

Boiling Point.

A PRACTITIONER'S JOURNAL ON
HOUSEHOLD ENERGY, STOVES
AND POVERTY REDUCTION



Energy in Emergency Settings

Energy access for safety, health and well being in emergencies – p2
Safe Access to Fuel and Energy: A lifeline for refugee women and girls – p6
Estimating the global energy use of forcibly displaced people – p12
Clean and safe energy for cooking in Ethiopia's refugee camps – p16
plus interviews, toolkit, sponsor news and more....

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Household Energy Network
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Boiling Point is a practitioner's journal for those working with household energy and stoves. It deals with technical, social, financial and environmental issues and aims to improve the quality of life for poor communities living in the developing world.

Welcome...

to the latest edition of Boiling Point. We strive to make the journal as accessible and participative as possible, and welcome any comments or suggestions by email or post. Please see the inside of the back cover page for details on how to contribute papers to future issues. Boiling Point is published by the HEDON Household Energy Network (www.HEDON.info).

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Cover photo: Refugee woman with firewood and infant in Dadaab, Kenya (Source: R.Gangale, UNHCR)

Contents

Theme

Editorial: Energy in Emergency Settings	1
"With light there is more life": Energy access for safety, health and well being in emergencies <i>Allison Dworschak, Shanti Kleiman</i>	2
Safe Access to Fuel and Energy: A lifeline for refugee women and girls <i>Megan Gerrard</i>	6
Moving Energy Initiative: Estimating the global energy use of forcibly displaced people <i>Owen Grafham, Glada Lahn, Johanna Lehne</i>	12
Clean and safe energy for cooking: Ethiopian Jigjiga refugee camps <i>Wubshet Tadele Tsehayu, Desalegn Getaneh</i>	16

Viewpoints

Interview with Azam Saber, Rwanda Country Representative for UNHCR	10
Interview with Alima Mohamed, Refugee Leader at The Nakivale Settlement in Uganda	20
Interview with Patrick Jacqueson, Senior Strategic Advisor, UN Food and Agriculture Organisation	27

Helpline

Expert response by Mark van Dorp	26
----------------------------------	----

Toolkit

SET4food guidelines on sustainable energy technologies for food utilisation in humanitarian contexts and informal settlements <i>Jacopo Barbieri, Marco Caniato, Emanuela Colombo</i>	22
--	----

Sponsor News

GACC- Latest news from GACC <i>Katherine Arnold, Corinne Hart, Amare Egziabher, Betsy Lippman</i>	28
UNHCR – Latest news from UNHCR <i>Amare Egziabher, Betsy Lippman</i>	31
GIZ News – Latest news from GIZ <i>Reimund Hoffmann, Anna Ingwe, Anja Rohde, Gabriele Wurster-Vihuto, Caspar Priesemann, Monika Rammelt</i>	32
University of Nottingham – Latest news University of Nottingham <i>Charlotte Ray, Mike Clifford</i>	34
Global Household Energy News – Latest News	40

General

The Empower Project: An innovative approach to the diffusion of portable solar lanterns in rural Malwai <i>Arnold Juma</i>	36
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Call for papers

Boiling Point forthcoming themes	41
----------------------------------	----

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Editorial

ISSUE 68

Energy in Emergency Settings



This year the first ever World Humanitarian Summit will take place in Istanbul, where energy leaders will encourage decision makers to address the urgent need for increased access to cleaner and more efficient cookstoves, fuels, and renewable energy products in humanitarian settings. Capitalising on this opportunity to share knowledge and raise awareness, the Global Alliance for Clean Cookstoves (Alliance), the UN High Commissioner for Refugees (UNHCR) and HEDON have published an emergency energy issue of Boiling Point.

Today there are more than 59.5 million refugees and internally displaced people (IDPs) worldwide that have fled their homes due to war and conflict, and another 97 million people that have been affected by natural disasters. Many of these people have no option but to use three-stone fires and traditional fuels for cooking and lighting, negatively impacting their health, environment, food security, and safety. While millions of refugees receive food from humanitarian agencies, they often receive food like rice that must be cooked before it can be eaten. In camps in north Darfur, 80% of IDPs interviewed reported selling food from their World Food Programme ration to buy firewood, and on average they missed three meals a week when they had food but had no fuel to cook it. In this issue, we take a closer look at the Sustainable Energy for Food (SET4food) Guidelines which links technical capacity and field experience to provide information on a wide number of technologies for cooking, food preservation, water pumping and purification, and electric power supply for use in humanitarian settings.

Not surprisingly, in emergency settings, women and girls are hit the hardest. UNHCR assessments in central and east Africa show that on average refugee women walk more than five hours each trip to collect firewood for cooking and heating, putting them at risk for physical and sexual attack and injury. Assessments in Chad found that 42% of refugee households experienced incidents of assault, attempted rape, rape, or other forms of sexual gender based violence during firewood collection over just six months. Long hours spent collecting firewood stops women and girls from utilising that time for education, business, child care, or rest. Further, lack of access to fuel for lighting prevents children from studying at night and increases

women's vulnerability when navigating camps to use latrines and other services. Articles in this issue from the Women's Refugee Commission and Gaia Association explore the need for clean cookstoves and share how the Safe Access to Fuel and Energy (SAFE) Humanitarian Working Group works to protect women and girls from violence in humanitarian settings.

Unclean and unsafe energy access also has dire health consequences, exacerbated in refugee camps. Millions of refugees are exposed to health risks, including respiratory infections from smoke produced by inefficient stoves and fuels. Yet this receives comparatively little attention in humanitarian relief policies despite the fact that in crisis settings the burden of airborne respiratory infections (ARIs) tends to be exponentially greater than in non-crisis settings. In Nepal, for example, ARI mortality rates were roughly 10-17 times higher among refugee populations than among those in non-crisis settings. Despite this evidence, practitioners struggle to get energy access on emergency relief action plans. In this issue, Mercy Corps shares key learnings and practitioner takeaways from their efforts to secure energy access in their recent Nepal earthquake response programme, and Chatham House shares their Moving Energy Initiative report which outlines specific recommendations for humanitarian agencies, donors, and host governments to try introducing cleaner, more sustainable forms of energy at scale.

Boiling Point 68 explores diverse aspects of emergency energy access, including report summaries, best practices and expert responses. However, at the heart of this issue are the words of Alima Mohamed, a Refugee Leader at The Nakivale Settlement in Uganda. Alima not only brings to light the burden of energy poverty from a refugee perspective, but more importantly highlights the incredible bottom-up capacity of refugees to create, deliver and promote energy access solutions for their own communities - if only they were empowered to do so. Wanting her message to be taken to the upcoming Summit, Alima says "You can tell them: I am Alima, I'm a woman and we cannot live without light here. If we get light, we can work and if we can work we can do anything".

Katherine Arnold, Corinne Hart, Amare Egziabher, Betsy Lippman and Karima Hirji

Theme

“With light there is more life”: Energy access for safety, health and well being in emergencies

Keywords: Energy access; Acute emergencies; Solar lighting; Nepal earthquake; SAFE network; Health; Shelter; Protection



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Picture 1: Solar home systems were distributed to health posts and clinics destroyed by the earthquake, like this birthing centre in Dhunkharka VDC (Source: Allison Dworschak)

This article is focused on the impacts of access to improved ‘Tier 1’ energy products in Mercy Corps’ recent Nepal earthquake response efforts. The article presents how energy access was selected for inclusion amidst competing priorities, presents initial post-distribution monitoring data that reflects how families are using and valuing the energy products provided, and discusses key lessons for humanitarian response practitioners providing relief in acute emergencies, including addressing the risks of market spoilage. Among recipients of the non-food relief item kits, three main factors influenced receptivity to solar: 1) Improving safety and mobility; 2) restoring normal routines with family; and 3) avoided costs or savings on lighting and mobile charging.

Introduction

In April 2015, a 7.8 magnitude earthquake struck Nepal, the most powerful to occur in the region in 80 years. A month later, an aftershock of 7.3 magnitude caused further devastation. More than eight million people were immediately affected, destroying homes, basic infrastructure, including hydropower plants and transmission lines for electricity, productive assets, and businesses in both rural and urban areas. The impact of the earthquake was particularly devastating to the rural poor, first by the immediate destruction to their homes made largely of mud and stone, and after, with limited access to outside assistance due to the isolation of their mountain communities.

Rebuilding community infrastructure, assets, and supportive networks is further complicated by regular climatic events in Nepal like the annual monsoon, which brings flooding into major river systems and landslides in the hills and mountains, causing significant loss of life, damage to vital infrastructure, agricultural land and property. Before the earthquake, 76% of Nepali households were electrified (Nepal DHS, 2011) primarily through hydropower plants owned and operated by the Nepal Electric Authority (NEA) and power purchase agreements with independently owned and operated power plants. The earthquake damaged 14 hydropower plants resulting in a loss of 150MW. While all but one NEA plants are reported to be up and running again, at the time of this article submission, the distribution networks are

not fully restored and a number of smaller IPP hydro-projects remain damaged. Even before the earthquake, distribution of electricity access was low in rural areas (60%) and even lower in mountain regions (49%) and households could expect planned load shedding for up to 84 hours per week (Central Bureau of Statistics, Nepal Annual Report, 2014). In the districts where Mercy Corps delivered cash transfers and critical basic non-food relief item (NRFI) kits, households averaged pre-earthquake electricity access of between 81-87% (Nepal DHS, 2011). Following the earthquake many of these areas were without electricity for weeks and repairs to the grid have been slow. Further, some villages were displaced and moved to areas thought less vulnerable to aftershocks and landslides, but entirely without access to electricity (UN Shelter Cluster, 2015).

Picture 2: Nepal
(Source: Tom Van Cakenberghe,
Mercy Corps)



Mercy Corps earthquake response

Operating in Nepal since 2005, with four offices and more than 100 staff, Mercy Corps responded within 48 hours of the first earthquake, distributing emergency relief supplies to affected communities. Through the initial emergency response phase from May-August 2015, Mercy Corps reached 23 400 households (117 000 people) with unconditional cash transfers (the provision of money to individuals or households, either as emergency relief intended to meet their basic needs for food and non-food items or services, or to buy assets essential for the recovery of their livelihoods) through local service providers and with consolidated NFRI kits within the worst affected communities in four primary districts; Kavrepalanchok, Sindhupalchowk, Dolakha and Nuwakot. Unconditional cash allows distressed families to pay for the items that are most important to them – such as food, school fees, building materials, crop seeds, and agricultural tools – at their own discretion. The influx of household cash also boosts local economies, aiding long-term recovery.

The four primary districts were selected based on findings from our initial assessments in coordination with district-level government. Mercy Corps was requested by local government line agencies and District Disaster Relief Committees (DDRC) to respond in areas they had identified in need of immediate relief. Distributions are coordinated and managed by our locally-based network of four district teams and the district Nepal Red Cross Society (NRCS) chapters. To select NFRI items to include in the kits, the team began with the Nepal Red Cross Society recommendations as a baseline and made important choices based on staff recommendations, including drawing on the expertise of a gender and protection advisor. The team made a critical decision to upgrade the shelter kit with d.light solar lanterns. This brand was selected because it meets Lighting Global minimum standards and because the Mercy Corps Nepal team had an existing partnership with an established d.light solar distributor in Kathmandu, Empower Generation.

For Mercy Corps, incorporating energy access items such as solar lanterns or improved cookstoves (ICS) into NFRI kits is not standard practice. While the agency is a leader in emergency response, our energy programming to date has been focused mostly in protracted crisis and development settings. In these settings, we take a markets approach to increasing energy access. This entails identifying gaps in service provision and the enabling environment, and designing targeted interventions to address these gaps through existing service and technology providers, rather than assuming core market functions ourselves. However, through needs assessments, market price monitoring, and consultation with local energy distributors and service providers, we determined that the Nepal earthquake was exactly the kind of crisis, where short-term free distribution of energy technologies was needed and appropriate. Using the experiences from the Nepal earthquake response, we are creating guidance for our programme teams responding to acute emergencies. As a member of the Safe Access to Fuel and Energy (SAFE) Working Group, we are working to ensure that energy access is recognised as crucial within the wider humanitarian response community, as well as within our own organisation. An important aspect of this work, and a perspective that is shared among many of the SAFE membership, is that energy access in acute emergencies and energy access in development settings need not be at odds. We see the responsibility of agencies to ensure that distributions in emergency settings, such as the Nepal earthquakes, are designed in such a way that does not disrupt functioning or emerging private sector markets for energy products and services.

Coordination with energy access actors

Currently, there is no official UN cluster to ensure that cooking, lighting, heating, and powering needs are considered in emergency response efforts and that the response is coordinated. In lieu of an official coordinating cluster, the SAFE Working Group, chaired by the Global Alliance for Clean Cooking (Alliance) and Women's

Refugee Commission (WRC) took a leading and critical role in organising coordination calls for organisations involved in energy access initiatives in Nepal following the earthquake. SAFE also established in person meetings in Kathmandu hosted and led by the Alternative Energy Promotion Centre (AEPC), and posted minutes and a map of member activities on their website. These coordination meetings were open to all sectors, and had regular participation from UN agencies, implementing agencies, and key Nepali solar distributors and service companies such as Gham Power, SunFarmer, and Empower Generation. For example, Gham Power organised coordination efforts with the Global Nepali Professional Network and others providing solar relief, mapping active, in progress, and fulfilled requests from communities, organising shared shipping containers and transport for solar products, and launching 'Rebuild with Sun' - a successful donation campaign. Information sharing coordinated by the SAFE Working Group was useful in a number of ways, helping to: generate a map of response activities and avoid duplication of efforts, promote information sharing including assessment results, coordinate donations, build a sense of camaraderie and morale for each organisation's part in the larger response effort, provide guidance on procurement and assessments, and importantly helped validate the appropriateness of the free distribution approach through the active involvement of Nepali distributors and private sector energy service providers.

Project impact and findings:

PDM methodology

Mercy Corps Nepal conducted Post-Distribution Monitoring (PDM), Focus Group Discussions (FGD), and Key Informant Interviews (KIIs), with beneficiary households across the four programme target districts. Quantitative PDM data was collected through 400 household surveys and a total of 13 FGDs, including six exclusively women FGDs and seven exclusively men FGDs. Focus groups consisted of 7-12 each. A total of KIIs, consisting of 1-3 interviewees

Picture 3: Nepal
(Source: Tom Van Cakenberghe,
Mercy Corps)



each, were conducted with savings group members and Mercy Corps field team staff. The PDM and FGDs were designed to help evaluate the effectiveness of kit items, better understand cash usage, and learn more from communities about what worked to enable people to cope with and recover quickly from disaster. The PDM included five questions relating specifically to the inclusion of solar lights in the kits. The full PDM report will be made publicly available in early 2016.

PDM & FGD results: Solar lighting and charging

- 76% of households are using the new lamp on a daily basis
- 87% report that they are saving money with the solar light
- 288 households surveyed received lanterns with mobile charging capabilities and of these, 226 are actively using their lanterns for mobile charging
- 92% of households who use their lantern for mobile charging report that they are saving money with the solar charging feature of their lantern
- Of households with at least one child in school, 83% report that the solar light makes it easier for children in the household to study at night
- 99% of respondents report they feel safer at night now that they own a solar light
- The birthing centre staff feel more equipped for nighttime deliveries

Key informant interviews reveal that, as most families are limited to one-room temporary shelters, the whole family benefits from the new lamp. The light is used while cooking, studying, and safely visiting the latrine at night, checking for environmental risks like scorpions and snakes and for damage after landslides and aftershocks. People emphasised how important it was to have the peace of mind of being able to check on their property immediately, if a landslide or aftershock happened at night, without waiting until the next day. The addition of solar has enabled families to get back to normal routines, cut the cost of other lighting methods like kerosene, candles, and battery powered torches enabling households to reallocate those savings to

other needs and has allowed affected people to feel safer in an uncertain time.

Similarly, the birthing centre in Dhungkarka, which serves 11 678 people and attends to an average of 10-12 births a month, has increased the safety of their operations with solar. Since the earthquake, the centre is operating out of a tent. Staff shared that “most deliveries happen after dark. Before we had the solar, we had to use a torch and our emergency light. Neither work for long and someone has to hold it. With the solar system, we always have light and our hands are free.” In each of the 13 focus group discussions, participants singled out the solar lanterns as a vital and valuable resource in the weeks and months following the earthquake and in the wake of subsequent aftershocks and ensuing monsoon season. In 70% of FGDs, households said that solar was the “most important” item for households out of the entire kit contents.

Discussion

Three important factors seem to have influenced receptivity to solar among recipients of the NFRI kits: 1) Improving safety and mobility; 2) restoring normal routines with family; and 3) avoided costs or savings on lighting and mobile charging. In addition, households with restored grid access use the lanterns as backup during scheduled load shedding of up to 11 hours per day.

First, the solar light allowed families to improve safety and increase the ease of moving around at night to tend to their duties like feeding cattle or get to the latrine. Aftershocks still occur regularly and landslides can be heard in the night. People reflected that the immediate access to solar allows them to check on their property and livestock instead of waiting until morning. Across the board both men and women in focus group discussions, and 99% of all households surveyed, emphasised that solar increased their feeling of safety at night. As temporary shelters are constructed with available materials, tarpaulin and CGI sheeting, they are open in places. Animals, snakes and scorpions entering the house after dark are of concern, especially in households with small children. Parents

of small children appreciated being able to check the surrounding area for these risks before bed. Women of all ages in 13 focus groups mentioned that they felt much safer traveling to the latrine or tending to other responsibilities at night without tripping and risking injury. Solar lighting promoted freedom of movement, the option to cook meals and eat when it is convenient, and greater control over the environment.

Second, solar lanterns helped families get back to regular meal times and homework schedules with their children; getting children back to a regular schedule was important to families following such a traumatic event. Further, in agricultural communities it is common for family members to eat their evening meal as they finish with their respective responsibilities. As a result, women often eat latest and are especially appreciative of being able to prepare food and eat by the light of the solar. One community talked about the difference it made to see lights on in neighbours' homes at night. Before the solar light distribution, the entire community was dark, which was described as a depressing reminder of the damage. After the kit distribution, people had lights on again, repairing feelings of community, family, and home. As one woman from the community put it, “With the solar light, there was more life.” These bits of normalcy and more control over the environment are important to families whose whole lives have been disrupted and in some cases physically relocated.

Third, in most areas there was immediate damage to grid power, and solar lighting enabled people to quickly restore access to basic lighting without the added expense of batteries and with the feature of mobile charging for some of the beneficiaries. One community estimated a monthly saving of about US\$5 per family in lighting costs, while another woman reported that previously, she typically paid a neighbour US\$1 to charge her mobile to talk to her daughter in Kathmandu. For most communities, it was not possible to find kerosene or candles on the market, or it was very expensive after the earthquake. In these households, solar saved on immediate costs and helped free up income for other essential items like food and building materials.

Box 1: Lessons learned

Mercy Corps found that solar lanterns were a welcomed and critical addition to the NFRI kits, which promoted household safety, savings, and control over allocation of time. However, the inclusion of solar lanterns into the NFRI kits could have easily been omitted. An important factor in the decision to include solar lighting was Mercy Corps Nepal's (MCN) pre-existing relationship with solar light distributors in Kathmandu. Without these relationships, and internal champions for solar lighting within MCN, it would not have been as easy to make quick decisions to incorporate a new product, like solar lanterns, into NFRI kit contents in the first 24 hours following the earthquake. Likewise, coordination with private sector solar lighting distributors and service providers, helps protect existing clean energy markets from spoilage.

Box 2: Key takeaways

1. Energy access for cooking, lighting and powering should be a deliberate consideration in acute emergency response efforts
2. Coordination of energy actors, including the private sector, is critical in ensuring an efficient response that does not compromise long-term sustainable energy access goals
3. Development of relationships with local solar distributors and collection of information on national clean energy distribution networks before an emergency helps speed decision-making and coordination in the critical first 72 hours of an emergency

Recommendations for incorporating energy access into emergency response programming

Prevent market spoilage: In emergency response contexts we must strike a balance between maintaining the core humanitarian principles and taking measures to not undermine the long term stability of clean energy markets by flooding healthy markets with free or heavily subsidised goods. This requires taking a nuanced approach to defining our humanitarian context, assessing market availability of goods and services, and choosing appropriate response mechanisms (e.g. results based financing agreements with local banks, government, or private sector, direct cash transfers to households, vouchers through local vendors, distributions of food or non food items etc.). While this seems logical, there are still cases, even in non-emergency settings, where good intentions can be destructive to long-term sustainable access to improved energy services. In Nepal the damage wrought by the earthquake was widespread and indiscriminate and affected key nodes of power provision throughout affected areas, making free distributions of lighting appropriate. However, it is still important to verify assumptions through due diligence such as rapid market-price tracking that includes fuel for cooking and lighting; using resources such as the Rapid Assessment for Markets (RAM), Market Analysis Guidance, or the Emergency Market Mapping Assessment tools (available @HEDON); participation in a coordinating group like the SAFE Nepal Coordination meetings; and/or through consulting directly with the private sector to understand how the emergency has affected distribution networks and whether free or heavily subsidised distributions would displace businesses. Finally, establishing relationships with national and sub-national private sector distributors and service providers before an emergency, is essential in ensuring rapid response and responsible decision making in the event of an acute emergency.

Establish minimum standards for lighting assistance in emergencies and disaggregate lighting types when tracking relief distributions within UN cluster system: Lighting types should be tracked separately to indicate the quality of lighting provided, just as thickness of tarpaulin or length and quality of ropes would be indicated to maintain a minimum standard. Mercy Corps found that the solar lighting provided in the NFRI kits were being filed under the same category as kerosene and candles. Kerosene, candles, and battery-powered torches are not the same quality as solar in terms of health, lighting quality, safety, and running costs. World Bank/IFC guidance for aid organisations and governments on procurement of off-grid lighting products can be found on the SAFE website. This guidance should be adopted as a minimum standard for aid organisations distributing lighting products in emergencies.

Include energy access as a part of standard emergency response capacity building and in prepositioned emergency resources at the HQ, regional, and country levels: Each decision point in an emergency can add time delays to response efforts. Information like regional or domestic suppliers of energy products with guaranteed capacity to procure, package, and deliver quality materials, pre-filled purchase requests and waybills, and pre-positioned market studies which show the pre-emergency market actors and distribution channels for improved energy products, improve the efficiency of response efforts and help teams avoid market spoilage. For teams that are new to energy access, providing a small set (five or less) of readily adoptable questions in both paper and tablet formats to include in assessments and post distribution monitoring is helpful to ensure that energy needs are considered, assessed, and incorporated into response planning.

Recognise energy access as a key protection and health issue: The link between energy, protection and health should be more explicitly recognised and acted upon by donors, implementing agencies, and coordinating bodies when respond-

ing to acute emergencies. Because rigorous quantitative data demonstrating these links is scarce, there is also a need to develop a more rigorous evidence base upon which to influence funding and policy decisions. In Nepal, safety concerns voiced by communities primarily centred on environmental safety, however in many contexts walking to collect fuel for lighting and cooking can put women and children at risk of assault or gender based violence. This is a risk in non-emergency settings, which can be exacerbated during crisis. In focus group discussions, communities who previously used kerosene for lighting were appreciative of the health benefits of solar, noting that there is less smoke in their small one-room temporary shelters without the kerosene. Although the environmental health risks of indoor air pollution (IAP) are well documented, indoor air quality is not consistently addressed or considered in relief interventions – even within a ‘do no harm’ frame.

Avoid pressing sector specific agendas: Recognise that energy is not the only need, and in some circumstances, not the most important focus among competing response priorities. Emergency response teams are often inundated with demands to include sector specific assistance. Unsolicited and uncoordinated advocacy for specific sector interests can be a distraction with the potential to detract from real on the ground response efforts in country. It is important to respect teams’ identification of priority needs within the communities they are working in. However, there is a balance between, and real utility to, providing this space while also ensuring that the right questions are asked and that important needs are not overlooked.

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- * Analysis and Assessment tools
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Safe Access to Fuel and Energy: A lifeline for refugee women and girls

Keywords: Refugees; Women and girls; Violence; Firewood; Cooking; Energy access



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Picture 1: Women carrying firewood
in Ethiopia (Source: J. Ose)

Millions of people displaced by crisis and conflict – primarily women and girls – risk their lives daily just to be able to cook a simple meal, heat their homes, and light their homes and communities. Food distributed to crisis-affected communities by humanitarian agencies must be cooked before it can be eaten, yet cooking fuel is generally not provided. The Women's Refugee Commission has been working for a decade to put Safe Access to Fuel and Energy (SAFE) on the humanitarian agenda and led global efforts from 2007-2009 that resulted in comprehensive guidelines for cooking fuel in humanitarian settings. Today, access to energy is increasingly recognised as a human right and global attention is being drawn to the issue, but important global frameworks, such as the United Nation's Sustainable Energy for All and Sustainable Development Goals, have largely overlooked the humanitarian sector. Moreover, within the humanitarian sector itself, there is no cluster or lead agency responsible for responding to the energy needs of crisis-affected populations. The SAFE Humanitarian Working Group is working to fill this gap, but donors and policy makers must support safe access to fuel and energy if they want to help protect women and girls from violence in humanitarian settings.

The challenge

“If our daughter is getting raped, it is because of firewood,” a Congolese refugee mother living in Nyarugusu settlement in Tanzania told me. The same afternoon, an adolescent refugee girl said: “I am afraid of so many things [when

collecting firewood] – to be attacked, to be killed... to be raped.”

The negative consequences of energy poverty are enormous, and the impact is especially severe in humanitarian contexts. Millions of people displaced by crisis and conflict risk their lives daily just to be able to cook a simple meal, heat their

homes, and light their homes and communities. The drudgery and burden of finding cooking fuel and household energy almost always falls on women and girls. In refugee camps, aid agencies commonly distribute food, but almost never provide adequate fuel to cook it. Cooking fuel and household energy have not been systematically

Figure 1: SAFE interventions
(Source: WRC)



prioritised by the humanitarian system for a number of reasons. For one, there is a lack of awareness about the protection and life-saving aspects of safe access to energy, as well as a lack of leadership and accountability – no one humanitarian agency or organisation is mandated to address and meet the energy needs of crisis-affected populations. There is also limited capacity and technical expertise on this issue area within the humanitarian community. And finally, crisis-affected communities and host communities are often dependent on the same sources of energy (biomass), which presents challenges such as land access, ownership of natural resources, and environmental degradation, which must be carefully negotiated with the host government and communities.

Since the food distributed by aid agencies is inedible unless it is cooked, women and girls are forced to spend long hours gathering firewood. In many cases, they travel tens of kilometres several times a week into remote, unsafe areas and sometimes must sleep overnight at the collection sites (WRC, 2014). Every time they leave the camp, they risk being raped, beaten, or even killed. Displaced women and girls have repeatedly reported to Women's Refugee Commission (WRC) and other organisations that firewood collection is the most dangerous activity that they must undertake in their daily lives.

These fears are backed by research. For example, in Doro, South Sudan in 2014, 54% of refugee respondents reported incidents of violence against women in firewood collection locales (Danish Refugee Council, 2012). Most egregiously, in 2009, Physicians for Human Rights reported that 90% of documented rapes in Farchana camp in eastern Chad occurred outside of the camp when women were collecting firewood needed to cook their food (Physicians for Human Rights, HHI, 2009). And most recently, there is evidence of increased incidents of rape and sexual violence associated with firewood collection in Nyarugusu camp in Tanzania since the mass influx of Burundian refugees in 2015 (IRC, 2015).

The energy-related dangers refugees experience are not confined to fire-

wood collection. Women and girls face risks within the camps and settlements as well. The lack of lighting at night in remote camp locations provides predators with the cover of darkness to commit their crimes. The simple act of using the latrine at night can be risky. Earning a living carries its own risks. Refugees are often banned from working and are forced to rely on natural resource-intensive livelihoods, such as making and selling charcoal, cooking food to sell, brewing alcohol, and brick-making. Consequently, women and girls spend a significant amount of time and labor collecting firewood not only for their own household energy needs, but also for income-generation purposes. This time burden prevents them from partaking in safer and more sustainable activities, such as farming, agroforestry, education, and childcare. Moreover, these livelihood activities rely heavily on natural resources, which has devastating effects on the environment. The overexploitation of natural resources not only has negative impacts on local ecosystems, but it also triggers tensions between refugees and host communities over dwindling resources, further exacerbating the risks that women and girls experience in these settings. Protection, livelihoods, energy, and the environment are inextricably linked.

The SAFE solution

Energy needs in humanitarian settings present complex social, development, and logistical challenges that require a robust solution. In order to ensure safe access to fuel and energy, a set of activities that addresses the root causes of energy challenges in these contexts is required to help protect both people and the environment. Thus, Safe Access to Fuel and Energy (SAFE) seeks a comprehensive approach, combining clean and efficient technologies, alternative fuels and energy supplies, safe and sustainable livelihoods, protection interventions, and environmental activities. This comprehensive approach to energy needs, which goes beyond simply handing out a cookstove or a solar lantern, helps to shift communities away from harmful reliance on firewood and, in so doing, protects and empowers women and girls.

A UN World Food Programme (WFP) SAFE initiative in Darfur, which has reached more than 1.5 million beneficiaries, proved successful in limiting gender based violence and harassment in Darfur, with 86% of women reporting less or no harassment as they switched from collecting firewood to using briquettes, improved stoves, and safer livelihood activities (e.g. selling self-made stoves, briquettes, seedlings, and tree products) at SAFE centers (WFP, 2013).

SAFE Humanitarian Working Group Objectives

Objective	Example of key activity
Improve coordination and share information and knowledge	Identify and document key achievements, best practices, lessons learned, and other information on effective mechanisms to address energy needs and challenges, and utilise the information for future planning and programming
Commission research and build evidence through standardised monitoring and evaluation	Develop standardised indicators and an M&E framework for SAFE that can be used to evaluate programmes and build evidence on impacts
Provide technical support, tools and guidance for implementation	Serve as a technical resource to governments, non-governmental organisations, inter-governmental organisations, and practitioners using the best practices and principles including the IASC SAFE Guidelines (matrix and decision tree) and other resources developed by the SAFE Working Group
Build human resource capacity of partners and key stakeholders	Conduct trainings and hold workshops on SAFE for relevant stakeholders including field staff, donors, partners, and government officials (e.g. ninety participants from 25 countries attended the 2015 Annual SAFE Training held in Kampala Uganda)
Conduct advocacy	Increase the organisational, political, and financial prioritisation of SAFE in humanitarian settings through targeted advocacy messaging and education
Mobilise resources	Collaborate on joint proposals for SAFE coordination, research, and implementation

Table 1: SAFE Humanitarian Working Group Objectives

Putting energy on the humanitarian agenda

WRC has been working for nearly a decade to put cooking fuel and energy on the humanitarian agenda. In 2007, WRC spearheaded the creation of the Inter-Agency Standing Committee Task Force on SAFE in humanitarian settings, which it co-chaired with the UN High Commissioner for Refugees (UNHCR) and the WFP. The task force, which comprised of UN agencies and humanitarian non-governmental organisations, produced comprehensive guidance on providing safe access to cooking fuel in humanitarian settings. This guidance – a matrix and a decision tree – lays out roles, responsibilities, and response options for practitioners on the ground. It is a practical resource for practitioners to implement more and better programmes for communities in need. SAFE has subsequently expanded to cover humanitarian energy needs more broadly to include lighting, heating, and powering.

WRC, along with the Global Alliance for Clean Cookstoves, currently co-chairs the SAFE Humanitarian Working Group. The Working Group is the primary coordination body for energy in humanitarian settings and facilitates a more coordinated, predictable, timely, and effective response to the fuel and energy needs of crisis-affected populations. The Working Group provides much-needed expertise and guidance on how to assess fuel and energy needs, incorporate energy technologies and systems into humanitarian programming and response, as well as facilitate the coordination and contributions

of experts across sectors to improve access to energy for crisis-affected communities around the world.

Moving forward: Embracing the humanitarian sector

Today, safe and sustainable access to energy is increasingly recognised as a human right, essential for people's safety, well-being, and productivity. New global attention is being drawn to this issue through initiatives like Sustainable Energy for All and the Sustainable Development Goals. However, the humanitarian sector has largely been overlooked. The goals and objectives laid out by these frameworks will not be achieved if displaced and crisis-affected communities are not served under them as well.

Within the humanitarian sector itself, one critical barrier is that there is no cluster or lead agency responsible and accountable for responding to the energy needs of crisis-affected populations. While energy is a cross-cutting issue that touches many sectors (e.g. protection, livelihoods, environment, health, food security, and shelter), it also requires specific technical expertise and leadership that other sectors are simply not able to provide. The SAFE Humanitarian Working Group is working to fill this gap through six objectives so that partner agencies can effectively and efficiently meet the needs of crisis-affected communities, but it requires support to develop the tools, resources, and opportunities for practitioners and policy makers to effectively address the energy needs of crisis-affected communities.

In addition, the vast majority of energy-related interventions in displacement contexts to date have been implemented in an ad hoc way. It is critical that humanitarian organisations go beyond standard stove distributions and implement comprehensive energy programmes as outlined in the Inter-agency Standing Committee (IASC) SAFE Guidelines. These programmes should be community driven and should combine cleaner, more efficient technologies, sustainable fuel and energy sources, environmental activities, and alternative livelihoods. Given the direct linkage between access to energy resources and exposure to gender-based violence, donors and policy-makers must support this work if they want to help protect women and girls from violence in humanitarian settings. Furthermore, while research and pilot projects over the past decade have repeatedly confirmed the grave dangers and risks faced by women and girls due to a lack of safe and sustainable access to cooking fuel and other energy resources, few evaluations have been undertaken in humanitarian settings to document the impact of energy interventions following a holistic response. The available evidence, albeit limited, demonstrates numerous and incredibly positive outcomes for the protection and empowerment of women and girls.

Measuring violence and risk is notoriously difficult, but going forward, rigorous monitoring and evaluation must be prioritised along with comprehensive programming to meet the needs of displaced and crisis-affected communities and establish a strong evidence base for

Box 1: SAFE Working Group coordination at work in post-earthquake Nepal

When a massive 7.8 magnitude earthquake devastated Nepal in April 2015, humanitarian and energy stakeholders mobilised to provide support and access to energy for earthquake survivors. Without a central coordinating body, however, these agencies risked duplicating efforts, wasting resources, and providing uneven or ineffective assistance across communities.

In response to this need, the SAFE Humanitarian Working Group coordinated efforts among humanitarian response agencies, community-based organisations, international NGOs, private companies, and the Government of Nepal to assess energy needs and respond accordingly with distributions of solar lamps, fuel-efficient cookstoves, off-grid power systems, mobile charging units, and other critical energy supplies to earthquake survivors.

The SAFE Working Group hosted weekly conference calls, shared updated response activities and requests as partner reports came in, and maintained a Nepal energy response webpage with an activity map and resource list on the official SAFE website. This webpage was the only energy-related resource listed on OCHA's humanitarianresponse.info Nepal emergency site.

During the coordination calls, it was discovered that humanitarian response agencies and the Government had overlapping plans to distribute fuel-efficient stoves in certain locations, but they were able to avoid this duplication thanks to information sharing.

The coordination effort continues in 2016, and is now led by the Government of Nepal's Alternative Energy Promotion Centre (AEPCC), which took over the role in July 2015. AEPCC has reported that the coordination helped responders to avoid duplication and align capacities to reach survivors more efficiently.

outcomes and impacts in terms of exposure to risk, as well as opportunities for livelihoods, education, and other productive activities. After all, safe access to fuel and energy work is, in every respect, an issue of life and death for millions of women and girls.



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Picture 2: Displaced woman sitting on firewood in North Kivu, Democratic Republic of the Congo. (Source: Megan Gerrard, WRC)

Author profile

Megan Gerrard is Senior Programme Officer for Gender-based Violence Prevention at WRC, where she leads the SAFE programme. Megan works at the inter-agency level to develop strategy, coordinate with partners, and advocate for high-level commitment to SAFE in humanitarian settings. At the field level, she manages SAFE research projects and initiatives. Megan co-chairs the SAFE Humanitarian Working Group and serves as a member of UNHCR's SAFE Advisory Board.

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Viewpoints

Interview with Azam Saber, Rwanda Country Representative for UNHCR

Azam Saber has worked within the UN High Commissioner for Refugees (UNHCR) since 1974, holding several positions including Head of Office in Ivory Coast and Kenya, Deputy Special Envoy for south east Europe, Deputy Director for External Relations and Regional Representative for central Asia. Currently serving as UNHCR's Country Representative for Rwanda, Azam represents the UN High Commissioner to the Rwandan Government, diplomatic community and other similar entities. Boiling Point Editors speak to Azam about his experiences in Rwanda, the need for energy access in refugee camps and UNHCR's emergency relief strategies.



Azam, can you please tell us about your role at UNHCR and the work you are currently involved with?

UNHCR is the UN Refugee Agency which is mandated by the United Nations General Assembly to ensure that refugees around the world are protected and enjoy human rights. In Rwanda UNHCR co-leads the response for the refugees with the Government of Rwanda's Ministry of Disaster Management and Refugee Affairs (MIDIMAR). This responsibility includes ensuring protection of refugees, finding durable solutions for refugees and providing multi-sectoral assistance. Approximately 147 104 refugees currently reside in Rwanda and live in one of the six refugee camps or in urban settings. We work closely with different international organisations to provide the assistance and help that is needed. I am the Country Representative, which means I represent the UN High Commissioner vis a vis the Rwandan Government, the diplomatic community in Rwanda, the UN in Rwanda and all other entities in the country. In other words, I am the head of UNHCR in Rwanda. So I oversee our entire programme to protect and assist refugees in the country, and I am the Government's counterpart in the UN on all refugee matters.

In 2015, you said "Preparedness is an important element of a successful response... which will save lives, even with limited

resources". Can you elaborate on this in relation to the need for energy access for Rwanda's growing refugee numbers?

Particularly in an emergency situation, where time is limited, the impact on people's lives is enormous and the potential for disaster is very high. Preparedness is absolutely key in dealing with an emergency while preventing a disaster. UNHCR with the Rwandan Government leads contingency planning to envisage scenarios for sudden mass influx of refugees, which is done with all UN and NGO actors who are engaged in refugee response. We organised an emergency simulation exercise in January 2015 which helped enormously to prepare for the Burundi refugee emergency which we faced suddenly in April. It ensured that everyone knew who needed to take action and in which sectors.

In relation to the need for energy access, especially with the growing refugee numbers in Rwanda, preparedness is also important. Looking for suppliers and partners with whom we can engage in long term contracts is essential to ensure that we can access the supplies we need to provide cooking and lighting facilities for refugees in an emergency without delay. This creates a possibility to react immediately with the necessary items when people arrive. Preparedness is an important element but it is not the final answer. For example, due to budgets restraints, we are not capable of providing limitless access to energy for refugees. This information

teaches us to not only work in the present but also be aware of possibilities in the future.

We know that women and children often suffer the biggest burden of energy poverty and in Rwanda, over 80% of refugees are women and children. How does this affect the need for clean energy access and do your programmes take a gender-based approach by involving women and girls? If so, has this had a positive impact by, for example, reducing gender-based violence?

Yes, refugee women and children suffer a big burden of energy poverty in Rwanda, and women and girls specifically are exposed to fire and smoke during cooking which puts them at major health risks. UNHCR is helping women and girls in the refugee camps by providing energy saving stoves in order to contribute to mitigating the health issues related to cooking, and also trying to increase safety by providing solar lighting across camps and in key risk areas and strategic locations, including latrines and washing zones. If these areas are unlit at night, refugees face specific forms of insecurity, particularly assault and sexual and gender based violence (SGBV). Women and children are also at risk of SGBV when they go to collect firewood for cooking, heating and lighting, so UNHCR provides firewood for refugees so they don't have to leave the camps to collect it. However, refugees do still

go out to collect firewood to supplement what we provide for them, so we nonetheless aim to reduce the dependency on firewood by aiming to provide briquettes that would help refugees fulfill their cooking energy needs and stop the need for collecting firewood.

Refugees in Rwanda's camps receive dry food rations that are only edible when cooked. How does UNHCR provide access to such cooking facilities in refugee camps, both in the short-term and as a longer-term strategy?

We provide energy saving cooking stoves for each household so they are all able to cook their own food. For the short-term strategy as many as possible, but for the long-term strategy we are working to provide all of these energy saving cooking stoves for all households in all camps. Another long-term strategy is to provide enough fuel to all camps following the UNHCR standard which is 0.8 kg per person per day. We are also exploring other energy solutions such as biogas and briquettes to reduce the dependency on firewood.

What lighting solutions are provided to refugee camps, and why are they so vital?

For lighting solutions, we use solar panels to provide lighting for individual households. In the Kiziba camp, one of the oldest camps in Rwanda and home to some 25 000 refugees from Congo, all households already have individual solar lighting thanks to a generous donor contribution. In the Mahama camp, a new camp constructed in April 2015 for the Burundi refugee emergency, we are still working to distribute lighting to the nearly 47 000 refugees who live there.

UNHCR also provides lighting for key public spaces in camps such as places where refugees go to collect water, to bathe or to use sanitation facilities. This is vital for the safety of the camps, but also to ensure that life doesn't just stop when it gets dark. With public and household lighting we can ensure that refugees can still go out and move through the camp, collect water, bathe, meet friends, read or do their homework, or other day to day activities, even if the sun sets at 6pm.

Many of Boiling Point's readers are energy practitioners creating energy solutions for both cooking and lighting which you have highlighted are critical in refugee camps. If these practitioners are creating products specifically for emergency response programmes, what would you advise they keep in mind throughout the design process? In what ways should these products differ from products sold in non-emergency settings?

The design for energy solutions should be simple, keeping in mind that refugees can come from any range of backgrounds and that not all refugees in a single camp will have the same knowledge or familiarity with technology. As such, it is important to ensure that the technology level is user friendly enough that it could be used by anyone. Working in an emergency situation, we are always looking for quick and easy solutions. We are talking about huge numbers of people and always face budget problems, given that we rely almost entirely on voluntary contributions from governments or private sector partners to be able to carry out our operations. Therefore items we distribute to refugees also cannot be costly. This is unfortunately a challenge when it comes to energy and lighting; often the most cutting edge technology, which is the most sustainable, can come at a high price. As a humanitarian agency which is constantly responding to emergencies, donors fund us for one year at a time and are not looking at the long-term. For us, this means often having to go with options which are perhaps not the most energy renewable but strike a balance between being energy-saving and cost-effectiveness.

The sustainability of an item is also something we take into account. Products should be easy to repair, or even to reproduce, so that refugees can repair them or make new ones themselves. It is also critical to know the background and culture of the people who are going to use the end product. Refugees may have specific preferences and habits which differ from those of the host community, or from those producing the item. So it is important to know the population you are targeting, to ensure that they will accept

the item even though it might be something new to them and to understand their way of life before they became refugees.

How has UNHCR in Rwanda worked with government institutions, such as MIDIMAR, to ensure adequate energy access to refugee camps? How can energy practitioners working in refugee camps better communicate with and work with local governments?

UNHCR in Rwanda drafted a strategy for safe access to fuel and energy with all stakeholders including different relevant Government entities. There is a working group which coordinates and collaborates to ensure implementation of the energy strategy. We work in particular with MIDIMAR, who are also involved in the development and implementation of the energy strategy, as MIDIMAR is our key partner for energy as they provide access to firewood.

Going forward, what is UNHCR's long-term strategy for energy access in refugee camps, and in particular, for Rwanda's refugees?

Our long-term strategy is to reduce the dependency of refugees on firewood for cooking and move towards more sustainable energy sources such as biogas and solar energy. We are already moving in this direction. For example, we already provide solar lanterns, energy saving stoves, and other measures. But we want to increase our reliance on renewable energy sources and that is a key priority for our operation going forward. The more cost-effective these options become, the better we can advocate with donors to help us cover the costs and make the transitions.

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* UNHCR Rwanda Factsheet

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Moving Energy Initiative: Estimating the global energy use of forcibly displaced people

Keywords: Refugees; Displaced persons; Moving Energy Initiative; Renewable energy; Energy access; Energy for refugees



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Picture 1: A migrant girl looks at a light illuminating the camp site of refugees and migrants who spend the night on the street after their arrival at the Greek island of Lesbos after crossing the Aegean Sea from Turkey on 4 October 2015. Europe is grappling with its biggest migration challenge since the Second World War, with the main surge coming from civil war-torn Syria. (Source: Aris Messinis)

Protracted situations of displacement globally are at a crisis point and desperately in need of approaches that take long-term sustainability into account. Whilst political solutions for people being forced from their homes in Syria, Afghanistan, Burundi and elsewhere will take years to achieve, investments in services made now can do more to ease suffering and assist hosting communities in managing the additional resource pressures. Energy is an area in desperate need of attention which bridges the divide between humanitarian relief and host-country resilience. There are major health and protection issues associated with energy use amongst displaced people, from saving young children from hypothermia in cold climates to reducing long-term exposure to pollution from cooking over open fires. The Moving Energy Initiative (MEI) has been formed to catalyse change around energy delivery in humanitarian situations. Using a purpose-built model, MEI provides the first ever global estimates of energy use and costs among forcibly displaced people. The model reveals low levels of energy access, high human and economic costs for displaced populations and the agencies that serve them, and dangerous environmental impacts. The report outlines potential scenarios for doing things differently, with specific recommendations for humanitarian agencies, donors, and host governments. Now is the time to try introducing cleaner, more sustainable forms of energy at scale in ways that better protect and enable the displaced, support host governments' energy and environment policies, and increase aid effectiveness in the process.

Box 1: The Moving Energy Initiative

The Moving Energy Initiative (MEI) is a collaboration between GVEP International, Chatham House, Practical Action Consulting (PAC), the Norwegian Refugee Council (NRC) and the United Nations High Commissioner for Refugees (UNHCR).

The initiative is supported by the UK Department for International Development (DFID). The MEI aims to offer solutions to deliver energy in situations of forced displacement in a manner that reduces costs, is safe, healthy and respectful; that also benefits host countries and communities; and where possible creates opportunities for income generation and knowledge transfer to tackle energy poverty and sustainability.

This article is produced by Chatham House on behalf of the MEI. It is partly based on an evolving data set that continues to be updated as the project obtains data. As such, the data and findings of the Chatham House model included here may be adjusted in line with new information during the duration of the project. Our flagship report and toolkits are available @HEDON.

Introduction

In the 19 years since the last Boiling Point issue on household energy in emergency situations was published, the number of forcibly displaced has more than doubled, to 59.5 million people in 2014 (UNHCR, 2015). In this same period, it is striking how little has changed in the discourse surrounding energy provision in emergency settings. Many of the same arguments are still pertinent and energy remains peripheral and largely unintegrated in the humanitarian response despite the encouraging recent work of the Safe Access to Fuel and Energy (SAFE) Humanitarian Working Group. Energy is, for example, not officially incorporated in the cluster system, adopted in 2005 by the Inter-Agency Standing Committee (IASC) as a means of making emergency responses more holistic. This leaves millions of displaced people without access to clean, safe and secure energy services and renders humanitarian agencies reliant on increasing volumes of inefficiently burned fossil fuels to power generators.

In spite of the rising numbers, and costs associated with this, the resources and political will needed have not kept pace. Whilst UNHCR's funding requirements rose by US\$3 billion between 2009-2013, voluntary contributions rose by just US\$1.2 billion in the same period (UNHCR, 2014).

Energy services present a major opportunity for greater aid effectiveness. Light, heat, power and mobility are essential both for human dignity and the transition to self-reliance that UNHCR and many other humanitarian agencies are committed to. To do energy well, however, we need a longer-term perspective. The current approach in responding to emergencies results in ad hoc and temporary energy services that may lock in fuel demand and miss opportunities for more efficient and cleaner solutions. While emergencies are often seen as short-term events, ones that require an immediate response targeted at the most essential needs, the solutions, especially with regards to energy provision, need to have a longer-term outlook.

The economic case for change

To do things better we need to know four things: 1. How is energy currently being used in displaced contexts? 2. What are the costs and to whom? 3. What alternatives are available and will end-users face any barriers adopting these technologies or fuels? 4. How much could these save both the displaced and humanitarian agencies? There is not enough consistent data to answer questions one and two. The studies that do exist tend to focus on a particular type of energy provision – often cookstoves – in one-off case studies. The lack of reliable numbers as well as the vast differences in country contexts make it difficult to estimate energy-use patterns and costs with any confidence. This in turn makes it difficult to establish what the most effective approaches are and how to adapt these to different circumstances.

In a bid to overcome this basic knowledge gap, Chatham House developed a model for the MEI, assessing energy use by displaced people in camps, urban, slum and rural settings (Box 2). The model reveals incredibly limited energy access for the majority of the forcibly displaced. For example, an estimated 79% of the 8.7 million displaced people in camps only have Tier 0 energy access for cooking and 89% only have Tier 0 energy access for lighting. As a point of comparison, the International Institute for Environment and Development has called for the recognition of a minimum standard for energy at Tier 4 for cooking and Tier 3 for lighting to form part of the Sustainable Development Goals (IIED, 2015). For both, this denotes adequate access: reliable, good quality, affordable, legal and safe energy supply with adequate capacity of the primary cooking solution and lighting levels which allow them to cook, engage in livelihood activities and continued education. Moreover, the predominant source of this low-level energy is dirty and inefficient biomass.

The economic costs of this poor energy provision are great. We estimate that household energy use among displaced populations reached at least 3.5 million tonnes of oil equivalent at a cost of about US\$2.1 billion in 2014. These costs are borne chiefly by displaced people themselves. In field work for the MEI project, displaced households in Goudoubo refugee camp in Burkina Faso were found to spend around US\$10.65 per month on energy. Although humanitarian agencies try to reduce costs to households by providing some firewood – we were told, for example, that in Burkina Faso a three-person refugee household receives 12kg of firewood per month – this is inadequate as most households in Goudoubo use over 100kg of firewood per month. The 3053 households in Goudoubo camp, therefore, end up spending around US\$254 000 on firewood, US\$119 000 on charcoal, and US\$16 000 on batteries each year (Practical Action, 2015).

Meanwhile, we know from wide-spread anecdotal evidence that the fuel costs of running camp operations and transporting goods and staff are an increasing burden on humanitarian agency budgets. However, there is no standardised process to pool data from the UN or government authorities and NGO implementing partners. The MEI study's assessment of Dadaab camp in Kenya finds that costs for energy-use for administration and operations (not including transport) is in the realm of US\$2 million annually. However, usage in camps varies widely, with some severely underserved. In Goudoubo, Burkina Faso, for example, humanitarian agencies spend around US\$31 512 annually (Practical Action Consulting, 2015). Electricity, supplied via diesel generators, is only provided to the water pumping stations, the health centre and the school. This holds true for on-site administrative offices. As a result, implementing partners such as International Emergency and Development Aid who are responsible for camp management, do not have comput-

ers, or even lights installed in their offices, and most activities have to be conducted via pen and paper, or mobile phone. There is no public lighting for refugees and therefore, economic, educational, social, and other activities are limited to daylight hours.

The human and environmental case for change

Beyond financial costs there are serious health, safety and environmental concerns to the lack of affordable, clean energy access. Collecting firewood can, for example, expose women and girls to gender based violence. A number of studies attest to this with Médecins sans Frontières reporting that open fires present further risks, in the form of indoor air pollution which we estimate may lead to the premature deaths of 20 550 forcibly displaced people every year (Moving Energy Initiative 2015, adapted from WHO). Fires can also spread quickly in densely populated camps with flammable materials used for shelter. One UNHCR official in South Sudan told us “house fires, kids’ burns and hospitalisation of individuals with severe burns are common, especially during the dry season when the country is dry and there are strong winds”. In terms of the environmental costs, we estimate that energy use in displaced contexts generates around 13 million tCO₂ per year and forcibly displaced families living in camps consume the equivalent of 49 000 football pitches of forest in cooking fuel each year.

Testing possible interventions

The MEI model also estimates the upfront capital costs for and the savings generated by a range of possible interventions. It revealed that the widespread introduction of improved cookstoves (ICS) and basic solar lanterns could save US\$323 million in fuel costs and 6.85 million tCO₂ a year after an initial capital investment of US\$335 million. The annual fuel saving would mainly accrue to the displaced who currently spend substantial proportions of meagre household income on energy. Best

available technologies offer even greater human and environmental benefits. Widespread introduction of liquid petroleum gas (LPG) cookstoves, LPG fuel and solar photovoltaic (PV) mini-grids could transform the lives of forcibly displaced populations, resulting in emissions savings of 11.38 million tCO₂ a year, at an initial capital investment of US\$1.63 billion but at a considerable addition annual fuel cost of US\$685 million per year. As these costs emphasise, this type of intervention would not always be practical as LPG can be expensive, depending on the context. The costs above indicate that such interventions should be considered with an eye to subsidies and market development strategies.

Our model is still quite limited in being able to test these interventions. A key lesson learned from many energy access pilots around the world is that one size technology solutions do not fit all and adaptation to local conditions is essential for acceptance and durability. The figures cited above represent only the initial costs of the technology and do not incorporate the substantial costs of maintenance, training and support that are necessary to make interventions effective, nor do they account for a less than 100% adoption rate. In its next phase, the MEI partnership will be preparing to pilot energy interventions in Jordan, Kenya and Burkina Faso. Work will focus on country and local level activities that demonstrate new approaches, such as contracting for energy service solutions at scale. These pilot studies will offer more fine-grained assessment of the potential for different types of interventions.

Barriers to change

Our findings show that the energy challenge facing the humanitarian sector is not just about developing new technologies, but about changing mindsets and governance around energy management. There are several barriers to transformations within humanitarian agencies, donor funding preferences and host country political contexts.

One considerable barrier is the fact that energy has not been seen as a stra-

tegic priority. This is slowly changing as humanitarian agencies and donors recognise the lifesaving potential of energy interventions, but, for the most part, the current system lacks a systematic approach to data-gathering on, planning for and managing energy. There is a severe shortage of dedicated energy experts in the humanitarian system with the requisite skills and knowledge. In turn, energy is not presented as a priority to donors whilst donor funding can quickly switch based on political priority rather than need. Decisions are made on the basis of annual budgets and most often will not support sustainable energy investments, such as solar, whose savings are likely only to accrue over a number of years. Short-term humanitarian funding is poorly suited to financing long-term energy solutions in protracted emergencies.

Where cleaner or more sustainable energy options are implemented, agencies have tended to rely on a ‘procure and provide’ model that allows them to deploy at speed. While quick service provision is of course important, equipment is sometimes introduced with little consideration of local context or end-user preferences. Furthermore, the standards against which products are judged are rarely transparent and often highly confusing to companies that wish to offer their services. Success has often been measured by the number of products allocated to the displaced rather than on the basis of their uptake or long-term impact.

Perhaps the greatest challenge is that the length of stay of refugees is usually a politically charged issue in the host country. Many governments would not allow long-term infrastructural investment in camps and limit or deny official working rights to refugees. In addition, communities living side-by-side with large refugee populations are often not much better off and providing hi-tech facilities to refugees exclusively would only breed resentment.

Box 2: The Chatham House Model

Chatham House began by developing a typology of household energy use among displaced populations based on a series of semi-structured interviews with UNHCR staff around the globe. An average fuel consumption, energy cost and CO₂ emissions figure was calculated for each baseline household type based on data from interviews, field surveys, and independent desk research.

Data on the location and size of displaced populations came from the UNHCR Global Trends in Forced Displacement 2014 Statistical Annex. This data set encompasses a population of 49 053 874 displaced people and sorts them by country and settlement type. On the basis of these population figures and locations a baseline energy-use type was assigned to each context. By summing the respective annual fuel spend, volume of fuel use and CO₂ emissions of each camp and displaced population we are able to provide a first-time estimate of the scale of global energy use in situations of forced displacement. The methodology behind the model was presented and discussed during an international expert roundtable, on 18 June 2015. For more details on the assumptions, limitations, data used and calculations leading to final figures refer to the methodology in Appendix A of our report available @HEDON.

Recommendations

This first phase of research and fieldwork shows unequivocally that changes to energy provision in situations of human displacement can save lives and reduce costs and environmental impacts. In view of this, we have identified a number of directions for change.

Humanitarian agencies should incorporate energy considerations into core programming at each stage of their emergency response. This includes establishing more energy-dedicated posts and ensuring that detailed energy-related data is collected by all relevant agencies and reported in a standardised manner. Procurement should focus increasingly on energy service delivery rather than simply products.

This will be enabled by new funding structures which allow greater flexibility in spending based on estimated savings over several years. Donors should support funding deployed in the form of soft capital to de-risk private sector investment and kick-start local markets and supply chains. Cash transfers to vulnerable households may prove more effective than fuel hand-outs, allowing choice over energy services.

Energy interventions also offer scope for collaboration with host governments many of whom are facing major energy access, energy security and environmental challenges. Larger scale projects should be coordinated with local government authorities and extended to local populations. The accountability of service providers for the on-going success of interventions in line with humanitarian and development aims will be an important consideration.

Conclusion

Implementing these reforms will not be straightforward, especially in emergency contexts where money is short and the immediate priority is saving lives. They require investment and a willingness to innovate, experiment and do things differently. The conditions for reform in the international system have, however, never been better. The humanitarian sector has already begun to experiment with new technologies and delivery models. The SAFE Humanitarian Working Group is actively working to improve energy delivery for crisis-affected populations and has taken important steps to coordinate multi-sector responses to this issue. The upcoming World Humanitarian Summit in 2016 provides a historic opportunity to galvanise the international community around the energy-access agenda and scale-up existing efforts. And the Seventh Sustainable Development Goal commits the world to affordable, reliable, sustainable and modern energy for all by 2030. Displaced populations must not be left out of this and the effort to include them must begin now.

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- * MEI flagship report and toolkits
- * Authors' profiles
- * Acknowledgements

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Clean and safe energy for cooking: Ethiopian Jigjiga refugee camps

Keywords: Refugee Camp; Clean energy; Safe energy; Cooking; Ethanol; Jigjiga; Kebribeyah; Awbare and Sheder



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Picture 1: Aisha cooking on her ethanol stove (Source: Teklu Seyoum/Gaia Association Project Coordinator)

Gaia Association, an Ethiopian Resident Charity, was established in 2005 to introduce clean cooking technologies, particularly high performing ethanol fueled stoves, into the refugee camps of Ethiopia, under the auspices of the UN High Commissioner for Refugees (UNHCR) and the Ethiopian government Authority of Refugee and Returnee Affairs. Ethanol fuel is produced in the local sugar industry from molasses, a by-product of the manufacturing process. It is often thrown away or dumped. An ethanol stove fuel market creates the opportunity to transform molasses into clean burning ethanol fuel and sell it at prices competitive with kerosene or charcoal fuel. In September 2015, Gaia Association marked its tenth anniversary of service in the refugee camps as a UNHCR Implementing Partner. Gaia has provided over 12 million stove-user days of service in the camps, hauled over three million litres of ethanol to the camps, built extensive fuel-handling infrastructure in the camps, and now supports 7000 ethanol stoves in three locations: Kebribeyah, Sheder and Awbere camps. These stoves have displaced 100% of wood fuel use. The programme has enjoyed an accident-free record and is the most highly rated intervention by the refugees, as documented in the annual Participatory Assessments conducted by UNHCR. The following article shares lessons learned and best practices for practitioners to replicate this model in other humanitarian settings.

Introduction

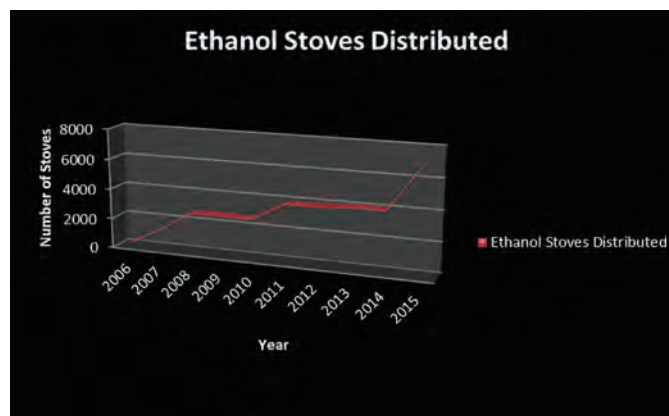
What began in 2005 as the pioneer programme for ethanol cookstoves in humanitarian settings has now grown to a full-scale intervention, reaching 100% of families in the three Jigjiga refugee camps. As

this is the only full-scale ethanol stove programme in a refugee camp setting, this article shares lessons learned and best practices for replication of this unique clean liquid fuel mode in other settings.

Aisha Osman Ibrahim is a 50 year old Somali refugee who has been sheltered at Kebribeyah camp since its establishment in

1991. She has been living at the camp for 25 years with her husband and 16 children in a small tukul (a dome-shaped hut common in east Africa). Her family depends entirely on the food rations they receive from the UN World Food Program (WFP). Other basic supplies and services are provided to Aisha's family by the UN High Commissioner

Figure 1: Gaia's stove distribution in the camps (Source: Gaia Association)



for Refugees (UNHCR), the Ethiopian Government Refugee Agency (ARRA), and other humanitarian organisations. Around the Kebribeyah refugee camp, there are very limited economic opportunities and resources to sustain the host community, let alone the refugee camp population. The host community is primarily made up of pastoral farmers who rely mostly on subsistence farming.

Aisha and her family have no economic means to earn an income, leaving them to rely completely on aid. She says “though we receive some of our necessities since the day we arrived at the camp, it is always a struggle to meet all our needs, including cooking fuel, which was one of the major necessities we had that had placed us in danger”. In Kebribeyah camp, firewood was the only cooking fuel available, but the semi-arid nature of the camp and its environs left little firewood available to the thousands of refugees, much less to the host community. Aisha and her family used to walk up to eight hours per day to find shrubs and small pieces of firewood for cooking. Her children missed several school days each week because they had to collect firewood. She adds “the task was dangerous, exposing us to the risk of physical assault and even to sexual abuse”. Aisha’s memories of those times are still vivid, though it has now been ten years since she ceased collecting firewood and started to use ethanol for cooking.

Aisha’s story is not unique. Hundreds of thousands of refugees sheltered in Ethiopia, and in many other African countries, face the same fundamental challenges of energy access. For Aisha and Gaia Association, this year is a milestone: it has now been ten years since the start of the ethanol fuel programme.

Gaia Association’s ethanol fuel and stove programme

Gaia Association, an Ethiopian nonprofit organisation, decided to use locally available ethanol fuel for cooking (produced from the molasses by-product of Ethiopia’s sugar manufacturing). Gaia introduced ethanol and ethanol fuelled stoves (CleanCook) to UNHCR camps in 2005. The CleanCook stove, manufactured in

Europe by Dometic AB (originally Sweden, later Slovakia) met the basic needs of users but still required adaptation. Gaia worked with Dometic to transform the stove for the bottom of the pyramid markets in Africa, reducing the cost of the stove from US\$250 to US\$50 for a two-burner stove and later to US\$30 for a one-burner stove. Gaia pilot tested the new stove in a study of 850 households in the city of Addis Ababa, sharing the results with the UNHCR and the Ethiopian government agency ARRA who both expressed interest.

The Gaia stove has a special design feature - a refillable adsorptive fuel canister that keeps the liquid fuel safely inside, however, when turned on, it facilitates its evaporation into the stove’s combustion chimney where it burns as a gas, ensuring safe, spill-proof use of the fuel. The stove is manufactured using either stainless steel or aluminium and the flame can be regulated by a knob to increase or decrease its power. The stove canister can hold up to 1.2 litres of fuel, enough for 4-7 hours of cooking depending on the power level used. The stove has a thermal efficiency of 61% and 1.8kW at high power and 0.3kW at low power. Following guidance from UNHCR and ARRA, Gaia tested the stoves in three refugee camps hosting three distinct nationalities: Somali, Sudanese and Eritrean.

Following extensive baseline studies in the refugee camps of Shimelba (housing Eritrean nationals), Kebribeyah (housing Somali nationals) and Bonga (housing South Sudanese nationals), Gaia conducted three-month pilot studies in 50 households in each camp. The results of the pilot studies were deemed satisfactory by Gaia as well as by UNHCR and ARRA based on household satisfaction, time savings, household air pollution reduction and less firewood use. However, Gaia found the replacement of the baseline fuel (firewood) in Kebribeyah to be close to 100%, unlike Shimelba and Bonga camps where part of the cultural staple foods required households to continue using firewood for cooking, despite acceptance of the ethanol stove for the remaining cooking tasks. The cooking culture in Shimelba includes traditional large bread-like baking (Injera) and in Bonga large pot cooking is

the norm to feed large size families. Thus, after assessing cooking habits, particularly for bread baking and large pot cooking, the Somali camps were selected for scale-up.

Addressing Ethiopia’s refugee energy needs

Ethiopia hosts the largest number of refugees in Africa, accommodating more than 630 000 refugees in 23 camps located throughout the country. Somali refugees account for more than 250 000 of the refugees in the country (UNHCR, 2015). However, the country has a fragile environment that is unable to support their energy demand, of which 94% is met by biomass fuels. Massive deforestation has occurred around the refugee camps as a consequence of the need for cooking fuel. Until Gaia’s intervention, no other cooking energy option existed for the camps, except, in some cases, expensive, imported kerosene fuel, which is costly for the government and for UNHCR and its donors. For years, this problem was not properly addressed because the reliance of refugees on firewood was considered to be a problem for the local government to fix, and was therefore not addressed by UNHCR. This created enormous tension between host governments and refugee communities. Now, because there is an achievable, affordable solution at hand, and one that contributes to the domestic economy, the UNHCR can be more proactive in providing a solution for refugee energy needs.

Aisha Ibrahim’s residence, Kebribeyah refugee camp, was established in 1991 to host Somali refugees fleeing from a devastating civil war. More recently, instability in Somalia forced the UNHCR to open new camps in the Jigjiga area, Awbere and Sheder camps, in 2008 and 2010 respectively. The Jigjiga camps currently house over 40 000 refugees. The successful result of Gaia’s stove programme in Kebribeyah encouraged UNHCR to expand it to the other camps. Thus, a pilot study that started with 150 stoves ten years ago has today expanded to more than 7000 families in three camps, and serves all refugees residing in Kebribeyah, Awbere and Sheder camps. Roda Mohamed and Shukuri Abdin in Sheder and Awbere camp share

similar stories to Aisha, telling how the new cooking solutions made their life easier. They further explain that they cook staple foods such as ‘Somali-Injera’ and porridge as well as other foods like rice and pasta with their ethanol stoves.

Reasons for the programme's success: Practitioner takeaways

The success of the ‘Clean & Safe Energy’ programme is due largely to Gaia’s research- and test-based approach to development challenges as well as its belief in starting small and scaling up carefully. This approach made it possible to meet demand and make the necessary technology and procedural adjustments along the way to ensure quality of service and reliable results. These results manifested in a perfect safety record for the stove and a nearly perfect safety record for the fuel. The programme also received high consumer satisfaction, as documented in the annual participatory assessments conducted in the camps, following an established methodology (UNHCR, 2006). Gaia has built capacity in trained, expert staff in the camps, including refugee staff and staff recruited from the host community. Gaia has also built infrastructure in the camps, including storage for 500 000 litres of ethanol fuel, enough for approximately three months of fuel consumption. Gaia regularly transports ethanol purchased at US\$0.44 per litre, denatured with colour and a chemical agent called Bitrex from Metahara Sugar Factory located around 485 kilometres west of the camps. Sometimes ethanol had to be hauled from the more distant sugar factory, Finchaa, around 1030 kilometres away. During the 10 years operating the ethanol programme, Gaia has hauled over three million litres of ethanol fuel to the camps and logged more than 12 million stove user-days. To achieve and maintain its results of safety and consumer satisfaction, Gaia provides training for its clients on a continuing basis and interacts with them at a minimum of every tenth day during the formal fuel distribution procedure. Ethanol is distributed at pre-planned distribution schedules in labelled jerry cans. During each fuel distribution session, a maximum of 10 litres is provided to fami-

lies with large family size (equal to or higher than 13) to ensure safety. Gaia’s community workers go door to door to conduct training and safety checks. Furthermore, Gaia’s camp staff provides stove inspection and maintenance services for all stoves. As a result of this maintenance programme, around 70% of the stoves that were introduced in 2005 are still in use today.

UNHCR’s Environmental Officer, Dr. Deribe Gurmu, is quick to explain the many achievements of the ethanol stove programme. It has cleaned up the indoor air of refugee households and allowed refugee families to cook in their homes rather than their cooking shelters. The programme has even cleaned up the ambient air in the camps, with the elimination of cooking fires. Given that the refugees no longer leave the camps to collect wood, the programme has reduced tensions with the host community and improved quality of life for children and women. Children have better school attendance and women are able to attend social and livelihood activities, helping them develop entrepreneurial skills and build a better life. Aisha and her community agree with Dr. Gurmu’s assessment of the programme and each year they express their views in the annual Participatory Assessment.

To quantify the impact on air quality in the camp homes, Gaia has from time to time conducted household air quality monitoring studies using equipment provided by Berkeley Air Monitoring Group and the Centre for Entrepreneurship in International Health and Development (CEIHD), now Impact Carbon. This has enabled Gaia to build its skill in conducting such studies and it has yielded data useful in measuring the impact of the ethanol stoves. Particulate Matter (PM) and Carbon Monoxide (CO) were measured in these studies. The CO concentrations in the room were measured with the HOBO CO logger (model # H11-001, Onset Computer Corporation, Bourne, MA, USA), which was set to record a concentration reading every minute. Fine particulate matter was measured by the University California Berkeley Particle Monitor (UCB PM), which uses a photoelectric detector (Litton et al., 2004; Edwards et al., 2006). The UCB PM measured the PM_{2.5}

concentration every minute (reported in units of milligrams per cubic meter of air, CEIHD/Gaia Association, 2007 4 mg/m³). Colour dosimeter tubes (model # 1DL, Gastec Corporation, Kanagawa, Japan) were also used to measure CO. The Gastec CO tube offered a different, simpler method of measuring the CO levels. Gaia Association was able to document up to 90% reduction in PM and 80% reduction in CO (Pennise, Brant, et al., 2009). Impact evaluation conducted by Ministry of Energy in 2006 at Kebribeyah camp showed household firewood replacement by ethanol saved an average of 3.7 tons of firewood and 200 hours of time annually by each household.

Next steps and concluding thoughts

Ethanol production is growing in Ethiopia with a large government expansion of the sugar industry, as part of Ethiopia’s Growth and Transformation Plan (MoFED, 2010). Producing ethanol as a valuable co-product of sugar is an important part of the strategy, especially now that the market for ethanol stoves has been developed. The government plans to increase annual production from the current 20 million litres to more than one hundred million litres in the next five years.

Gaia has now commissioned a micro distillery demonstration plant in Addis Ababa, jointly funded by the World Bank and the Nordic Climate Fund. This micro distillery, with a capacity of 1000 litres per day, will demonstrate what could be possible for farmers and entrepreneurs all over Ethiopia – to produce ethanol fuel from underutilised feedstocks and waste streams. Gaia recently completed a national strategy document for this approach, under the Strategic Climate Institutions Programme (SCIP), entitled Holistic Feasibility Study of a National Scale-up Programme of Bio-ethanol Stoves and Micro Distilleries (Gaia Association, 2014). This approach examines the opportunity to supplement larger scale production of ethanol in the sugar industry with smaller and even micro scale production by farmers and farm cooperatives (available @HEDON).

Figure 2: Haul distance from Metahara to Kebribeyah Camp: 485 kilometres. As an energy-dense liquid fuel, ethanol can be hauled efficiently over long distances.

Alongside all of this activity on the fuel side, is further development of the ethanol stove itself. Now, modified stoves have been developed that can be locally assembled and manufactured. Gaia has also designed a Programme of Activities for carbon finance that will include not only commercially sold stoves but also stoves distributed in the refugee camps. It is hoped that carbon finance will help to support the expansion of the ethanol stove and fuel programme to other refugee camps as the need to stop all fuelwood burning in the camps is finally addressed. There are in fact plans underway to expand to the Asosa camps.

The Government of Ethiopia has always been an African leader in renewable energy development. As early as 2003 they had forged a policy to develop ethanol as a fuel for domestic use and they invited Project Gaia to bring its stove work to Ethiopia. Reliance on domestically produced ethanol as a substitute for kerosene and as a blend stock for gasoline promises to save the nation many hundreds of millions of dollars in foreign exchange while at the same time expanding the domestic economy. Likewise, it promises finally to provide a solution for the over reliance on woody biomass for fuel.



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Author profiles

Wubshet has over 10 years of professional experience with the household energy sector. He has an educational background in Carbon Finance, Chemical Engineering and Economics. He started his career with Gaia as Project Coordinator and later he served as Director. He is now Energy Consultant at Project Gaia working on renewable energy solutions and carbon finance programming.

Desalegn has over 10 years of professional work experience in humanitarian activities. He has worked with Gaia since 2008 and he is currently Director of the organisation. He has extensive field experience on energy provision programming for refugees and he is now leading UNHCR refugee camps' Energy Programme as well as an Ethanol Micro-Distillery project and National Feasibility Study on ethanol.

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- * Holistic Feasibility Study
- * Full list of references

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Viewpoints

Interview with Alima Mohamed, Refugee Leader at The Nakivale Settlement in Uganda

The Nakivale settlement is located in the Isingiro district South West Uganda. With an area of 185 km² consisting of three zones and 79 villages, Nakivale is the eighth largest refugee camp in the world and is the same geographical size as the Indian city of Kolkata. The settlement was established in 1958, officially recognised as a refugee settlement in 1960, and is now home to over 60 000 refugees, almost half of which are Congolese. There is also an estimated population of 35 000 nationals surrounding Nakivale who directly benefit from water, education, health and nutrition programmes in the settlement.

To better understand the end-user perspective of energy access in emergency situations, Karima Hirji speaks to Alima- a Ugandan refugee who serves as one of Nakivale's Refugee Leaders and directly supports the Livelihoods and Environment programmes by the UN High Commissioner for Refugees (UNHCR) and implementing partners. Alima tells us more about the Nakivale settlement, the role of women in refugee camps, and the desperate need for energy access.



Alima, tell us about the Nakivale Ugandan Refugee Camp and what your role entails as a Refugee Leader?

Nakivale has more than 60 000 people who are children, elderly and the youth. They come from everywhere- Burundi, Rwanda, Somalia, Sudan. Many different places and so the people are also different. Some live in houses and many others live in shacks made from plastic sheets. This is an old camp and many people have gone from here to the US, to Canada, to Australia. But people continue to arrive and the government keep sending refugees here.

I am a Refugee Leader and I work with the UNHCR Livelihoods Programme and with the American Refugee Committee. What I need to do is to help develop the people. I organise women's groups so that women can do business together, like open shops and stalls and make clothes to sell. I can also interpret for them when they need to speak with people or go to court. When you give people guidance and counseling, you see them change. You can change the whole world by giving people advice and teaching them.

This issue of Boiling Point focuses on energy access in emergency settings. In your experience, why is energy access so important for refugee camps?

Sure yes, it's very important. You can't live without it. A woman in the camp can be sick and she can't go to the hospital in the night because she can be raped. There is no light so you are scared to leave the house. When women go to get firewood, they will be raped. It happens a lot. The young women will sometimes sell their bodies for firewood because they cannot leave their babies to go find it. That is why we made a greenhouse here to grow vegetables so that the young mothers can work here and use the money to buy firewood or charcoal. The World Food Programme helps us with this.

What types of energy access does the Nakivale Refugee Camp currently have?

There is not so much electricity here. Some people have power and generators, maybe about 30% of the people. The rest can have small solar lights but others have to cook at 4pm because after there is

no light and so they have to use candles. Some people can't even afford to have a torchlight.

As a Refugee Leader, are you a key decision maker with regards to the types of energy the camp has or the camp's plans for improved access? Does being a woman help or inhibit your decision making capacities?

They respect me. Maybe they even fear me? If they see a person help the community, then they will love you. All over the world, men don't do everything so women are saying that women need to have the power. Especially the refugee women. I work with UNHCR to show the women clean cookstoves and charcoal briquettes and we do demonstrations for them and they listen to us, so yes, women can make good decisions here.

How do most refugees cook at Nakivale and why is access to safe fuel so important for cooking in humanitarian settings?

Many women cook with firewood. It's always the women who cook. If there

is no rain and no wind then it will only take them 10 minutes to cook, but they have to collect firewood first. If there is wind and rain then they won't cook and they won't eat. They will just sleep. It's not safe to cook inside the house because it makes too many fires. Briquettes and cookstoves exist but the majority still cannot access them economically (that is they cannot afford money to buy them). This is because the majority do not have income sources and this is worse for single mothers and the like. Because they can't afford these, majority eat breakfast and supper only, young single mothers now sell their bodies to better their lives by getting stoves and charcoal, and others have to move long distances into the host community to get firewood. Imagine women walking all these distances and so they get old quickly! It even becomes worse when the population increases.

What support do you have from the local community in the provision of basic needs such as food, energy and water?

The local people sometimes benefit from our programmes too and I think they also need help and they also need support. But other leaders from the community come to see me and we plan to go together to UNHCR and to the local government. You can't decide everything on your own, you have to work with other people. They sometimes make the briquettes and bring it to Nakivale to sell.

What do you think local governments could do to work with leaders such as yourself and improve the energy access for refugees?

The local government do health treatments and help the refugee children join a school. But the children still have to walk for 20 kilometers to school everyday. When the older children come home, the sun is gone and there is no light for them to cook or eat or do their studies. They come home and go fetch water to wash. But the government provides security. If there are any problems they come and solve it. If there is a husband and wife fighting then I can call them and they will come. I have their number and they have my number.

So you see we do work with each other but they need to help people do business and make money so we can afford energy. They should help with every aspect and work with us in every aspect.

They could give us light though solar. Or even just one generator and we would all contribute a little per month so that the community could buy oil. Light is so important. If I had light, then at night if there was any problems I could call an ambulance. Now, people are scared because when it is only dark then there is fear. You can't see if someone has come into your home.

In the last year, there has been a large increase in global energy advocacy and policy. Do you feel this really affects people on the ground? Do you hear about these changes?

I have twitter and I communicate with the GACC and with other organisations. I read the emails and I can see the energy work in India and in other places. It's amazing. I was very happy when I saw what was happening. If there are workshops in other countries, I would like to be invited so that I can improve my skills and see what others are doing. I used to tell the women's group about what the governments are doing all over the world. I showed them what communities are doing in Burundi too and in different women's groups. It gives people hope and then they try more.

One of the reasons we produced this issue of Boiling Point is to place emphasis on the importance of energy access in the humanitarian emergency response sector. What message would you want to send to the leaders of this sector?

You can tell them: I am Alima, I'm a woman and we cannot live without light here. If we get light, we can work and if we can work we can do anything. If you are a refugee you should get light. On the side of cookstoves, we can't just get charcoal every month. We want to buy it. New stove technologies need to be localised and redeveloped with us the end-users (we the refugees in this case). We got the SAVE80 cookstoves. They are good

but complicated and not all people can use it very well. And even those who can use it very well, not all of them got it. Refugees need to be empowered to afford an income so that they can buy these stoves and fuels (briquettes, gas, etc) instead of being given these things year in year out and which are not even enough to survive. If we had money, we could buy it ourselves.

Do you think its helpful to receive knowledge on energy access in hard copy form through journals like Boiling Point? What could we do to improve the way we provide information to leaders on the ground like yourself?

Of course it is good to get knowledge. We need to be educated about energy. To help leaders, you can send us books and you can send us Boiling Point and I can read them in English. But we need to have training and workshops with other leaders. Another thing is that women need to be in power and so we need scholarships for women, the young mothers, so that we can educate our girls. Women should not waste their time finding firewood.

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* UNHCR Uganda Factsheet

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Toolkit

SET4food guidelines on sustainable energy technologies for food utilisation in humanitarian contexts and informal settlements

The nexus between food utilisation and sustainable energy has not been fully analysed in the context of forced displacement. Humanitarian organisations usually provide assistance to refugees and internally displaced persons with standardised approaches. Specific local conditions are often not properly considered, paying little attention to availability or scarcity of specific resources, or the impact of the exploitation of available resources could have in the long run. Moreover, the staff involved in emergency response sometimes have limited knowledge on energy issues. These gaps can lead to a negative impact on displaced populations in terms of economic, environmental and social sustainability. The SET4food Guidelines resulted from the joint work of Politecnico di Milano and COOPI-Cooperazione Internazionale and aim at reducing this gap by linking technical capacity and field experience on energy and humanitarian action. These guidelines provide information on a wide number of technologies for cooking, food preservation, water pumping and purification, and electric power supply for use in humanitarian settings.

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Introduction

Politecnico di Milano, COOPI-Cooperazione Internazionale and Fondazione Politecnico di Milano are partners in the ‘Sustainable Energy Technologies for Food Utilisation (SET4food)’ project, co-funded by the EU’s Humanitarian Aid and Civil Protection Department (ECHO). SET4food aims to identify innovative energy solutions for food utilisation for refugees and internal displaced persons (IDPs), and to enhance response capacity of humanitarian actors. In particular, the project focuses on the nexus between food utilisation and energy availability, efficiency and sustainability in temporary, quasi-permanent, and permanent camps or informal settlements. The lack of access to energy has negative impacts on food utilisation in the following ways:

- The lack of proper energy solutions contributes to water scarcity, due to limited power for pumping, and/or the use of contaminated water, resulting in the potential spread of diseases and poor nutritional intake

- The lack of clean and modern cooking facilities is one of the main causes of indoor air pollution, which threatens health, and puts great pressure on local natural resources
- High reliance on firewood, due to the lack of affordable modern energy sources, leads to social problems, mainly for women and children
- The lack of proper food preservation methods and technologies leads to food deterioration

Reasons for the Guidelines

Natural disasters, social conflicts, political or structural crises determine forced movements of large groups of people. In this framework, insufficient food availability, malnutrition and poor health conditions increase mortality rates and worsen the situation. The availability of reliable and sustainable energy technologies is mandatory to give access to basic services, such as cooking, in an effective and efficient way. To achieve this goal, the selection of appropriate energy technolo-

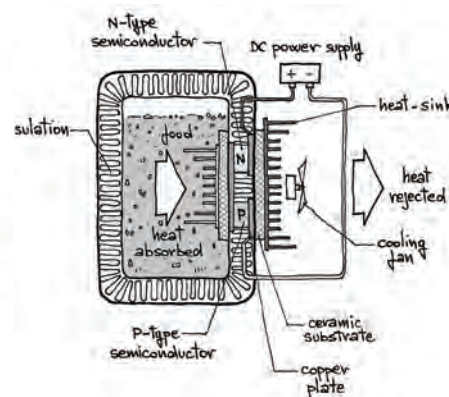
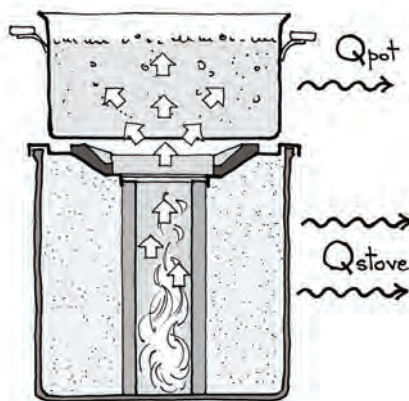
gies is crucial. NGO staff and other people working in emergencies often make decisions under pressure, without a specific background and adequate competences on energy issues. Therefore, the selected strategies do not always comply with the requirement of sustainability nor utilise the most effective energy technologies available at the international and/or local level. For this reason, the Guidelines are one in a series of tools that the SET4food Consortium developed for all the stakeholders involved in decision-making and technical issues regarding food utilisation and energy provision in humanitarian contexts.

Structure and content of the Guidelines

The Guidelines are meant to support implementers in the process of identification of the most appropriate energy technologies for food utilisation in humanitarian contexts. In fact, they provide the user with the necessary technical and non-technical information to point out the most important aspects of a given context to

Figure 1: Thermal losses which condition efficiency

Figure 2: Thermoelectric refrigeration scheme



take this decision, starting from the analysis of local conditions and needs. More in detail, they provide the user with a list of different needs and corresponding energy solutions for food utilisation, which are grouped within four main categories (Table 1):

- Efficient and effective technologies and fuels for cooking (e.g. improved biomass cookstoves, biogas stoves, electric stoves, gas/liquid stoves)
- Technologies for food preservation (e.g. solar coolers, home canning, thermoelectric refrigeration)
- Energy conversion systems for water pumping and water purification (e.g. pumps coupled with photovoltaic systems or micro-wind turbines ultraviolet lamps, membrane filters)
- Modular Integrated Renewable Energy Systems (IRES) for reliable electric supply (e.g. hybrid solar photovoltaic/diesel, hybrid wind/diesel systems) for cooking, food preservation, and other needs, including auxiliary services such as lighting

Each area of intervention and each system is analysed starting from the specific context of humanitarian assistance. The main text provides a general description of existing layouts and models of a given technology, the average efficiency, and basic indications regarding the functioning principles. A number of figures and schemes clarify key issues, such as the main components or the physical principle of functioning (two examples are given in Figures 1 and 2).

In addition to this, specific technical sheets give details of each device and/or system. The sheets inform readers on the main technical characteristics (in terms of size, components, materials etc), and provide indications about local manufacturing, warnings on the correct utilisation and specific requirements, operation and maintenance. They also provide a general idea about costs. These technical sheets are particularly valuable on the field, as they provide practical support for the selection of appropriate technologies.

A further section regarding the process and methodology applied in the frame-

Energy for food utilisation	Cooking	Solid fuel stoves
		Liquid or gaseous fuel stoves
		Electric stoves
		Additional cooking technologies
	Food preservation	Alternative fuel production
		Refrigeration and freezing
		Drying
		Preservation using chemicals and microbes
	Water supply	Heat treatment processing and packing
		Water pumping systems
	Electric power systems	Water treatment (basics)
		Electricity in emergency conditions
Basics of micro-grids		
Design of micro-grids		

Table 1: The main categories and sub-categories of SET4food Guidelines on sustainable energy technologies for food utilisation

work of the project (Figure 3) focuses in particular on the concept of innovation. We applied a definition going beyond the concept of invention and which includes any adaptation, improvement, or change that may be implemented in order to meet in a better way a specific local need. In such a way, standards or business models could also be considered as ‘innovative’.

Three case studies show in a practical way that innovative solutions can come out from a selection process, when cross-fertilisation and a multi-disciplinary approach are used.

The last section includes recommendations regarding local conditions, social aspects, monitoring, and other key aspects for the implementation of energy technologies for food utilisation. The objective of this chapter is to facilitate and improve the effectiveness and the efficiency of humanitarian assistance. The recommendations are defined on the basis of the practical experience of SET4food pilot projects implementations.

Using the Guidelines: A practical example

A brief example based on the implementation of a pilot project in Central African Republic explains how the guidelines can be used. Once a refugee/IDP settlement was selected, a detailed survey was carried out to get a clear picture of the main needs. The survey also collected data regarding the following issues:

- Cooking devices and habits, and type of fuels in use
- Food preservation techniques already in place
- Electric power supply (availability, reliability, cost etc)
- Water supply methods and quality of drinking water
- Availability of local resources (solar irradiation, wind, presence of nearby rivers etc)
- Artisanal skills of people (in both the host and hosted community), presence of nearby markets etc

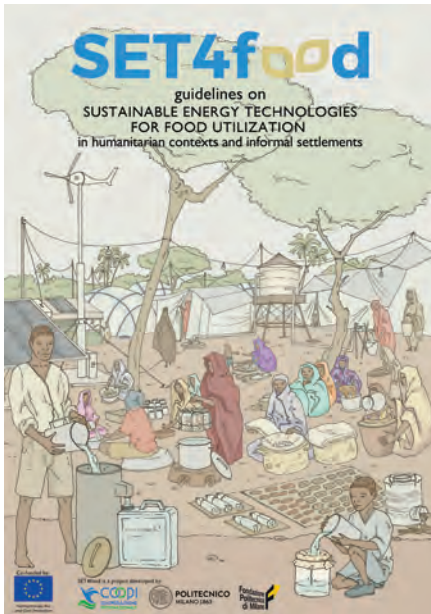
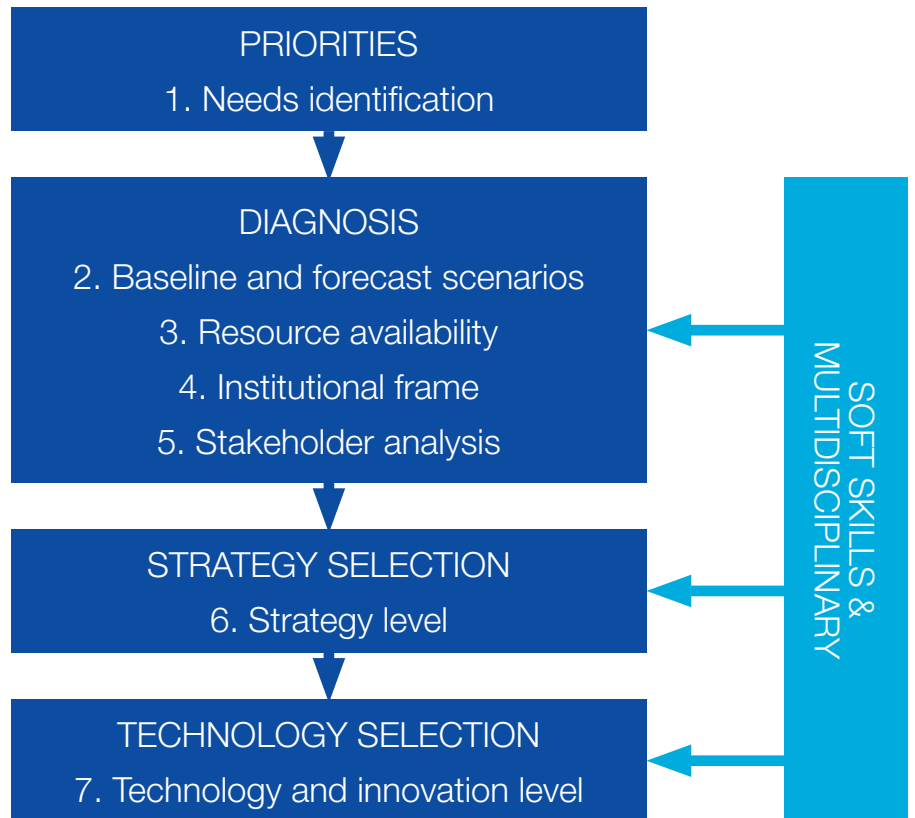


Figure 3: SET4food guidelines

Figure 4: Scheme of the process followed in the framework of the SET4food project



Based on the analysis of the results, a strategy for the improvement of the conditions of the targeted community was set up by ranking possible interventions on a priority base. In this specific case, priority was assigned to the following actions:

1. Improvement of the cooking systems in place (three-stone fire)
2. Exploitation of the high solar potential to power electric food preservation systems and provide basic lighting

In this pilot case, the technologies were selected by the team of experts working in the consortium. However, the idea is that the same selection process could be followed directly by humanitarian organisations using the Guidelines. As a matter of fact, once priority actions are based on the community's primary needs, humanitarian workers can obtain an overview of the main issues and technologies thanks to the information from the main text.

For example, in this case, information regarding the fuel mostly used for cooking (firewood) can guide the reader to the corresponding section of the guidelines. There he/she will understand which alternatives to a three-stone fire exist, and which of them is the most appropriate to that specific context (e.g. locally made improved stoves are not feasible due to the scarcity of raw materials and low manufacturing skills of refugees). The main text guides the reader through the selection of one or more particular technologies within each category. At this point, the technical sheet provides detailed information on characteristics and implementa-

General recommendations	Local resources (materials and capacity)
	Monitoring of installed systems and of the pilot action
	Infra- and intra- communities conflicts
	Technologies sharing
	Impact multiplier effects
Food cooking	Natural resources availability and exploitation
	Imported VS local manufactured stoves
	Complementary technologies issues
Food preservation	Effects of local ambient conditions
	Packaging
	Behavioral use of the technology
Electric power systems	Stand-alone systems and micro-grids related issues
	Plug and play systems
	Hybrid systems
	Relevance of lighting systems
	Monitoring of electric systems
	Capacity building and maintenance

tion of the technology selected (e.g. due to the high solar irradiation available, the spatial distribution of the tents, the type of foods consumed, the implementation of refrigerators powered by solar PV panels is selected, and coupled with a charging station for small LED torches).

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- * SET4Food Guidelines
- * Authors' profiles

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UV Lamps

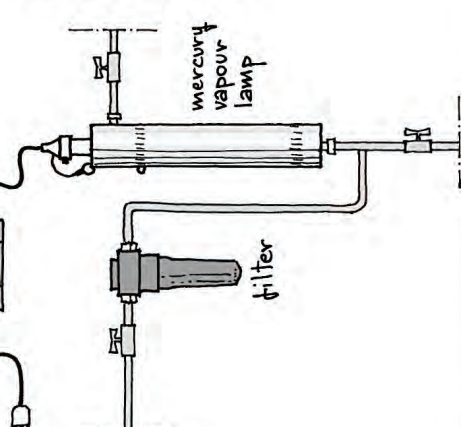
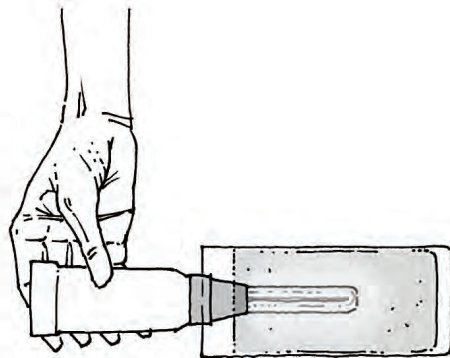
<p>Technology description</p>  <p>Ultraviolet (UV) Lamps are particular devices that emit UV rays that disinfect water when their light comes into contact with microorganisms; the light attacks the genetic core of the microorganisms and their ability to reproduce. They represent a quick, reliable and cost effective method, which can destroy 99.99% of harmful microorganisms (<i>Bacteria, Mould Spores, Algae, Viruses, Yeasts</i>). The short ultraviolet waves are produced through the conversion of electrical energy accomplished in a mercury vapour lamp; this is made of special quartz glass that allows 70% to 90% of the short UV rays to pass.</p>	<p>Utilization requirements</p> <p>It is fundamental to use a good pre-filter to remove any dirt or debris from the water because they work as a “shield” protecting microorganisms from the UV rays.</p> <p>Operation and maintenance</p> <p>A filter is vital before putting the water inside the lamp. However, minerals, debris and other materials in the water could settle on the quartz sleeve and limit the penetration of UV rays through the sleeve and into the water. Therefore, the glass around the lamp must be cleaned regularly in order to maintain high clarity.</p> <p>For fixed lamps, the UV bulb requires replacing after one year or 9,000 hours of use. Its lifetime is significantly affected by frequent turning on and off and it is advisable not to turn the lamp on and off more than once every eight hours. It works with electricity.</p> <p>Portable lamps have a longer lifetime because they are not constantly switched on and they work with a small battery inside; their main limit is the volume, which is usually less than 1 litre.</p>
<p>Morphological features and size</p> <p>Several design features are combined in order to determine the dosage delivered:</p> <ol style="list-style-type: none"> 1. Wavelength of the ray emitted by the lamp; 2. Length of the lamp: when the lamp is mounted in the same direction as the water flow, the exposure time of the water is proportional to the length of the lamp; 3. Design water flow rate: exposure time is inversely related to the linear flow rate; 4. Diameter of the purification chamber: the delivered dosages decrease logarithmically with the distance from the lamp because the water itself absorbs UV energy. <p>Water commonly flows through the annular space in the quartz sleeve, which contains the germicidal lamp, and leaves through the outlet nozzle once irradiated.</p>	<p>Another useful application consists of a portable water bottle, which has a small UV led inside. It is simple and useful: all you have to do is to fill the bottle with water, switch on the led and then shake the bottle</p>

Figure 5: Example of a technical sheet

for about 60 seconds. This device has a small battery inside which needs to be charged more or less every 80 cycles.



A third application consists of a UV Pen, which is a simple device that works when it is immersed in water (e.g. in a glass, a bottle or a pot) and switched on with the button. It is able to purify one litre of water in 90 seconds and works with simple AA batteries for about 200 uses.



Warning notes

UV disinfection does not remove dissolved organics, inorganics or particles in the water.

Technical and economic features

UV lamps have a high efficiency up to 99.99%, killing bacteria, mould spores, algae, viruses and yeasts. The output flow rate is high, too: around 3.5 litres per minute. In the case of portable lamps, the flow rate is less than 1 litre per minute.

The cost is high: the lamp has a cost of US\$ 50 - 110 and filters almost US\$ 10 - 15 (less if coupled with a clay filter). In the case of fixed systems, the internal lamp must be replaced every year and it can cost US\$ 30 - 60.

The electrical consumption is low (4-6W) and it can be easily coupled with a PV module or a battery.

Application sample

Solar UV is a widely diffused technology in Europe and the USA but it is also considered an appropriate household solution for water treatment.

Helpline

Dear Boiling Point,

We are an emergency aid team for humanitarian crises. Our team often has to address the needs of local people at the immediate aftermath of a natural disaster or in places of refuge where people often live for much longer than anticipated. We know that energy access is a critical component of relief aid, but we struggle to make this a priority in our programmes. How do we integrate energy in all our emergency relief programmes? Further, what are the immediate steps we need to take when designing energy relief programmes in these contexts? Any advice or examples from your experiences would be welcome.



Author

Mark van Dorp

Expert in Sustainable Economic Development in Post-Conflict Settings

Senior Researcher at SOMO (Centre for Research on Multinational Corporations)

Expert Response by Mark van Dorp

Dear emergency aid team,

Your question is a very important one, but also one that poses some challenges. Integrating energy needs in all your emergency relief programmes requires not only adopting a holistic approach towards the integration of environmental issues into emergency aid, but also additional capacity and financial resources to be able to make it work.

Traditional ways of energy supply, such as firewood collection, have disastrous consequences for the livelihood base of both displaced people and host communities as the ecosystem on which their survival depends are often destroyed. Also, firewood collection poses security problems for women and children, who are forced to travel large distances at the risk of being attacked or raped. There are also significant negative health consequences: exposure to indoor smoke can cause acute respiratory infections which kill many people, especially women and children, also in refugee camps. It should be applauded that your organisation wants to integrate energy issues into humanitarian responses.

The good news is that a lot of organisations, including UN High Commissioner for Refugees, have been involved in translating this new way of thinking into policies and practice for over a decade. The Safe Access to Fuel and Energy (SAFE) Working Group has signaled a turning

point by catalysing the participation of many UN agencies and NGOs in energy issues. A number of helpful tools have been developed for emergency operators, including the Matrix on Agency Roles and Responsibilities for Ensuring a Coordinated, Multi-Sectoral Fuel Strategy in Humanitarian Settings and the Decision Tree Diagrams on Factors Affecting Choice of Fuel Strategy in Humanitarian Settings. These tools could help you in deciding on the immediate steps needed when designing sustainable energy provision programmes, and they present a clear framework for cross-sectoral coordination of fuel-related activities in the context of emergencies. Other key efforts are initiated by the Women's Refugee Commission and the Global Alliance for Clean Cookstoves (Alliance). The Alliance emphasises that SAFE does not only include cookstoves and fuel, but also lighting and heating and embraces broader behavioural and market-based approaches during the transition phase from emergency response to durable solutions. These market-led solutions include pay-as-you-go (PAYG) solar, micro-enterprising, cash aid, cash for work and outsourcing labour from camps, and appear to offer a stronger basis for sustainability than providing handouts. A multitude of resources and best practices can be found at the website of the SAFE Working Group.

Regarding the capacity and financial resources required, it should be noted that so far, the environment has received fewer resources than other cross-cutting themes such as gender. Also, coordination on the ground on energy initiatives both among organisations and with local authorities is weak. The knowledge and skills of personnel dealing with energy solutions is essential, and yet the lack of dedicated resources for energy means that energy practitioners are not usually hired as part of emergency response teams. Emergency organisations have only just begun to seek alternative solutions to fossil fuels in camp operations, even though a lot of alternatives are available. It is therefore highly recommended to train and facilitate your camp operators, managers and sector specialists so they are capacitated to ensure the uptake of sustainable energy. This will provide hope for a better future of refugees and internally displaced persons, and of the ecosystem on which they depend.

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- * Emergency Operator tools
- * Additional sources

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Viewpoints

Interview with Patrick Jacqueson, Senior Strategic Advisor, UN Food and Agriculture Organisation

The vast majority of people effected by emergency situations rely on agriculture for their livelihood. Often working as farmers, foresters and in similar roles, when affected by crisis, these populations can lose their entire productive assets and their ability to sustain themselves, thereby becoming highly vulnerable. Patrick Jacqueson is the Senior Strategic Advisor, Resilience Management Team at the UN Food and Agriculture Organisation (FAO). FAO's expertise in farming, livestock, fisheries and forestry is crucial to the efforts that help people in emergency settings salvage what they have left and build a new future.



Patrick, can you tell us more about FAO?

FAO works to eradicate hunger, food insecurity and malnutrition, eliminate poverty and increase sustainable management of natural resources. A crucial part of this work includes the development of land, water and food security information systems, promoting the sustainable use and conservation of natural resources, capacity building in the agricultural sector, community empowerment to build resilience, and gender mainstreaming. FAO has decades of experience in assessing and mapping forest and energy resources, and supporting the development of policies and measures that are appropriate to ensure the sustainability and resilience of both ecosystems and livelihoods.

We've read that FAO is currently seeking US\$759 million in funding. What would you say are the main fundraising barriers to energy access for food security in emergency settings?

The importance of providing fuel and appropriate cooking technologies in emergency settings is often overlooked or inadequately prioritised by humanitarian and emergency response actors. This is a significant fundraising barrier. While food may be provided, for example through the World Food Programme food basket, the means to cook that food is not consistently provided. When aid agencies do provide cooking fuel they often do not provide enough to cover needs. Lack of access to cooking fuel as well as appropriate technologies for cooking and heating has implications for a range of sectors and for the well-being and livelihoods of affected households.

FAO's resilience strategy is to be 'proactive' rather than 'reactive'. Can you explain what this means?

Prevention and mitigation refer to the avoidance or limitation of the adverse impacts of hazards and related disasters but preparedness is a proactive strategy referring to the knowledge and capacities necessary to effectively anticipate, respond to, and recover from these shocks. FAO supports countries with the establishment of different preparedness measures including agricultural practices at national/local level (seed and grazing fodder reserves; stockpiling agricultural tools; emergency funds etc) and support to national and local preparedness planning (contingency plans for agriculture, fisheries/aquaculture, forestry and livestock; mapping, coordination arrangements, public information and training etc).

The ongoing conflict in South Sudan is an area that is of great importance to FAO. With more than 3.9 million people nationwide facing severe food insecurity, what work is the FAO undertaking to aid communities in this crisis?

Despite continued constraints to humanitarian access, FAO is acting to meet the two-fold challenge of responding to urgent needs triggered by the current crisis, while continuing vital livelihood protection and support programmes in less-affected states. Through a mixture of immediate assistance to the most vulnerable communities and longer-term support to build the capacity of local, state and national government institutions, FAO is helping to strengthen food security and

build sustainable, agriculture-based livelihoods in South Sudan.

Clean cooking is clearly a vital part of food security in your work. Has FAO considered developing crops that require less or even no cooking?

Although this has not been considered yet, FAO is continuously exploring options for the promotion and use of innovative technologies and approaches.

We've heard about your promising new partnership with MasterCard in Kenya's Kakuma refugee camp to ensure provision of cooking fuel and fuel-efficient technology. Can you tell us more about that?

The unique aspect of this project lies in the fact that FAO has been able to link the host communities with refugees in Kakuma. This is an important starting point that can potentially create long term economic linkages as well as reduce conflict and tension between social groups competing for scarce natural resources.

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* UNHCR South Sudan Factsheet

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News

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Addressing energy access: GACC and UNHCR

The Global Alliance for Clean Cookstoves (Alliance) and UN High Commissioner for Refugees (UNHCR) are working together with the Safe Access for Fuel & Energy (SAFE) Humanitarian Working Group to develop and implement comprehensive programmes in refugee camps that reduce fuel usage and emissions by improving access to cleaner and more fuel-efficient cookstoves and renewable energy products such as solar lanterns and solar home systems. The Alliance and UNHCR are conducting research to better monitor and evaluate the impacts of energy access programming, and are training humanitarian staff on how to identify refugees' energy needs and plan and implement high-quality energy programmes. In parallel, the Alliance and UNHCR are advocating to ensure that the humanitarian community prioritises and includes energy access within any new humanitarian policies and funding mechanisms.

The Moving Energy Initiative, a consortium of Global Village Energy Partnership (GVEP) International, Chatham House, Practical Action, Norwegian Refugee Council and UNHCR have recently launched its flagship report - Heat Light and Power for Refugees: Saving Lives, Reducing Costs. This report presents estimates of the volume and costs of energy used in situations of forced displacement worldwide. It provides recommendations to policy makers, donors, governments and practitioners on how to reduce energy poverty for the displaced and the communities which host them through access to cleaner and more sustainable energy solutions.

Energy access as a priority for the humanitarian and energy sectors

Energy should not be an after thought. Humanitarian staff should include questions on household and community energy needs in rapid assessments, and when energy needs are expressed, address these comprehensively within programmes.

The private energy sector should partner with humanitarians to provide innovative, high-quality products and leverage financing mechanisms such as carbon credits, micro-finance institutions (MFIs), vouchers, and revolving-loan funds to reach crisis-affected households at scale. Whenever possible and legal, the private sector should also work with humanitarian partners to employ crisis-affected people and create new jobs and livelihoods in energy. National governments can contribute by ensuring humanitarian populations are integrated into existing energy planning and implementation, especially as global leaders begin planning how to meet the 'Affordable and Clean Energy' Sustainable Development Goal 7 by 2030. Likewise, humanitarian policy makers and donors can support the effort by recognising the importance of energy access in ensuring the dignity and safety of refugees, and by integrating energy access



Picture 1: Refugee woman carrying a fuel-efficient stove (Source: J. Ose, UNHCR)

into humanitarian policies, funding mechanisms, and the 2016 World Humanitarian Summit discussion.

The general public can support this effort by donating or advocating on social media in support of humanitarian energy access. Follow @SafeFuelEnergy, @cookstoves, and @UNHCR Env on Twitter. Research the issue on www.safefuelandenergy.org and on the Alliance's and UNHCR's humanitarian energy pages. Together we can improve energy access for refugees and other displaced populations, and in so doing, we can improve the health, safety, food security, and livelihoods of millions of people.



Four new studies will measure cardiopulmonary benefits of clean cooking



The Alliance, in partnership with the Public Health Institute, has announced support for four new studies to measure the impact of clean cooking on non-communicable diseases (NCDs). The studies, which will take place in India, Nepal, Ghana, and Peru over the next two years, will examine how the adoption of clean cookstoves and fuels can prevent chronic respiratory and cardiovascular disease.

As NCDs increasingly emerge as a leading threat to global health, it is critical to understand the leading risk factors for developing these diseases, the populations they impact, and what interventions can be most effective in limiting these risks. Nearly three billion people are exposed to high concentrations of household air pollution (HAP) from the use of open fires or traditional cookstoves for cooking. As a result, HAP is a leading risk factor for NCDs in developing countries – and perhaps the leading risk among women, whose health is seldom affected by the other leading risk factors (smoking, alcohol abuse, diet, and physical inactivity) in developing countries.

“Exposure to household air pollution kills millions of people in developing countries every year. This is a leading risk factor for women in developing countries, and we are glad to play a role in helping the world understand the need for effective solutions like clean cooking to protect public health,” said Radha Muthiah, the CEO of the Global Alliance for Clean Cookstoves. While there is no doubt that this is a major public health problem, more research needs to be done to understand how shifting to clean cooking can minimise exposure to this risk and improve health outcomes. The Alliance and the Public Health Institute are working to strengthen the evidence base to better demonstrate how clean cooking can improve public health. The NCD studies will examine the impacts of several types of clean cookstoves and fuels and will measure the impact of the reduction in household air pollution on indicators of respiratory and cardiac diseases. The India study will build on the work of two longitudinal studies funded by the Indian Council for Medical Research (ICMR) to measure the relationship between exposure to household smoke and the subsequent development of early-stage markers of cardiovascular disease. The studies in Ghana and Peru will both measure the effects of exposure to household air pollution on adult lung function and respiratory symptoms. The final study, taking place in Nepal, will look at household air pollution from cooking, heating, and lighting sources, and will study the association between household air pollution and cardiopulmonary disease, including the novel use of retinal vasculature as an indicator of cardiovascular health.

“More than 165 million of Indian households use open fires or chulhas for cooking, making household air pollution one of the greatest and most preventable risk factors for non-communicable diseases in India. ICMR has set up some of the first cohorts in India that are focused on health effects of air pollution, and this study is an important step towards strengthening the evidence for addressing household air pollution within the national NCD agenda,” said Kalpana Balakrishnan Director of the ICMR Centre for Advanced Research on Air Pollution at Sri Ramachandra University, Chennai and the principle investigator for the Indian study.

Table 1: Description of studies on NCDs

Country	Study description	Technologies assessed	Outcomes measured
Ghana	This study measures the effects of exposure to household air pollution on adult lung function and respiratory symptoms. Principal Investigator (PI): KP Asante, Kintampo Health Research	Advanced biomass stoves; Liquid petroleum gas (LPG) stoves	Lung function; Respiratory symptoms
India	The study leverages two cohorts funded by the Indian Council for Medical Research to measure the relationship between exposure to household smoke and the development of early-stage markers of cardiovascular disease. PI: K Balakrishnan, Sri Ramachandra Medical	Advanced combustions biomass stoves	Lung function; Blood pressure; Endothelial dysfunction; Arterial stiffness; Intima-media thickness
Nepal	This study measures the effects of exposure to household air pollution on adult lung function and respiratory symptoms. PI: Checkley, Johns Hopkins	Biomass; Kerosene; LPG fuels	Cardiopulmonary diseases
Peru	This study explores the association between household air pollution and cardiopulmonary disease, including the novel use of retinal vasculature as an indicator of cardiovascular health. PI: M Bates, UC Berkeley	LPG stoves	Lung function; Respiratory symptoms

Annual Gates Letter calls for more energy access and less unpaid work; Alliance CEO highlights how clean and efficient cookstoves and fuels can help

Every year, Bill and Melinda Gates write an Annual Letter outlining their take on key global issues. Their focus this year – energy access and time poverty. In this year’s letter, they write, “Poverty is not just about a lack of money. It’s about the absence of the resources the poor need to realise their potential. Two critical ones are time and energy.”

These issues are at the heart of what the 1400 partners of the Alliance have been working on, according to CEO Radha Muthiah. Household energy is critical to powering productivity within the home and in the local community. Hours spent collecting fuel and cooking inefficiently over an open fire could be hours saved with a more efficient cookstove or fuel.

To draw broader attention to the Gates Letter, which made multiple references to cooking, the Alliance issued a supportive response, which we’ve printed below:

Clean cookstoves and fuels: A launch pad for the Gates’ superpowers

by Radha Muthiah, CEO, Global
Alliance for Clean Cookstoves



The Gates Annual Letter, always inspirational, is no exception this year. In their 2016 message, Bill and Melinda Gates lay out their case for why having “more time” and “more energy” would be their chosen superpowers. Their message is clear: “Poverty is not just about a lack of money. It’s about the absence of the resources the poor need to realise their potential. Two critical ones are time and energy.”

As the leader of an organisation trying to change the way millions of people in developing countries cook, I couldn’t agree more. Household energy is critical to powering productivity within the home and in the local community. Hours spent collecting fuel and cooking inefficiently over an open fire could be hours saved with a more efficient cookstove or fuel. I fully support the Gates’ choice of superpowers – more energy and more time. Achieving either would be catalytic and significant, but achieving both could be truly transformative. This is at the heart of what the 1400 partners of the Global Alliance for Clean Cookstoves have been working on, and these two superpowers would allow us to accelerate our efforts toward universal adoption even faster.

On energy -- every day, nearly three billion people rely on burning solid fuels like charcoal, wood, and animal dung to cook their food. The resulting toxic smoke penetrates deep into the lungs, resulting in more than four million deaths each year and a wide range of deadly chronic and acute health effects such as child pneumonia, lung cancer, chronic obstructive pulmonary disease, and heart disease. Children and women are disproportionately affected. Universal access to clean energy at the household level, particularly clean and efficient cookstoves and fuels, would be immensely impactful: we could save millions of lives and make vast improvements to public health; we could protect the environment and significantly reduce the global percentage (25%) of black carbon produced from cooking; and we could improve the quality of life for women and their families.

On time poverty – globally, women spend an average of 4.5 hours a day cooking, cleaning and caring for others. Without access to clean fuels and stoves, many women will also spend hours more gathering fuel to cook with. Time spent on unpaid work results in tradeoffs for time spent on other pursuits like health, education, or a career. It can also cost society dearly. Studies estimate that unpaid work being undertaken by women today amounts to as much as US\$10 trillion of output per year, roughly equivalent to 13% of global GDP.

There are countless stories and now a strong evidence base on how access to clean and efficient cookstoves and fuels is transforming people’s lives. One such story comes from Natalie, a cookstove user in Haiti who works with one of our many partners there. After switching from a solid-fuel burning stove to one that burns ethanol, Natalie said, “My new stove is clean, burns with no smoke, and cooks all our meals quickly, including fried chicken. I can now spend more time with my children. My family is happier and much healthier with our new stove. We no longer suffer from coughing and burning eyes.”

Improving people’s health. Reducing toxic air pollution. Enabling a mother to spend more time with her children and pursue economic opportunities. These sound much like the powerful accomplishments of a cape-wearing superhero. The good news is they’re not only for caped crusaders -- these types of heroic results are actually within the reach of all of us by helping to increase access to clean and efficient cookstoves and fuels. Let’s continue working together to help change the way much of the developing world cooks. And let’s ensure cooking no longer kills. Learn more at www.cleancookstoves.org

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- * MEI flagship report and toolkits
- * Full Gates Letter

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Success stories

Mini-grid solar system in Nepal

UNHCR Nepal in association with Engineers Without Borders and the IKEA Foundation have successfully installed a solar powered mini-grid system at the Beldangi Refugee Camp in Eastern Nepal. This pilot project was funded by the IKEA foundation with technical support provided by Engineers Without Borders. This mini-grid system powers a total of 11 evenly spaced solar street lights, of 15 watts each, on the main roads and some residential areas, within close vicinity to the local health centre. Capacity building training was conducted with a group of refugees who were shown the micro-grid system and the camp electrician participated in the installation and will remain as a key person to look after the system and carry our reporting. Data monitoring will be important for reviewing how successful this project is, and to support the proposal of adding even more street lights in the future and an increase in residential service opportunities. The solar street lights offer many benefits to the residents of the camp including increases in security at night and an infrastructure to make them feel more at home within the camp. Sancha Hang Subba, the camp secretary, says that “this will improve safety in the camps and we can now rush to (the) health centre even at night in case of emergency without too much difficulty”.

Solar streetlights, solar lanterns and Afrah cookstoves in Chad

In 2013, UNHCR in Chad received funding for energy as part of the UNHCR Light Years Ahead fundraising initiative. With these funds, UNHCR Chad was able to procure solar streetlights, solar lanterns and set up centres for fabrication of Afrah stoves. The Afrah stoves are locally made fuel-efficient stoves that are made by and distributed to Sudanese refugees in east Chad. The production and use of these stoves creates livelihood opportunities for refugees who fabricate the stoves, leading to increased training and employment. Members of the host community are also taking part in this activity. The stoves can reduce protection and safety risks associated with firewood collection, thereby reducing the risk of women being subject to gender-based violence. Additionally, this reduces deforestation, preserving the natural resources used for other livelihood opportunities for both the refugee and host communities.

Blazing Tube solar cookers in Burkino Faso

Blazing Tube solar cookers have proved to be extremely popular in Burkino Faso. These fuel-efficient solar cookers are assembled in the USA and cost around US\$100, and UNHCR

delivered them to 601 households. Before the introduction of these stoves, refugee women had to walk several hours a day to collect firewood, and the introduction of these solar cookers have reduced firewood collection by two to three times. In addition to decreasing incidences of sexual and gender based violence (SGBV), refugees are able to spend their time concentrating on other activities, and can use their firewood more sparingly. Burkino Faso receives a lot of sunshine, which makes it an ideal environment for using these solar cookers, and because they do not produce any smoke they have a massive positive impact on the health of refugees.

Recommendations for practitioners

The following are key considerations when developing and implementing a national Safe Access to Fuel and Energy (SAFE) strategy:

Energy Needs Assessment: A national SAFE strategy should be informed by an assessment of needs, availability of natural resources for energy use, analysis of markets, local capacity, etc.

Consultations with refugees, host communities, local authorities, civil society and other stakeholders: Engage with refugees extensively to ensure that selected interventions are culturally appropriate and will be readily adopted. Consultations also help identify individuals within the refugee and host communities who have skills to develop and maintain energy technologies.

Develop new partnerships, including with the private sector: Ensure that partners have experience in implementing energy programmes, with appropriate technical expertise.

Engage with a wide range of partners: The work of education, SGBV, livelihoods, health and environment can be facilitated through enabling safe access to fuel and energy. A cross-cutting approach will help engage a broad range of partners and funding sources.

Capitalise on new and innovative funding opportunities to address energy needs: Funding may be available through new approaches to energy, including climate change funds and carbon finance, as piloted by UNCHR Rwanda.

Further guidance on the steps above is available in the UNHCR Global SAFE Strategy, and is complemented by a practical energy toolkit for practitioners, available @HEDON.

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- * Global SAFE Strategy
- * Practical energy toolkit

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Kakuma Refugee Camp

The Kakuma Refugee Camp in Northern Kenya was established in 1992 to accommodate refugees, predominantly from Sudan, who left due to the civil war between the southern and northern part of the country. Even after the independence of South Sudan in 2011, many refugees did not return because of the persisting volatile situation. Currently more than 186 000 refugees, mainly from South Sudan, Somalia, Sudan, Democratic Republic of Congo, Ethiopia and Burundi, live in four sub-camps. The camp is located in Turkana West Sub County, north-west Kenya, with a local population of 210 000. The host community in Kakuma town alone totals 33 500. Turkana County has recently allocated a piece of land close to Kakuma, in Kalobeyei, as a new settlement area and its development is under way. The new camp will host about 60 000 refugees and benefit approximately 23 000 host community members. Integrating refugees and the host populations is an approach that aims at integrating the refugees in to the local economy.

Kakuma Camp and the host community lack access to modern energy. There is limited access to electricity and most people cook with firewood. The UN High Commissioner for Refugees (UNHCR) distributes approximately 10% of the firewood needed, complemented by free stoves from a number of aid organisations. In 2010 the World Food Programme undertook a feasibility study in Kenya to understand how displaced populations were coping with fuel scarcity and the related consequences. At the time, a total of 33 568 improved cookstoves (ICSs) had been distributed to both refugees and host communities in Kakuma by the previous UNCHR-GTZ partnership programme, implemented by GTZ (now GIZ). The Maendeleo stove was promoted by GTZ. Other agencies distributed stove including Jiko Poa, Envirofit G3300 and Save 80.

The study revealed that the Maendeleo metal clad potter liner stove was widely accepted by refugees because it was not necessary to constantly attend the fire, resulting in time savings for other chores. The stove achieved around 30% firewood saving compared to the three stone fire and was safe and portable. Other stoves did not enjoy the same acceptability, primarily because of the design (could only cook for few people), the time taken to heat up and the taste of the food cooked.

Pilot projects with solar and ethanol stoves were also carried out. The solar stoves were met with poor uptake and were abandoned due to lengthy cooking time, different food taste and inability to cook in the mornings, among other reasons. The ethanol stoves were appreciated by refugees, but sustained supply of the fuel was a barrier to their widespread adoption. Cooking habits vary among refugee populations. Some prefer the hard to cook cereals, mainly maize, or a maize-bean mixture (githeri) as their main dish, while others prefer porridge (ugali), flat bread (injera) or rice. Requirements for cooking appliances are therefore different.

The vast majority of refugees, as well as the host community, use firewood as their main cooking fuel; scarcity of this commodity is increasing by the day, and collection is a big burden on women and girls who are tasked with this. Access to fuel saving cookstoves therefore ranks highly on the communities' priority list.

GIZ's market-based approach

The GIZ project 'Support to Refugees and Host Communities in Kenya' (SIF), financed by the German Federal Ministry for Economic Cooperation and Development (BMZ), supports food security, conflict resolution and medical care. Access to modern energy is considered a cross cutting issue. GIZ SIF therefore decided to support a local NGO to revitalise the Maendeleo stove production centre, installed and maintained by the previous GTZ project, and to contract them for the distribution of 2100 stoves to vulnerable refugee and host community households as a first fast track measure.

The market for stoves around Kakuma is very limited. Stoves found in shops and markets are charcoal stoves and most of the few models sold have a very low energy efficiency. Most firewood stoves are distributed by relief or charity organisations. As a result, the only stove producer in the sub-county is the GIZ supported NGO. However, it is necessary to develop market-based and commercial approaches for wide spread support of access to modern energy in both communities. Taking this into consideration, GIZ SIF is now evaluating the development of market-based approaches, which include private sector engagement and training and entrepreneurship activities in order to stimulate the local market and improve access to modern cooking energy, lighting and electricity for productive use. These activities will be supported through collaboration with the Energising Development Kenya Programme (EnDev-K) which totals 1.5 million household customers that have paid for an ICS. About 3000 stove entrepreneurs have been trained both in technical and marketing skills and approximately 450 last mile entrepreneurs, supported by EnDev-K, managed to sell more than 153 000 solar products so far. Most of these entrepreneurs operate in areas with high population density and a reasonable purchase power.

In Turkana West Sub County, however, the host community is quite dispersed, with a traditional nomadic lifestyle. In addition, refugees are used to free handouts. Therefore GIZ SIF and EnDev-K will embrace a market-based approach adapted to the local conditions. GIZ SIF and EnDev-K plan to conduct further studies; engage agencies, refugee and host community leaders to increase stove production and marketing; increase distribution of lighting products; support the diversification of fuels, especially the utilisation of the prosopis plant; and link producers, distributors and users to micro-finance systems.

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New tender approach for mini-grids

One of the major goals of Madagascar's new energy policy is to tackle the extremely low rural electrification rate of 5%. The policy promotes mini-grids via a Build-Operate-Transfer (BOT) model based on tenders. In the coming months, the Malagasy government is planning to award concessions to eligible projects for the duration of 15-25 years. The first tender for four solar-PV mini-grids was launched in mid-2015 and the systems are expected to be operational in early 2016. A second and larger solar-PV tender (hybridisation of diesel networks) was expected to launch in December 2015, adding 50 MW to the country's installed capacity. Further auctions for solar PV mini-grid capacities are expected in 2016. Auctions for hydropower capacity of 617 MW were launched in 2015 as well. The auctions are based on regional electrification plans and one of the incentives available to developers is an investment subsidy through the national electrification fund. The GIZ project 'Rural electrification through renewable energies' supports the planning and implementation of the tenders and awarding of concessions. GIZ also provides advice to the reform of the national electrification fund and planning processes.

For further information on the upcoming tenders please visit <http://www.energie.gov.mg/> and <http://www.ore.mg> or contact Martin.Hofmann@giz.de.

Amaray magazine makes a case for clean energy access for climate protection

Energising Development's (EnDev) country project Peru published the latest issue of its magazine 'Amaray' dedicated to the Climate Change Conference (COP21) in Paris. The issue depicts the impacts that climate change brought to the Peruvian population and environment. It provides insight into how Peru is affected, and what the government and organisations do in the energy sector to counteract the effects as well as change towards more sustainable energy. In the article 'The climate is changing, so is my life' people recall how they themselves and their immediate environment are directly affected by climate change. Mariano Castro Sánchez-Moreno, Peruvian Vice-Minister of Environmental Management of the Ministry of Environment, also talks about access to clean energy as a step to reinforce climate-friendly policies. To read more about this and learn how EnDev Peru contributes to a low-carbon energy use access the magazine @HEDON.

Policy and Regulatory Framework for mini-grids in Rwanda strengthened

In March 2015, the Rwandese Government approved its new Energy Policy in which it defines a 22% off-grid electrification target to be achieved by 2017/2018. To assist in reaching this target, the Rwandese regulatory body RURA has just published a simplified licensing framework for rural electrification (available @HEDON). The regulation now distinguishes between four categories of mini-grids: For large mini-grids above 1 MW the existing Electricity Licensing Regulation of 2013 applies; For medium size mini-grids of 100–1000 kW; For small mini-grids of 50–100 kW the application requirements and process have been greatly simplified; For very small mini-grids below 50 kW no particular licence is needed; operators only have to notify RURA. Regarding the tariff, the regulation does not set fixed ranges, instead it provides rules for the tariff calculation by the operator. RURA does, however, reserve the right to review any tariff, especially in the case of customer complaints. But there are limits to these complaints: The comparison to on-grid tariffs, for example, does not qualify as a reason for complaint. The regulation also covers the case when mini-grids are eventually connected to the main grid. In this case, the mini-grid operator has a range of options such as conversion into a small power producer (SPP) and/or distributor, selling some of its assets to the utility, and/or, if feasible, relocating its assets. In case an agreement on the purchasing price or compensation for relocation cannot be reached, RURA will provide binding conflict resolution. Complementing the Government's efforts on rural electrification, Energising Development (EnDev) Rwanda is currently offering up to 70% subsidy on the investment in privately owned and operated mini-grids of up to 100 kW installed capacity. Contact Mirco.Gaul@giz.de for more information.

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Reflections from the Global Alliance for Clean Cookstoves' Clean Cooking Forum 10-13 Nov 2015, Accra, Ghana

On arriving at the Alisa Hotel, Accra, it was clear that the next few days were going to be a high-energy experience. As well as the prospect of listening to presentations from academia, industry and policy makers, we were looking forward to meeting local and international cookstove manufacturers, but nothing adequately prepared us for what was billed as “the largest biennial gathering of organisations, corporations and individuals working in the cookstove and fuel sector”.

In the welcome addresses, the Global Alliance for Clean Cookstoves' (Alliance) charismatic CEO, Radha Muthiah, celebrated the news that in just five years, the Alliance and its partners have enabled more than 28 million households to use clean cookstoves and fuels, and was well-placed to reach the target of 100 million households by 2020. Given that China has already placed more than 100 million cookstoves into people's homes, it seems that the final target is not over-ambitious. Ghana's Minister of Petroleum added some local detail explaining that Ghana had “catalysed the clean fuels and cookstove market” and had already distributed 20 000 LPG cylinders to homes in 2015. With Ghana's goal of 40 000 cylinders for 2015, his assertion that the remaining 20 000 would be given out by the end of the year was regarded as a little over-optimistic, even to the ears of the keenest stove enthusiast, given that only seven weeks remained to achieve the goal.

The discussions around LPG (especially in a Ghanaian context) was an interesting topic of debate at the forum. Whilst it was refreshing to hear the Minister of Petroleum acknowledge the limitations of electricity supply in the country and the need to work together in order to provide alternative ‘clean’ fuels, the drive for LPG by national governments, donor organisations, stove manufacturers/producers etc. has come under criticism recently, especially when, in the rest of the world, we are trying to move people away from the use of and reliance on fossil fuels. Amidst the positivity, a long-term solution is still needed from a global environmental perspective.

The run-up to the forum had attracted some scepticism, most notably in a Washington Post opinion piece by Marc Gunther. Gunther questioned whether ‘clean’ cookstoves that do not meet the WHO's strict health guidelines really save lives or make a positive difference. Ben Good from GVEP appeared to accept some of this criticism, admitting that perhaps three-quarters of small, local manufacturers were turning out stoves that are “a little bit rubbish” and might be at best described as ‘improved’. GACC had responded more strongly, by highlighting that clean stoves have many advantages besides health, including providing climate and environment, gender, and livelihood benefits. As such, it was interesting to hear



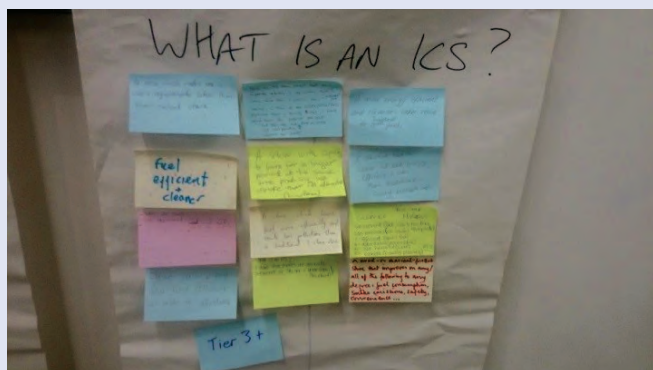
presentations at the forum focussed around child health benefits. Although significant reductions in exposure are being observed, currently, hard data to support the assertion made by many cookstove manufacturers that clean stoves result in health benefits are thin on the ground. Indeed, data purporting to show health gains were often presented with caveats such as: “although there is a clear secular trend the results are not statistically significant”. With many health studies currently underway, hopefully this picture will become clearer in 2016.

The proof of the pudding is indeed in the eating, and the forum included a cookstove display and demonstration event, where international and local manufacturers showcased their wares. Gasifier stoves were particularly popular, with some impressive prototypes on display, which are capable of reducing emissions from biomass stoves considerably. Many manufacturers took the opportunity to fire up their products. Unfortunately, lighting several of the stoves proved to be more difficult than expected. Alcohol-based gel lighting fluid came to the rescue of several red-faced and smoke-dried manufacturers, although we were shocked to see perhaps the world's largest cookstove manufacturer resort to soaking wood in kerosene to assist with ignition! The demonstration event was indeed an opportunity to see stoves and fuels first hand but more perhaps could have been done to promote some of the smaller manufacturers who do not necessarily cater for the mass market but rather are changing the clean cooking scene from the ‘bottom-up’. One interesting example of this was a private enterprise named ‘BB equipment et services’ based in Benin who produce ‘Naafa stoves’ which is a dual fuel Charcoal and LPG stove. The rationale behind this stove is simple; “people want to use gas but it is not always available or affordable... when this happens people go back to use charcoal.” In our



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eyes, this particular stove demonstrates the everyday reality of fuel choice, incorporates the aspirational element of clean cooking solutions and attempts to address stove-stacking. Unfortunately however, there was less excitement about this in comparison to the crowds gathering around the stalls of the larger, more well-known stove manufacturers.

As part of the University of Nottingham's wider research project to investigate the barriers to the introduction and uptake of improved/ clean cookstoves, we are particularly interested in the perspectives of the stove user and it was fascinating to see a locally manufactured insulated 'Wonderbag' (named the 'New Cooking Bag' based in Tamale, northern Ghana) sell out their entire stock of forty colourful bags, several of which were purchased by hotel staff.

Events like the forum can sometimes feel somewhat artificial, so it was good to escape from the conference bubble one morning for a site visit to a local stove manufacturer. Production here is very low-tech and labour-intensive. The sound of several men cutting and hammering metal into shape still rings in our ears. As well as an 'improved' stove, the more traditional 'coalpots' are also being sold and Mike (Clifford, PI on the University of Nottingham's Barriers project) bought the smallest one he could find to take back to the UK as a souvenir. On our return to the hotel, we were met with broad smiles from forum delegates and also from the receptionists and hotel staff at the US\$1.50 purchase. Had Mike invested in a bulk purchase, he could have sold the stove many times over!

In closing, we will take many lessons away from the forum – mostly that the drive and enthusiasm in the stove sector should not be under-estimated and with such a dedicated Alliance the sector is in good shape for the future.

The Barriers project: Annual project meeting 27-29 October 2015, University of Nottingham, UK

As readers may be aware, HEDON is a project partner on an EPSRC, DfID and DEC £685k funded project investigating the 'Barriers to the introduction and uptake of improved cookstoves in east and southern Africa' led by the University of Nottingham, UK. The annual Barriers project meeting took place in October 2015 where project partners from Malawi, Zambia, South Africa and the UK were able to discuss progress. Readers that are part of multi-country, multi-partner projects will understand the difficulties of coordinating and even communicating such a project and how, when everyone can sit in a room for a few days and discuss progress, challenges and the way forward, it really adds value and purpose.

The Barriers project is currently in its third and final year and we have just finished data collection. We have collected 210 Household interviews, 35 Policy interviews, 35 Value Chain interviews and 20 Finance interviews across seven countries and will analyse this data using qualitative analysis software NVivo and SPSS. One of the interesting observations that is being reinforced by our data is that we know what the barriers to the uptake of ICS are. These barriers include (but are not limited to); financial, market, political, awareness, and socio-cultural and they are widely documented in the literature (including a feature length article back in Boiling Point Issue 64, available @HEDON) and they may well be the same in 20 years. There are lots of systematic reviews and briefing papers that discuss these barriers but the cookstove sector is struggling to overcome them. Another observation the Barriers data is telling us is the importance of context, not just regionally or nationally but also geographically between urban, rural and peri-urban areas. The barriers will differ in these locations, but more importantly the enablers will also differ in these areas. More interestingly, the Barriers project has highlighted a lack of consensual terminology when it comes to defining what an ICS actually is and definitions differ from person, organisation and by country.

Overall, the three days in Nottingham with all project partners brought us closer to the project with a belief that we better understand the barriers to the uptake of ICS but we are also closer to understanding how we can overcome these barriers. Watch this space as we begin to analyse and publish this data!

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General

The Empower Project: An innovative approach to the diffusion of portable solar lanterns in rural Malawi

Keywords: Rural; Households; Lighting; Solar; Lanterns; Micro-credit



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Picture 1: Village Headman Zatuba shouting a slogan "Zatuba! Dream! Act! Change!"
(Source: Crispin Gogoda)

In his book entitled 'Selling Solar', Miller observes that lighting is the most essential need in the home as it enables people to see between sunset and sunrise. However, the provision of sustainable lighting in rural areas is a large challenge for many developing countries. This is due to low incomes prevalent in the rural areas and, in some cases, sparse populations which render rural electrification financially unviable. In recent years, solar photovoltaic systems have become one of the most viable options for lighting in rural areas. The strategy has been to start small, with portable solar lanterns, and move up the ladder to larger solar home systems as user satisfaction, confidence and incomes grow. Experience has shown that projects to promote these technologies are sustainable when they are commercialised and not aid-oriented and sustainability is enhanced when the projects are coupled with micro-credit schemes within the rural communities. Such schemes empower people economically and enhance their purchasing power. It is also important to train community members in the basics of the technologies so that they are able to use these products effectively and take proper care of them.

Introduction

Empower Inc. is an Australian non-governmental organisation which initiated a project to promote a savings culture as well as disseminate portable solar lanterns for lighting in the remote community of Kapita. Kapita is in Traditional Authority Khosolo in the south-

east of Mzimba District in the Northern Region of Malawi. The area comprises of 38 villages with a population of around 5000 people. The project was piloted in Zatuba Village in 2010 in collaboration with the Test and Training Centre for Renewable Energy Technologies at Mzuzu University. The project is now being up-scaled to reach 38 villages.

Project design and implementation

The project was designed to first and foremost empower the community economically. With this philosophy, Empower provided seed money of around US\$10 000 for the project. At that time US\$1 was equivalent to 152 Malawi Kwacha

Picture 2: An Engineer demonstrates how the solar lanterns operate (Source: Crispin Gogoda)



(K152). Thus, a total of K1.5 million was provided as seed money for the project.

One of the first activities in the project was to establish a village bank, to engender self reliance in the area through the promotion of a saving culture in the community. According to Samarakoon (2012) “in addition to promoting saving, the bank aims to provide business and development loans in a region that has no financial services within a 50 kilometres radius”. At the community level, savers earned 7% interest on their savings while borrowers paid 20% simple interest on the loans. In an interview, the Executive Director of Empower explained that the 20% included a provision for administrative costs and inflation, which was about 6.3% in 2010. This implies that the real rate of interest paid to savers was less than 1% while the real rate of interest paid by borrowers was about 14%. On average, borrowers managed to repay the loans within 6-12 months.

Empower engaged a local training and consultancy provider, Business Expansion and Entrepreneurship Development (BEED), to train members of the community in business and entrepreneurship as well as establish a Village Revolving Fund. The fund later became the capital base for the provision of loans.

Solar lanterns

Having established the village bank, Empower introduced the concept of solar lanterns providing light in homes, rather than depending on paraffin lamps, candles or grass. The objective was to promote a clean, reliable and less expensive source of lighting in Kapita, a remote area about 70 kilometers from Jenda, the nearest trading centre. However, while many projects of this nature, involving the provision of goods or services, advocate and perpetuate the principle of ‘handouts’, Empower decided that the users should pay for the lanterns in installments over a period of nine months, just to cover the cost of the lanterns without any profit. Donations or handouts were not considered from the outset.

Phases of project development

Phase one

The Village Revolving Fund was established as planned and a committee to manage the fund was set up. The committee opened a bank account with Opportunity Investment Bank of Malawi (OIBM) at Jenda, a major trading centre in the district, about 70 kilometres from Kapita. Members of the community obtain business and development loans from the fund as well as energy access loans, which are used for the purchase of solar lanterns. BEED also trained eight volunteers from the village as bank tellers. According to Empower, there is no requirement for collateral as the system is built on trust.

As part of capacity building in the community, BEED trained 50 members of the community in business entrepreneurship. Both men and women underwent training. This was a free service to the people because, according to the policy of Empower, all capacity building activities should be provided at no cost. Out of the 50 participants, seven who had excelled in the training course, received interest-free business loans from the fund. One of them, Felix Chibwe, used a loan amounting to US\$197, to start a fish-marketing business. Chibwe’s business was so successful that he has now opened a grocery store. With money from the business, Chibwe bought a solar home system and is now charging cellular phones for other people and operating a barber shop.

Empower bought and supplied the first lot of 41 lanterns in 2011. The lanterns ranged from D Light S2 (pico) which are used for lighting only, to larger lanterns which can be used for lighting as well as charging of cellular phones. Large lanterns cost US\$43 each while small ones cost US\$23 each. A customer had to pay a deposit of at least

US\$11 before collecting the lantern and the balance was paid in monthly installments over a period of nine months. All repayments were channeled to the village bank. As of May 2012, all the 41 lanterns had been fully paid for. The money was ploughed back into the fund and this provided capital for upgrading the fund into a community bank, a form of a financial cooperative. Thus, Empower provided start-up capital for the village bank with a one-time soft loan in the form of up-front purchase of the lanterns and this became a revolving fund. The loan was to be recovered from the village bank in five years.

As already stated, the village bank has been upgraded to a community bank which is registered by the Registrar of Cooperatives in the Ministry of Trade and Industry and is regulated by the same ministry under the Cooperative Societies Act as well as the Financial Cooperatives Act. Meanwhile, in 2012, Empower Inc established a local subsidiary, known as Empower (Malawi) to advance its mission in the country. Thus, the project is now the responsibility of Empower (Malawi) and is now in phase two. The total cost for phase one was US\$30 000.

However, despite the various achievements cited above, there was one weakness in the project design, namely the lack of supply chain for the lanterns. The lanterns that were sold to the people of Zatuba Village were brought in by Empower who had bought them from Solar Aid, a supplier certified by the Malawi Energy Regulatory Authority and based in Mzuzu, about 300 kilometres away. As a result, other people who were interested in buying the lanterns on their own, failed to do so simply because there was no supply network within their reach. This meant that the people had to rely on the project sponsors to keep bringing the lanterns. This is where the sustainability of the model was compromised.



Picture 3: A group of men and women singing and dancing in praise of the project
(Source: Crispin Gogoda)

Phase two

The main goal in phase two is to upscale the project to cover 38 villages with a population of about 5200 people under Group Village Headman Makhuwira. A total of US\$30 000 has been put aside for the upscaling process and 50 more lanterns are to be sold to the community. A new committee, the Kapita Development Committee, has been set up to manage the upscaled project. The Zatuba Village Revolving Fund has now been upgraded to a community bank to cater for the 38 villages and all transactions under the community bank are done at a community centre. The bank bears the cost of transport to and from the commercial bank and these costs are covered under administrative costs for the community bank as well as membership fees.

In addition, under phase two, Empower is facilitating partnerships between the community bank and private solar firms which supply lanterns as well as solar home systems. This will improve the people's access to these technologies. Furthermore, Empower used its partnership with Mzuzu University to train three men and three women from the community in basic installation and maintenance of solar systems in order to build local technical capacity. The training was funded by a grant from the Small Grants Programme under the Global Environmental Facility. With respect to warranty, the firms which supply or install the solar lighting systems normally provide a one year warranty to their customers.

Project impacts

Extended working hours

The households that have solar lanterns are talking about a different experience altogether. They now have a more reliable and clean source of lighting. With close to eight hours of good quality lighting from the lanterns, women are now able to cook or perform other domestic chores even after daylight. In addition, children can study or do their homework in the evening.

Empower Inc summarised the impact of the solar lanterns in one of their

commentaries as follows: "The impact of having a more powerful, cost-effective lighting solution has been incredible. We observed women cooking, families chatting and eating dinner, children playing and grocery stores operating later at night. There is increased mobility and a sense of safety across the village. A highlight during one of our trips was when one of the village elders told us that there was no kerosene to be found in the village" (Empower Malawi, 2013).

Availability of better quality lighting

Before the introduction of the solar lanterns, community members were using kerosene lamps, candles, dry cells and grass for lighting. These are low-light sources which produce hazardous smoke which leads to indoor pollution. The use of solar lanterns has reduced exposure to such smoke, particularly with regard to women and girls, who are mainly responsible for cooking in Malawian households. As a matter of fact, most of the lanterns in this project were purchased by women. This follows from the fact that women dominate the membership of the village bank.

Improved quality of life

During a vision workshop at Zatuba in 2010, villagers reported that they used to spend between US\$5-7 per household per month on paraffin. The fact that the households which own solar lanterns no longer use paraffin or candles means that the money that could have been spent on these particular sources of energy is freed for other uses. In addition, they no longer have to travel to Jenda, a round trip of about 140 kilometres, just to buy paraffin. In this case, both the money and time saved can be used for other productive aspects of life.

Future prospects

There appears to be a brighter future for the project. When visiting Zatuba Village in October 2012, it was reported that many people outside the village wanted to buy their own lanterns, only that

they did not know where to buy them. Thus, establishing an effective marketing network for the lanterns can enhance their uptake in the rural areas. As stated above, this issue is already being addressed by Empower by facilitating direct linkages between suppliers and installers of the solar lighting technologies. An interesting thing worth noting here is that the people are not expecting donations. Rather, they are willing and ready to buy the lanterns. Thus, all the 38 villages to be covered in phase two are a potential market for the solar lanterns.

Looking further into the future, there is a clear development path for the project. Empower plans to grow the community bank into a regional bank, probably covering the whole Khosolo area and later register it as a savings and credit cooperative with the Reserve Bank of Malawi. This is expected to broaden and consolidate the capital base for loans, including the energy access loans, and enhance the uptake of the solar lighting technologies.

Concluding thoughts and lessons learned

The Empower Project is a model of sustainable transfer of portable solar lanterns. It is sustainable in the sense that there are no donations involved. This means that even the seed money will be repaid. According to Empower (Malawi), the money will be repaid in full by the end of 2015. The other favourable aspect of the model is that it has a built-in economic empowerment component, which enables participating communities to develop the financial capacity to purchase the solar lanterns, among their other needs. Users are able to purchase the lanterns since they can get energy access loans from the community bank. However, as mentioned, sustainability was somehow compromised in the first phase of the project due to the lack of an effective distribution system for the lanterns in the model, thus leading to several lessons learned from both project strengths and weaknesses.

Commercialise solar lanterns: It is recommended that solar lighting systems

Picture 4: Focus group discussing on the impacts of the solar lanterns in Zatuba village
(Source: Crispin Gogoda)



should not be given to people as handouts. Rather, users should be economically empowered so that they can buy energy products. Donations create a dependency syndrome and perpetuate poverty.

Develop local financial capacity: There might be various strategies of economic empowerment but village banks and community-based revolving credit schemes seem to be popular. In practice, the empowerment process should precede the marketing of the solar lighting systems. Where possible, suppliers of the systems or products should offer mutually favourable payment terms, particularly for large systems.

Develop local technical capacity: Where the solar photovoltaic systems are disseminated as part of social entrepreneurship, there should be deliberate efforts to train members of the concerned communities in the installation, operation and maintenance of the systems. This ensures that users are able to use and maintain systems properly and can carry out minor repairs when they break down. In turn, this translates into greater customer satisfaction and long use-ful life of the systems.

Match size and cost of lanterns with purchasing power of people: It is logical to match the size of the solar systems with people's ability to pay for them. It may not make much sense to promote large systems in communities whose most urgent energy need is lighting, and have very little prospect of owning a television set or refrigerator in the near future. It is better to start with small systems. These are likely to cost less and match with the low incomes of the rural households. The need and market for larger systems will arise gradually as people get used to solar energy and as their income increases overtime.

Establish supply chains for solar lanterns: Empower should engage with the private solar firms to establish an effective market system which can bring solar lanterns within the reach of rural communities. This should involve the establishment of distributors or agents in rural areas. It does not help much to promote solar lanterns in rural areas when people cannot physically access them when they are ready to purchase.

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Author profile

Arnold Juma has 30 years experience in the energy sector. He holds a degree in Economics and a Masters in Energy Management and Policy. He obtained a PhD in Strategic Management from Exploits University in Malawi. He is a Senior Lecturer in Energy Studies at Mzuzu University in Malawi.

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* Acknowledgements

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Global Household Energy NEWS

Mercy Corps: New report highlights lessons from energy efficiency programme in Indonesia focused on the tofu tempeh sector

In Boiling Point 67, Mercy Corps issued a learning study on the Mercy Corps' European Commission (EC) funded Scaling Sustainable Production and Consumption in the Tofu and Tempeh Industries (SCOPE) programme. A comprehensive report on the project has just been released, which provides a detailed analysis of the programme in Indonesia. The study was conducted alongside a formal programme evaluation and was intended to delve deeper into the process of implementation, drawing out key market development lessons. Of particular interest for Mercy Corps is the fact that the SCOPE programme had two distinct goals: (i) to contribute to poverty reduction; and (ii) to promote energy efficiency/reduced environmental impact. These dual goals are characteristic of many other sustainable energy programmes implemented by Mercy Corps and other organisations in the global energy community. This study examines the extent to which SCOPE was able to balance the imperative of achieving impact in both goals and the extent to which this was achieved. The full study is available @HEDON.

USAID: US\$767 000 grant awarded to Miller Centre for Social Entrepreneurship and New Ventures India

In an effort to lift 1 million of the 289 million people in India without electricity out of darkness, Miller Centre for Social Entrepreneurship at Santa Clara University and New Ventures India (NVI) have been awarded a US\$767 000 grant for an Energy Access Investment Readiness Programme. This public-private partnership, made possible by the generous support of the American people through USAID, has the goal to enable delivery of clean, innovative, off-grid power to people in India who currently lack energy access. Under the programme, NVI will facilitate the investment of US\$41 million of impact capital over three years to support local social enterprises that are able to deliver clean energy. Already, close to US\$5 million has been committed to the programme. Miller Centre's Global Social Benefit Institute will train social entrepreneurs in India to help them become investment-ready and able to increase the reach of their businesses and resulting impact.

Chatham House: The Moving Energy Initiative

Chatham House is working with the UK Department for International Development (DFID), GVEP International, and a consortium of other expert organisations, on a groundbreaking new project which seeks to meet the energy needs of refugees and internally displaced persons in a manner that reduces costs, is safe, healthy and respectful. In its first phase the initiative published a global level report, 'Heat, Light and Power for Refugees: Saving Lives, Reducing Costs', which assesses the extent of the problem and identifies challenges and potential solutions. Over the coming phases of the project, the MEI plans to continue generating momentum for change on a global level and to promote a 'learning by doing' approach through pilot projects in Jordan, Kenya and Burkina Faso. These local activities will aim to demonstrate new approaches on the ground, and will be geared towards delivering practical improvements in sustainable energy access for refugees and host communities. The global level report is available in full from @HEDON.

Solar & Off-grid Renewables west Africa: 19-20 April, Accra, Ghana

This conference aims to gather the key regional and international players of the solar industry. Taking place in Accra, this event transcends borders and has a distinctive west African focus with attention to the opportunities and barriers that are encountered by the solar industry of each country. The main aim of the conference is to aid in speeding up the uptake of solar in west Africa, whilst facilitating business opportunities for attendees. The event will provide attendees a platform to meet ministers and regulators responsible for future energy planning from ECOWAS governments, as well as other African countries such as Kenya and Equatorial Guinea; hear case studies from respected developers with a proven track record in the industry and learn from their experience; and meet international financiers and learn what kind of projects will get backed from development banks, commercial banks, export credit agencies, venture capitalists and insurance companies. Register at <http://westafrica.solarenergyevents.com>

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- * SCOPE programme report
- * MEI flagship report and toolkits

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Call for papers

Boiling Point forthcoming topics:

— Enablers to Cookstoves

— Goal 7: From Policy to Practice

Boiling Point is peer reviewed and published quarterly. We invite readers to submit articles, papers and news on a rolling basis at any time. So if you feel that you have something to contribute to the wider household energy community on any theme, including the above four, then please read the information below and send us your experiences – HEDON would love to hear from you!

Boiling Point looks for articles which are written in English, preferably using clear and plain language, and which can be used by other people in their own work. Do not be deterred, however, if you are not used to writing – it is the information that is important – we will review articles, edit them and return them for your approval prior to being published.

Theme articles

Each edition of the journal typically contains four to six full length theme articles which can include research papers and programme reports that are relevant to the theme topic. We encourage you to submit articles on your work on any of the above-mentioned themes at any time of the year. Each edition also contains a related Toolkit. If you are interested in contributing to these, then please contact us on the email address at the end of this page.

Viewpoints

If you feel you or someone from your organisation should be interviewed on your work in facilitating access to energy for households in developing countries, please contact us. All interviews will be published on the HEDON website and the best will be selected for publication in the Viewpoints section of Boiling Point.

General articles

We welcome submission of general articles at any time, which can cover any topic. Examples include project/programme updates, technical papers, book/report reviews, and conference and workshop

reports. Please note: technology based articles should be focused on the real life application of proven technologies.

Helpline

Would you like advice from experts on an aspect of your work in household energy? Contact us with your questions and we will strive to direct you to those who can help. Questions we feel are relevant to a wider audience are selected for publication in the Helpline section of Boiling Point. In the past, these have included dilemmas regarding marketing, emergency relief and enterprise development.

Sponsor

Boiling Point reaches over 11 000 readers globally, making it an ideal forum to get information about your project activities out to the worldwide community of practitioners and to showcase your work to potential collaborators and funders. Sponsoring Boiling Point gives your organisation a range of profile benefits; from space in the journal to communicate news, events, logos and website links; to receiving several printed copies to distribute to your colleagues. For more information, visit www.hedon.info/EYQB or send us an email.

Front cover photo competition

HEDON is offering you another fantastic opportunity to get your best image onto the front cover of Boiling Point. We are looking for a full colour photograph for the front cover that illustrates the future themes of Boiling Point. The photo must

be: of good quality format and suitable for high resolution colour printing (minimum resolution of 300 dpi and a high quality file type i.e. not .bmp); sent to us in its original format (not pasted into an MS Word file); credited to the correct person, with a caption if appropriate; owned by the person/organisation entering the competition; and preferably with a central focal point, bold composition and rich colours. The editor's decision is final and the selected photo will win absolutely nothing, apart from the admiration of thousands of subscribers and of course our thanks.

Guidelines and submission dates

We are now accepting articles and front cover photo submissions for BP69: Enablers to Cookstoves. Deadline for submission is 30 June 2016 (visit www.hedon.info/boilingpoint).

We are always looking for general articles which should be submitted via email to boilingpoint@hedon.info. Articles should be around 2000 words in length. Illustrations, such as drawings, photographs, graphs and bar charts that are essential, and all references should follow the given guidelines. Articles should also include a 100-200 word summary, a 50 word profile for each author and up to ten keywords that you feel best describe your article. Files can be emailed to the editor at the below listed address. Final selection is based on article quality, originality and relevance.

Thank you for your cooperation, and please do not hesitate to contact us for any clarification

Regards,
The Boiling Point Team

Email: boilingpoint@hedon.info

The HEDON Household Energy Network is dedicated to improving social, economic and environmental conditions in less developed countries, through promotion of local, national, regional and international initiatives in the household energy sector.

The HEDON Household Energy Network is established in the UK as a charitable limited company registered with the UK Charity Commission. It is governed by seven Trustee Directors: Grant Ballard-Tremeer, Andrew Barnett, Raffaella Bellanca, Jack Dedman, Ben Garside, Dick Jones and Kavita Rai.

The network itself is comprised of thousands of active members with diverse backgrounds: practitioners, policymakers, academics, business owners and non-governmental organisations, based across the world. We exchange experiences, learn from one another and create new knowledge.

What the HEDON Household Energy Network offers:

Boiling Point
www.HEDON.info/
Boiling Point

- 68 issues over the past 34 years
- Free online access and subscription to receive printed journal
- Opportunity to showcase your organisation's activities and logo as a sponsor to thousands of readers

An interactive web platform offering:

- A global community of registered members
www.hedon.info/Community
- The latest news, events and funding opportunities sent to members via a monthly e-mail newsletter
www.hedon.info/news
- Regional Interest Group meetings
www.hedon.info/RIGs

Our Vision

A world where everyone has access to clean and sustainable energy; in fairness, respecting the environment and combating climate change.

Our Mission

To inform and empower practitioners in order to unlock barriers to household energy access by: addressing knowledge gaps, facilitating partnerships and fostering information sharing.

Our Patrons

HEDON Household Energy Network has the good will and support of two patrons: Archbishop Desmond Tutu of South Africa, and Professor Kirk R. Smith, Professor of Global Environmental Health, at the University of California, Berkeley, USA.



"As a patron, I believe that HEDON, in its work to address energy and climate improves lives for people living in poverty. I am a supporter of their work and would recommend others to support their endeavours further"

Archbishop Desmond Tutu



"HEDON is the oldest international network of organisations promoting clean and efficient household energy sources for improving health and welfare. I have been involved since its inception in the 1980s and it has provided both intellectual support and inspiration in my work to understand the health and climate implications of household combustion"

Professor Kirk Smith

To join us go to www.HEDON.info/register

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