2019), *Infrastructure Management Contracts – Improving Energy Asset Management in Displacement Settings*, Learning Brief, Moving Energy Initiative.

⁴ Grafham, O and Lahn, G. (2018), Costs of Fuelling Humanitarian Aid, London: Royal Institute of International Affairs, https://mei.chathamhouse.org/costs-fuelling-humanitarian-aid.

⁵ Corbyn, D. and Vianello, M. (2018), *Prices, Products and Priorities: Meeting Refugees' Energy Needs in Burkina Faso and Kenya*, Research Paper, London: Royal Institute of International Affairs, https://mei.chathamhouse.org/prices-products-priorities

priorities.

⁶ 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.

One of the most striking findings of Phase II of the MEI is the appetite among businesses to provide solutions in displacement settings. A total of 101 businesses tendered for grants to provide low-carbon projects across Burkina Faso, Jordan and Kenya. Many of these represented a familiar model of grant-funded engagement with limited risk-sharing, but they reinforce the private-sector's interest in working in displacement settings. Of this figure, 19 businesses expressed an interest in being awarded a non-wood cooking concession in Kakuma. This challenged the private sector to design an approach to distribute and sell, at scale, non-wood cooking fuels (and associated stoves) with financial support from the MEI. The level of interest in the concession indicates that there is an appetite for projects where risk is shared, and for deeper engagement with the market. Moreover, in Burkina Faso some businesses engaged in market development activities with little or no direct support or funding.

Some businesses, such as BBOXX in Kenya, wish to engage with more vulnerable communities to build a positive profile through social responsibility activities rather than for strict commercial reasons. They also recognize that a good reputation within the sector could lead to further work with agencies. Despite the prevalence of suitable businesses and the prevailing appetite to engage in displacement settings, private-sector engagement is not yet widespread.

Perception of camps

The MEI consistently found that there is a misconception among business people about life, conditions and markets in camps. In both Kenya and Burkina Faso, camps are considered inaccessible, insecure places populated by people of different cultures and languages, living in abject poverty as passive recipients of handouts. There is also a perception that credit is not widely available to help fund customer purchases, and that where it is available default rates would be high.

The MEI programme provided private-sector businesses in both Kenya and Burkina Faso with access to displacement settings, allowing them to witness the vibrant markets for the first time. They also came to appreciate the scale of market opportunities within camps, and their proximity to opportunities in neighbouring host communities.

We are many businesses, all competing. But when you come here you see there is plenty of market to share!⁸

Businesses widely cited a lack of information and specific data on markets in refugee camps. During Phase II, the MEI addressed this by undertaking a series of market assessments, providing businesses with data on populations, sectors, demand profiles and the willingness and ability of consumers to pay for goods. This helped to build confidence among some of the MEI partners to engage in Kenya and Burkina Faso.

⁸ Author interview with MEI participant and small-business owner, Kenya, 2018.

Impact of aid

Understandably, the presence of large agencies distributing free goods is a significant concern to prospective market entrants in displacement settings. While agencies often target the most vulnerable segments of the market, distribution of free energy technologies can certainly distort markets, and deepen the reluctance of businesses to engage. Moreover, if products fail to meet user needs, or are of poor quality – as reported in Goudoubou – this can damage the reputation of the technologies and reduce customer willingness to buy related or similar products. This presents a challenge to commercial businesses entering the market, but also an opportunity to offer more suitable, high-quality, durable products, with the assurance of a warranty and repair services.

Businesses looking to provide longer-term engagement, for example by operating an electricity mini-grid, are also acutely aware of the threat posed by grant-funded activities. A lack of cooperation means agencies or other programmes may enter a displacement setting and provide cheaper power, rendering an existing service uneconomical or superfluous. In addition, changes in the political and funding landscape may mean that agency activities are cut, or displaced populations may move. It is critical that small to medium-sized businesses are given support to understand and manage the risks – and there is a role for donors to underwrite some of the funding. There is also a need for effective coordination between the private sector and those responsible for camps when planning activities.

Financial risk

Certain constraints for the private sector can be overcome relatively easily, for example, by changing perceptions, sharing information on markets and offering logistical support. Others are harder to predict and overcome, such as the uncertainty of humanitarian activities and funding, as well as the level of demand for services. As such, there is a role for grants to cushion risks, and incentivize and facilitate businesses to enter markets.

Donors can play an important role in offering grants to reduce the upfront risk to allow shareholders and investors to back businesses. Grants can distort the market if applied without a clear strategy, however, MEI research has found that without some financial cushioning businesses are not willing to risk investing their own money. Ideally grants should be awarded with a specific focus on start-ups (for example, establishing a shop or purchasing hardware), and contingent on a rigorous, realistic business plan that demonstrates that the initiative has life beyond the grant.

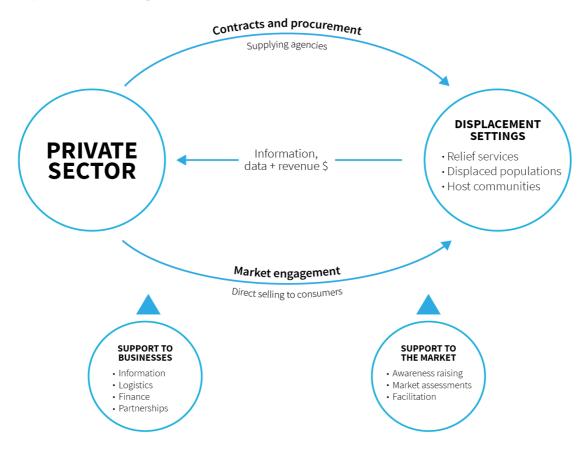


Figure 1: Requirements to overcome constraints for private-sector engagement in displacement settings

Source: Author's own analysis

Box 1: Facilitating BBOXX to sell solar PV home systems in Kakuma, Kenya

BBOXX is a UK-registered for-profit company selling innovative solar PV systems across 35 developing countries to improve energy access. Prior to engaging with the MEI, Kakuma was not considered a priority market opportunity for BBOXX. However, during MEI Phase II, site visits helped change this outlook.

'Before my initial visit to the camp, my perception was that the population lived in abject poverty, supported by relief handouts. I was concerned about engaging in the market because of insecurity, lack of ability to pay for our products and language barriers. In reality, I was impressed with the vibrant economic activity in the camp, including some of our competitors!'9

This practical reassurance was reinforced by data collected by the MEI on the prevailing markets in Kakuma, demonstrating significant demand for solar PV systems.

⁹ Author interview with Pervin Mariga, retail manager, BBOXX, Kenya, 2018.

The MEI provided a grant to finance the purchase of 75 solar PV systems. BBOXX prepared a business case and covered the costs of selling the products with their own funds. This cooperation was primarily to test the market, and to see if a one-off grant could help to kick-start a viable commercial operation in the camp.

All of the solar PV systems were sold within three months. Refugees in camps bought 90 per cent of them for business use and 10 per cent were purchased by the host community for residential use. This demonstrates the demand for energy among businesses within the camp. Within the first two months there had been no defaults on payments (in the same period, the rate of defaults in Kenya averaged 3 per cent). The BBOXX operation had also provided full-time employment to four individuals from the host community, and nine staff paid on commission from the camp community. The project successfully achieved its objectives of selling the solar PV systems, providing local employment and securing reliable payment from customers.

The experiment had some challenges. The 120-km journey from Lodwar (the nearest commercial airport) to Kakuma takes five hours and is often impassable in rain. This added significantly to the transportation costs for BBOXX, reducing the profitability of sales compared with their other sales locations. The next steps of the plan are to increase the customer base, sales volumes and range of products to improve profitability.

BBOXX is exploring ways to continue its operations within Kakuma and build on the current momentum. However, some form of bridging finance would help to cover costs, allowing them to scale their operations in Kakuma and similar settings in the future.

The challenges faced by BBOXX hint at the possibility that some markets may not be viable, even with grant support. They also indicate that while grants can help companies to test the market, they may not enable them to breakeven or profit; longer term support may be required. However, the documented sales demonstrate that products can be sold within camps at prevailing retail prices, and with workable credit terms.

A sustainable fund for financing energy activities

In light of the role that financing can play in reducing the risk for businesses, the MEI completed a feasibility study in 2017 for a bespoke energy fund to support activities in displacement settings.¹⁰

¹⁰ Cohen, Y. and Patel, L. (2019), *Innovative Financing for Sustainable Energy Interventions*, Moving Energy Initiative, https://www.chathamhouse.org/sites/default/files/2019-02-2019-InnovativeFinancingforHumanitarianEnergy.pdf (accessed 2 Mar. 2019).

Box 2: Sustainable Funding

There are limited funding options for sustainable energy within the humanitarian system. These funds tend to be short-term and focused on pilot initiatives or 'procure-and-give-away' models.

The MEI developed a set of recommendations for the design of a fund to support sustainable energy initiatives specifically in displacement settings. One of the primary focuses of such a fund would be to facilitate private-sector engagement by offering grants to 'de-risk' their entry to the market. The fund would help remove barriers, mitigate risks and ensure technical and financial feasibility and long-term sustainability of clean energy solutions.

The findings of the study indicate that a mix of financing mechanisms is needed depending on the type of project and associated risks. Considering limited data on the ability of customers to pay for energy services, grants appear to be most appropriate for projects serving refugee households and small businesses, at least in the initial stages. Thereafter, returnable grants or quasi-commercial finance could be used. Guarantees and blended finance may be suitable for projects that serve camp operations.

The study also suggested technical assistance alongside funding for clean energy technical expertise; business development support; and facilitation of strategic partnerships between humanitarian and private sectors.

Market development

The prevailing vibrancy of markets for energy products and services affect the risk profile for businesses. For example, in Kenya where a strong awareness and market for stoves exists, suppliers of cooking technologies may feel more confident to enter the refugee camps. By contrast, in Burkina Faso very few energy products are available in conventional markets across the country; businesses lack the reassurance and experience to test markets in displacement settings. The MEI responded to this in Burkina Faso by focusing on developing markets (see Box 3) to create demand and boost business confidence. It should be noted that refugee markets are very context-specific. What works in one displacement setting may not work in another due to differences in costs of current energy sources, refugee legal status, culture, security, remittances, camp markets, and the requirements of a crisis versus protracted refugee situation.

Box 3: Market systems development in Burkina Faso

Goudoubou is a refugee camp in Burkina Faso, located 15 km from the town of Dori. The MEI completed a series of studies to understand the market and facilitated site visits and partnerships to stimulate interest in energy products and demonstrate market

opportunities. The focus of these activities was on refugees and host communities alike; this dual focus was considered critical to the success and acceptability of the work. An 'adaptive' process was used, reacting to the needs of refugees and host communities as they were uncovered.

Businesses were brought to the local region to speak with refugees and residents, as well as local businesses. An emphasis was placed on forging partnerships, and empowering local actors to initiate activities. For example, the Dori mayor organized a trade fair and invited businesses to attend. The MEI partially funded these activities (including paying for transport to the camp) but businesses themselves were also expected to contribute (such as by providing their own marketing materials). Unfortunately, businesses gradually withdrew as they realized this was not the offer of a grant, but an opportunity to access a market. However, two remaining businesses were willing to spearhead a different way of working in the camp.

A series of separate complimentary activities were catalysed by the MEI, including promotional campaigns to raise awareness of products, and production of a catalogue presenting the range of energy technologies available in the camp and in Dori. Quality assurance and after-sales service were also included in business strategies to help build consumer confidence. Flexible credit and other payment options were investigated to help address low purchasing power. At the time of writing these had not yet been implemented. The potential fin-tech and consumer finance solutions are presented in the market development materials published by the MEI.¹¹

The final output from this work was a joint MEI/UNCDF conference in Burkina Faso, held in 2018, to utilize the market development momentum and boost market opportunities for energy technologies in rural areas of the country, including refugee camps.

In Jordan, the MEI aimed to develop the local market for green building services and materials for the construction and retrofitting of homes through the Green Affordable Homes project, in cooperation with the Jordan Green Building Council. Prior to this there was just one prototype 'green affordable home' in the country, and no examples of retrofitting in existing buildings. The MEI project provided tangible examples of retrofitting and green building solutions in several communities in Jordan. In terms of health and well-being, the local populations were unaware of the difference that efficiency in construction (such as orientation, insulation, and water efficient appliances), solar water heaters and rainwater harvesting could make and the potential for lower electricity and water bills. The project successfully demonstrated and created local demand for these services. Local contractors were trained in new techniques, offering potential for local replication by the private sector

¹¹ MEI (2018), 'A Summary of Technology-enabled Finance for Solar Systems in the Sahel: Burkina Faso' and 'Executive Summary: Consumer Financing for Energy Products in Burkina Faso', London: Royal Institute of International Affairs, https://mei.chathamhouse.org/resources/market-development (accessed 12 Mar. 2019).

where there is demand. However, a large-scale project, such as for a whole neighbourhood, is needed to bring down costs of materials through economies of scale.

Infrastructure development contracts

The ready availability of grants can discourage the private sector from deep engagement in these markets, particularly in the management of energy infrastructure. Agencies are accustomed to funding energy provision with grants and the private sector expects this. Grants are suitable in the short-term, and 'fit' with agency and donor administrative systems that require no long-term commitments or expenses. However, there are businesses that have an appetite for engaging with the market directly, which recognize that one-off grant-based work is not a sustainable model.

Carefully structured contracts provide an opportunity for agencies to share financial burdens and risks with the private sector, making longer-term engagement more attractive and secure.

Outsourcing energy infrastructure management is complex and requires a detailed understanding of:

- The range of current and future stakeholders;
- How to document responsibility and structure agreements; and
- How to align economic incentives to make the relationship work for everyone.

Box 4: Partnership models for mini-grid power in Kalobeyei settlement, Kenya

Kalobeyei is a refugee settlement in northwest Kenya, set up and managed by UNHCR with support from local and national governments. The camp provides for over 38,000 refugees. New clusters are being added to the camp, which require electrical power solutions and infrastructure.¹²

Conventionally, power needs are met by distributed diesel generation. The MEI completed a feasibility study for a solar/diesel hybrid mini-grid capable of generating 1,037 kilowatt hours (kWh) a day to relief services and institutions, which private-sector experts could potentially maintain.

The study indicated that mini-grids are more economical to run than multiple standalone generators. The initial capital investment for such infrastructure in the settlement is estimated to be \$243,000, with an operating cost of \$25,400 per annum. While this solution is initially more expensive than a system relying on distributed diesel generation (estimated to cost \$62,200), annual savings in operating cost are estimated to be \$49,880, which will pay back the additional investment within 3.6 years. In addition, the solution provides improved electricity supply, resilience and reliability; can be expanded

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¹² Patel (forthcoming 2019), Infrastructure Management Contracts – Improving Energy Asset Management in Displacement Settings.

as the camp develops; and reduces the camp's carbon footprint, contributing to the UN target of being climate-neutral by 2020.

The feasibility study assessed several 'public–private partnership' models, ranging from 'operation and maintenance' contracts to 'design, build, own, operate, transfer' (DBOOT) agreements. It also explored options for sharing risks between parties, as well as various payment models: per kWh; flat rates; and bonus and penalty payments.

As a result of the study, there was considerable interest from a range of private-sector companies, and multiple possible solutions and models emerged. Pre-procurement consultations were held with key stakeholders such as UNHCR, local implementing partners, and private-sector actors.

Navigating the institutional complexities, administrative systems, conventions and politics presents real challenges in mainstreaming private-sector approaches. Major institutional changes are required to further facilitate public—private partnership models.

Despite the potential for such an arrangement to reduce the burden on UNHCR to procure, operate and maintain generators or solar PV systems, the appetite for such a change is limited. Partnerships of this nature tend to require commitments of 10–15 years, whereas donors and agencies operate on much shorter time frames. Other challenges include long procurement processes within agencies and reluctance of host governments to invest in long-term infrastructure in camps they wish to remain temporary.

UNHCR has moved forward with infrastructure in Kalobeyei funded through more traditional donor routes. However, the study is a valuable resource demonstrating the economy of outsourcing energy through creative contracts. It also provides information on potential contractual structures, costs, and challenges and savings to relief organizations.

The private sector is not a silver bullet for solving the energy crisis in displacement settings. However, in partnership with other stakeholders, and with targeted support, it does have the potential to contribute expertise, innovation and choice. Involving businesses could also help the humanitarian sector move away from short-term grants, and towards a longer term, better-managed, sustainable vision for energy provision. Certain core values of the sector must be retained in this process, notably the duty to do no harm, and ensure access to services is equitable and extends to the most vulnerable and marginalized.

About the Author

Jonathan Rouse provides specialist advice and training on household energy in low-income countries, with a particular focus on clean-burning cooking stoves. His experience includes planning and evaluation, market-based solutions, carbon finance, participatory fieldwork, survey design and behaviour-change approaches.

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Cover image: A shelf of energy appliances in a shop in Kakuma Town, Kenya

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