

Research Paper

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# The Energy Situation in the Dadaab Refugee Camps, Kenya



## Preface

The Moving Energy Initiative (MEI) is a collaboration between GVEP International, Chatham House, the Office of the United Nations High Commissioner for Refugees (UNHCR), the Norwegian Refugee Council (NRC) and Practical Action Consulting. The MEI seeks to identify how innovation in policy and practice within the humanitarian sector can improve access to sustainable energy among displaced populations and camp operators. Funded by the United Kingdom's Department for International Development (DFID), the initiative seeks to develop, research and test appropriate sustainable energy solutions, as well as innovative delivery models for energy solutions. As part of initial research intended to inform subsequent phases of the project, the MEI carried out an energy survey in 2015 in the Dadaab refugee camps in Kenya.

This paper has been written by GVEP International, with copy-editing and production support from Chatham House. Its purpose is to present the results from the 2015 field study. The paper is a summary of the survey report – the whole report can be obtained on request from GVEP International (Ben.Good@gvepinternational.org).

# Field Survey

## Background information

The Dadaab refugee camps are located in Garissa County, in northeastern Kenya. The complex consists of five sub-camps, and covers an area of 50 square kilometres. As of March 2015, the Dadaab area was the fourth-largest population centre in Kenya, with a total refugee population of 351,538.<sup>1</sup> The area is arid, with a hot and dry climate and occasional flooding in poorly drained areas.

The predominant inhabitants of the Dadaab camps are refugees from Somalia. The host and refugee communities overlap closely, and their identities are intertwined.<sup>2</sup> The two populations share a common language, culture and religion, and in many cases clan and sub-clan identities.

The UNHCR has overall responsibility for coordination and management of refugee-focused interventions in the area, including provision of energy to Dadaab camp operations.

## Study methodology

### Survey design

A combination of quantitative and qualitative methods was used to review the energy economy in the five sub-camps of Dadaab and the neighbouring host community settlements. The quantitative methods used consisted of surveying household energy use and measuring the energy consumption of administrative operations. The qualitative methods employed included 'key informant' interviews, focus group discussions and desk research.

### Target population and sample size

The survey targeted refugee households in the sub-camps and host-community households in the neighbouring settlements. According to UNHCR data at the time of the survey, there were 351,538 refugees and 83,277 households in the whole of Dadaab – these formed the total population from which the sample was drawn. A sample size of 381 households was selected.<sup>3</sup> To compensate for non-responses, a mark-up of 6 per cent (23 households) was added to the sample, bringing the total number of refugee households in the sample to 404. A total of 50 host-community households

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<sup>1</sup> UNHCR (April 2015), 'Camp Population Statistics – Dadaab, Kenya', UNHCR, [https://data.unhcr.org/horn-of-africa/documents.php?page=3&view=grid&Country\[\]=110](https://data.unhcr.org/horn-of-africa/documents.php?page=3&view=grid&Country[]=110).

<sup>2</sup> Enghoff, M. et al. (2010), *In Search of Protection and Livelihoods: Socio-economic and Environmental Impacts of Dadaab Refugee Camps on Host Communities*, Royal Danish Embassy in Nairobi and the Royal Norwegian Embassy in Nairobi, <http://www.ncg.no/novus/upload/file/2010-HostCommunities-Kenya3009.pdf>.

<sup>3</sup> The sample size was determined using a table published in Krejcie, R. V. and Morgan, D. W. (1970), 'Determining Sample Size for Research Activities', *Educational and Psychological Measurement*, Issue 30, pp. 607–10.

(about 12 per cent of the sample for refugee households) living within a radius of not more than 5 kilometres from the camps were selected to participate in the survey.

### Sample selection and sample size

The study followed a multi-stage sampling design. Stage 1 entailed stratification of settlements into six distinct groups: the five sub-camps plus the host community. For each sub-camp a sample proportionate to its population was selected. Ten households each were selected from five neighbouring host community settlements, making a total of 50 host community households. Stage 2 entailed random sampling of blocks from sample settlements. Stage 3 entailed random sampling of households from sampled blocks.

Since women are generally more involved than men in the use of energy at household level, women were identified as the primary targets for household interviews.

## Key findings from the survey

### Household cooking

The quality of household cooking energy accessed in Dadaab remains poor. Some 98 per cent of residents in the sample use wood as their main cooking fuel, and the authorities have been unable to regulate this market or to provide sufficient support to the most vulnerable. Refugees are rarely provided with energy resources by the UNHCR. The exception is firewood, which is provided to the most vulnerable households.<sup>4</sup> However, even in these cases the quantities distributed are insufficient to cover households' full energy needs. Distribution is also irregular and unpredictable. The firewood rations distributed by the UNHCR through local implementing partners cover only 10 per cent of a household's monthly firewood demand; this reinforces the tendency for households to procure firewood from other sources. There is a demonstrated need for a more sustainable source of energy for the refugees.

Refugee households in Dadaab spend an estimated US\$6.3 million per year on wood fuel. In addition, 49 per cent of households in the sample collect firewood at no financial cost from the surrounding woodlands.

Some 91 per cent of households cook in kitchens, of which 90 per cent have no chimney. The poor quality of fuel (i.e. firewood) used for cooking means that households are highly exposed to indoor air pollution from stove flue gases.

Improved cookstoves have been extensively distributed around the camps. However, meeting demand for firewood remains a huge challenge – the combination of the camps' population (approximately 350,000) and that of the host community (approximately 148,000 within a 20-kilometre radius) constitutes a huge burden on the local biomass resource. In addition, given the

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<sup>4</sup> According to interviews with the camp administrators, the most vulnerable households are determined according to criteria set by the UNHCR and its partners in collaboration with block leaders.

World Health Organization's advice on the limited health benefits offered by most so-called 'improved cookstoves', there is an urgent need to find a non-wood solution that can be made available at scale.

Some 75 per cent of households received donated cookstoves from NGOs working in the camps. Eleven per cent of the households have a secondary stove in addition to their primary stove – 48 per cent of secondary cookstoves run on charcoal, with firewood mostly used in the primary stoves in these cases.

### Household lighting

Dry-cell battery torches are the primary source of light for 60.8 per cent of refugee households, costing households a total of US\$1.6 million per year. Another 11.2 per cent of households use indirect lighting from street lights or neighbours' houses, 10.5 per cent use electricity from generators, 7 per cent use solar lanterns and 4.4 per cent use kerosene lamps.

For the neighbouring host community, the most important source of light is dry-cell battery torches (85.4 per cent) followed by firewood (4.9 per cent).

None of the camp complex is connected to the national grid, so the only way that residents can access electricity is through stand-alone or off-grid power systems. An interview with camp administrators revealed that a government-funded rural electrification project is extending a grid through Garissa town to Dadaab (the extension is already built, but there is no connection yet). The administrators hope that the camps will also benefit from this initiative. However, at the time of the survey they did not know if this would happen, as the Rural Electrification Authority had provided no information about the plans. Neither the camp administrators nor government officials had clear information about the oncoming grid line.

Although there is no main grid-connected electricity supply to the camp residents, some local supply arrangements exist. For example, better-off households have individual stand-alone power systems, which use poor-quality diesel generators. In some cases households distribute the electricity from these generators to their neighbours for a negotiated monthly fee. Camp residents with entrepreneurial acumen and capital have thus identified an investment opportunity: they buy a generator to supply electricity to other camp residents as a means of producing income. Some households have also invested in solar home systems, which provide power for lighting and equipment such as televisions, radios and mobile phone chargers.

From the sample, GVEP estimates that the average monthly price of connection to generator sets is KES 1,235 (US\$12.09), with a connection fee of KES 1,322 (US\$12.94). The total annual household expenditure on diesel/generators is US\$1.3 million.<sup>5</sup> Only 3.7 per cent of the refugee households connected to electricity have their consumption tracked through a meter; the rest pay for electricity according to verbally agreed supply arrangements.

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<sup>5</sup> 10.5 per cent of households are connected to a generator (mainly for lighting). This is calculated as 10.5 per cent of 83,277, or 8,744 households (MEI survey). The mean expenditure per household connected to a generator set is US\$12.09 per month (MEI survey). Therefore, the estimated total annual expenditure for connection to a genset is  $12 \times 12.09 \times 8,744 = \text{US}\$1,268,580$ .

Mini-grid connections still face challenges – unpredictable power outages and lack of sufficient capacity to run some home appliances. Refugee households report a mean of 1.4 unpredictable interruptions per week, lasting for a mean of 1.4 hours.

### Energy for other uses

#### *Heating and cooling*

Heating the home is not usually a priority for Dadaab residents, except during the rainy season (November and December) for some households with small children. On the other hand, the hot climate means that access to cold water and beverages is important. Some households have had to improvise water-cooling containers using local raw materials.

#### *Energy for commercial purposes, information and communication*

A number of businesses in the camps use energy. These include foodstuff shops, mobile money transfer (Mpesa) services, greengrocers, hotels, water trading services, ironing services etc. The type of energy used by these businesses depends on the nature and scale of their operations.

Trade in fuels such as firewood, charcoal, batteries and kerosene is quite common in the camps. Energy resources and technologies such as torch batteries, improved cookstoves for firewood and charcoal, solar lanterns, solar panels, kerosene stoves and torches are also sold in the camps. In addition, there are businessmen who have invested in generators and related infrastructure to supply electricity to residents at a fee. Despite the productive use of power within Dadaab, the survey indicated some supply constraints. An increase in power supply would be likely to encourage further productive use of energy.

Some 98 per cent of the camp households own a mobile phone. With most homes lacking an electricity connection, 48.9 per cent of phones are charged in kiosks/shops and 30.4 per cent are charged in neighbours' homes. Some 11.5 per cent of households charge their phones through electricity connections at home, and 9 per cent do so using solar lanterns. For those who charge in kiosks, the mean cost of charging is KES 10 per session. The fact that roughly half of all phones are charged in kiosks indicates significant income-generating activity in the camp – in total, KES 1.4 million (US\$14,000) is spent per month on phone charging at kiosks/shops.

#### *Energy for camp administration*

In the absence of national grid electricity, the camp operations' power needs are mostly met through generators and solar power, as well as solar hybrid systems in some cases. Health centres, water-pumping systems and administrative offices are powered using generators, while street lighting is solar-powered. The camps also have some hybrid water-pumping systems that have been installed in an effort to reduce power consumption.

To meet the camp operations' electricity needs, the Dadaab complex has 99 generators managed by the UNHCR. The power rating of these generators ranges from 10 kVA to 400–455 kVA. This situation may present risks of underloading and asset inefficiency. According to data gathered from camp administrators, the UNHCR consumes 200,000 litres of diesel per month for use in

generators, at a cost of US\$0.94 per litre – this is equivalent to a total of US\$2,256,000 per year.<sup>6</sup> However, data on electricity generation and consumption in the camp are patchy. The research was therefore not able to estimate important parameters such as the amount of electricity generated, overall electricity demand and supply scenarios, and the unit cost of generated electricity. Other operators such as the World Food Programme independently manage their own power generation and consumption. The research encountered data access challenges resulting from poor data management and confidentiality concerns.

### Household aspirations and willingness to pay

There is an active energy market in Dadaab, worth over US\$18 million per year, of which about 80 per cent represents direct expenditure by refugees themselves. After food and clothing, energy is the largest domestic expense. The informal economy of shops and other entrepreneurial activity is extensive, but could very probably be developed further for the benefit both of camp residents and the host community. Improved energy supply would be one (but not the sole) precondition for such development. There is none the less already a good base for developing a ‘productive uses’ programme that involves energy being used for business or livelihoods generation.

For example, 71 per cent of households have some source of income either from employment or other activities. The average monthly household income is US\$72, and average monthly expenditure on energy is KES 1,716 (US\$17.2).

However, refugees’ willingness to pay for improved home power supply appears slightly less clear-cut in relation to the pricing offered by most regional pay-as-you-go (PAYG) for solar home systems companies. According to the household survey results, camp residents would be willing to pay a mean of KES 864 (US\$8.6) a month for connection to a reliable grid supply, while the prices for solar home systems offered by most East Africa-based solar PAYG companies over a three-year period are over KES 1,000 (US\$10) a month.

Despite huge potential to involve the private sector, and the experiences of private-sector actors elsewhere in facilitating market-based solutions, there is still minimal engagement between the camps and the private sector in Dadaab. Efforts to engage the private sector thus far have been unsustainable, as they have mainly focused on initial acquisition of energy solutions with minimal involvement in maintenance thereafter.

### Energy management in Dadaab

According to interviews with camp administrators, energy issues on the ground are managed independently across different departments/sectors. This results in the existence of multiple and sometimes overlapping centres of management. It was also observed from the survey that most of the agencies do not have an energy ‘champion’ specifically to handle energy issues. Energy budgets

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<sup>6</sup> According to the MEI survey in Dadaab refugee camps, 2015.

are spread across multiple departments, and this makes accounting for the full cost of energy very difficult.<sup>7</sup>

At the time of survey, no energy infrastructure plan was in place. Energy interventions are developed on an ad hoc basis, which means that there are no long-term projects. The majority of projects already implemented have been set up on a pilot basis, with no clear follow-up plans.

There is an Inter-Agency Energy Task Force, which includes agencies such as the UNHCR, the World Food Programme, the NRC, CARE International, the Relief Reconstruction and Development Organization (RRDO), and the Fafi Integrated Development Agency (FaIDA) etc. The task force is responsible for coordinating energy issues within the camp complex and its environs. The task force has made a significant contribution by presenting an information-sharing platform among organizations. However, it has had minimal involvement in making decisions or influencing practices related to energy management and utilization.

The UNHCR is formulating a Safe Access to Fuel and Energy (SAFE) strategy in Kenya and other countries, with the intention of integrating energy into emergency preparedness and response. It is hoped that this will provide a framework that will eventually help improve management of energy in humanitarian settings. Providing expert feedback during the generation of this strategy will therefore contribute significantly to improving the management of energy in the Dadaab refugee camps.

Besides the challenges already cited in terms of energy management, there are also difficulties with funding – energy budgets are often reduced to offset shortfalls in other areas; most funding is also short-term in nature.

### Questions raised by the field survey

Given these findings, the key question still remains:

- How can innovation in policy and practice within the humanitarian sector improve access to the cost-effective supply of clean and sustainable energy among displaced populations and camp operators?

Other related sub-questions specific to the Dadaab context would be:

- Would a site-specific plan for energy provision be a useful tool for local managers in Dadaab? If so, what research is required and what scope of work is necessary to create such a plan? What benefits would be delivered by such a plan, and how would subsequent activities become more effective and deliver low-carbon energy in Dadaab and similar contexts?
- Would outsourcing a site's energy infrastructure assets to specialist energy providers create the opportunity for innovation that enables increased energy access and/or lower cost in Dadaab?

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<sup>7</sup> According to MEI energy survey in Dadaab refugee camps, 2015.

- What more can be done to unblock bottlenecks and encourage further take-up and scale-up of innovation that works? For example, would the availability of fast-track grant funding be the most effective and sustainable way to stimulate a selection of low-carbon energy demonstration projects?
- How can small-scale market development approaches used elsewhere in the off-grid sector be adapted to improve energy access in Dadaab?
- Can an innovative cooking intervention be designed that will enable the technology to ‘leapfrog’ wood-based technologies?

### Ways forward

In response to these questions, the MEI proposes carrying out the following activities during its second phase:

- 1. Creation of site-specific integrated energy plans.** This entails developing a blueprint for achieving access, efficiency and carbon targets, and for ensuring that subsequent initiatives by the MEI consortium or others are part of a wider energy strategy. The lessons learned from defining the scope of work, and from implementation of the work necessary to prepare such plans, should also be evaluated. The aim would be to provide guidance to other actors seeking to replicate energy strategies not just in Dadaab but also in other camp locations.
- 2. Research, design and implementation of infrastructure management contracts.** Currently, large-scale energy assets are primarily purchased, operated and owned by humanitarian actors in refugee settings. (This arrangement is seen as presenting a number of challenges. For example, humanitarian agencies rarely have in-house energy experts, which limits their ability to specify and operate energy assets.) Meanwhile technology developers and service providers have limited access to refugee camps and limited incentive to service assets, given their lack of stake in the ownership and operation of in-camp energy solutions. Additionally, camp administrators are barred from purchasing large-scale assets given longer-term payback periods. This limits their ability to invest in solutions that could lower their energy consumption and expenditure. Researching these issues, and how best to overcome bottlenecks, should be one of the focus areas of the next phases of the MEI.
- 3. Support for low-carbon energy projects.** There is a strong case for supporting investment (as a precedent for other actors) in projects to reduce fossil fuel consumption that would otherwise be blocked because of insufficient local funding.
- 4. Low-energy market development.** This entails identifying the potential for market-oriented solutions, based on refugees’ current levels of expenditure on unsustainable energy solutions, their ability and willingness to pay for alternatives, and the price points offered by suppliers in other base-of-pyramid energy access markets.
- 5. Trial and implementation of non-wood concessions at scale.** Wood fuel is used to meet a significant proportion of cooking energy needs in Dadaab. This has contributed greatly to

environmental degradation, as well as to conflict between the displaced population and host communities. Significant health risks are also associated with indoor air pollution; in nearly all cases these risks are not adequately addressed by the introduction of fuel-efficient stoves. Promoting non-wood fuel implementation interventions would build on lessons from previous trials in Dadaab – e.g. the use of ethanol/liquefied petroleum gas (LPG), which was tried but without any plan or resourcing for a subsequent scale-up. Camp administrators often order relatively small batches of energy equipment's and other related energy supplies on an infrequent basis, and therefore limit suppliers' scope for economies of scale. This is a missed opportunity. Camp administration could take advantage of the market scale available in a refugee camp setting to create a viable market opportunity for deployment at scale of a non-wood-based cooking solution. Significant costs and operational efficiencies may only be achieved by optimizing at scale – a large enough scale would create opportunities for ensuring profitability, and would in itself be an incentive for efficiencies. This approach would also create platforms that could then not only provide services and supplies for the host population, but also create demonstration effects to support development of the general market (i.e. away from the humanitarian population altogether).

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Cover image: Women bring firewood back to their tent in Dadaab, 2011.

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