The Role of Sustainable Energy Access in the Migration Debate

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Acronyms and abbreviations

CTA	Community Technology Access Centre
EdM	Electricidade de Moçambique
ESI	Energy for Social Infrastructure
ESF	Electriciens Sans Frontières
EU	European Union
EUEI PDF	European Union Energy Initiative Partnership Dialogue Facility
GAMM	Global Approach to Migration and Mobility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GRID	Global Report on Internal Displacement
ICT	Information and Communication Technologies
IDB	Inter-American Development Bank
IDMC	Internal Displacement Monitoring Center
IDP	Internally Displaced Person
IOM	International Organization for Migration
KfW	German Development Bank
LDC	Least Developed Country
LRRD	Linking Relief Rehabilitation and Development
MEI	Moving Energy Initiative
MMRP	Mediterranean Migration Research Program
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
PRODUSE	Productive Use of Energy
PUE	Productive Uses of Energy
SDG	Sustainable Development Goal
UNDP	United Nations Development Program
UNHCR	United Nations High Commissioner for Refugees
UN-Habitat	United Nations Human Settlements Program

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Introduction

Migration is a human condition. In 2015, 244 million people worldwide were registered as living outside their country of origin[1] and according to estimates, 740 million internal migrants moved to another place of residence within their country of birth[2]. These numbers have been on the rise with the world witnessing unprecedented migration flows. Natural disasters, violence, conflict continue to drive displacement, as a form of forced migration, putting the most vulnerable populations at further risk. The Internal Displacement Monitoring Center's (IDMC) Global Report on Internal Displacement (GRID 2017) estimated that there were 31.1 million new internal displacements in 2016, out of which 6.9 million were newly displaced by conflict and violence and 24.2 million by disasters[3]. In 2016 there were 40.3 million people living in internal displacement – a number which has almost doubled since 2000 and has increased significantly over the last five years[4].

In addition to the 40.3 million internally displaced persons (IDPs), currently there are around 22.5 million refugees in the world[5], people who are fleeing their countries due to conflict – a number not seen since the Second World War.

The refugee crisis is global, with developing regions currently hosting 86% of the world's refugees under the UNHCR's, the UN Refugee Agency's, mandate. In 2015, the least developed countries (LDCs) gave asylum to 4.2 million refugees[6].

Within the European Union, the total number of migrant arrivals by the end of December 2016 was recorded as 387,739[7]. Furthermore, 2016 was the deadliest year on record of those trying to reach Europe by sea: by the end of the year 2016 5,143 people were registered as dead or missing after trying to reach European soil[8].

1) United Nations Department of Economic and Social Affairs, Population Division (2015). International Migration Report 2015. *http://www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/MigrationReport2015.pdf*

2) International Organization for Migration (IOM) (2015). World Migration Report 2015 *http://publications.iom.int/system/files/wmr2015_en.pdf*

3) Internal Displacement Monitoring Center (IDMC) (2017). Global Report on Internal Displacement (GRID 2017). *http://www.internal-displacement.org/global-report/grid2017/*

4) Ibid

5) UNHCR, the UN Refugee Agency (2017). Figures at a Glance. *http://www.unhcr.org/figures-at-a-glance.html*

6) UNHCR, the UN Refugee Agency (2017). Global Trends – Forced Displacement in 2015. *http://www.unhcr.org/576408cd7.pdf*

7) International Organization for Migration (IOM) (2016). Mixed Migration Flows in the Mediterranean and Beyond – Overview. *http://migration.iom.int/docs/2016_Flows_to_Europe_Overview.pdf*

8) International Organization for Migration (IOM) (2017). Missing Migrants – Tracking Deaths along Migratory Routes. *https://missingmigrants.iom.int/latest-global-figures*

The number of vulnerable people migrating puts an increased strain on the resources of host countries, which also experience problems managing domestic issues such as poverty and lack of access to basic services including water, food, energy, health, and education. This situation presents an urgent challenge to the international community. In response to the current migration management and displacement crisis, the European Union has gradually integrated development policy instruments into its migration policy, reorienting and mobilising its service to address the root causes of unregulated migratory flows[9]. For example, The Global Approach to Migration and Mobility (GAMM) and the European Agenda on Migration explicitly underline the link between development and migration in order to tackle root causes[10], but also recognise the benefits that regulated migration can bring to development via remittances, which, in the long run, may attenuate economic push factors. Additionally, European policy has developed to address the intersections between migration and development related to the SDGs (for example in the New European Consensus on Development[11]) or the humanitarian and development nexus (see the Communication on Forced Displacement and Development[12], moving beyond the crisis situation to address these issues and challenges in a more long-term orientated manner.

9) European Parliamentary Research Service (2016). Briefing October 2016 – Growing impact of EU migration policy on development cooperation. *http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/589815/EPRS_BRI(2016)589815_EN.pdf*.
See also: European Agenda on Migration. *https://ec.europa.eu/home-affairs/what-we-do/policies/european-agenda-migration_en*; Valletta Summit on Migration. *http://www.consilium.europa.eu/en/meetings/international-summit/2015/11/11-12/*; Migration Partnership Framework. *https://eeas.europa.eu/sites/eeas/files/factsheet_ec_format_migration_partnership_framework_update_2.pdf*

10) In response to that approach, analysts claim on one hand, that using development policies to reduce migration is a faulty assumption. There is data that shows that economic growth can even increase some of the patterns of migration, because people have more money to pay for the travel cost. Only in countries with incomes per capita above $7,300 is economic growth associated with decreases in emigration. (Riccardo Faini and Alessandra Venturini, "Trade, Aid and Migrations: Some Basic Policy Issues," European Economic Review 37, no. 2 (1993): 435–442.) On the other hand, there is the argument of the importance of coordinating EU external policies to coherently have more leverage on the effectiveness of aid budgets and combine efforts at stemming migration flows, while at the same time having development outcomes for countries and regions that currently have an increased stress due to migration flows.

11) European Commission (2017). The New European Consensus on Development – 'Our World, our Dignity, our Future'. *https://ec.europa.eu/europeaid/sites/devco/files/european-consensus-on-development-final-20170626_en.pdf*

12) European Commission (2016). Lives in Dignity: from Aid-Dependence to Self-Reliance. Forced Displacement and Development. *http://ec.europa.eu/echo/files/policies/refugees-idp/Communication_Forced_Displacement_Development_2016.pdf*

The links between energy development and migration are numerous, but their practical expression has not received much analysis to-date. Poverty alleviation is the main goal of EU development policy, and access to affordable, reliable, sustainable and modern energy is a prerequisite, among other factors, for poverty alleviation. Furthermore, the Council of the European Union acknowledges that the lack of or uneven access to energy is part of the root cause of irregular migration[13].

These developments have taken place as the global agenda for sustainable development, international cooperation on energy, and the fight against climate change entered a new phase in 2015 and 2016, following the adoption of the Sustainable Development Goals (SDGs), 7 and 13 in particular, and of the Paris Agreement. An unprecedented surge in international activity in the field of energy development cooperation can currently be seen, backed up by growing financial flows and new funding mechanisms and initiatives. European Union institutions and member states are at the forefront of this increased action, with the EU being the largest global donor of official development assistance (ODA) and a leading voice in international climate change agreements.

Against this backdrop of increased irregular migration, amid the acknowledgement that lack of energy access as one of the root causes of migration, and given the importance of European action in energy, development and climate, the EU Energy Initiative Partnership Dialogue Facility (EUEI PDF) is uniquely placed to contribute to the debate – and to solutions to the challenges being faced. Drawing on more than a decade of experience, a clear mandate to support the achievement of the SDGs, in particular on energy, and to promote sustainable energy for equitable development in Africa, Latin America and Asia, the EUEI PDF is uniquely placed to explore the potential contribution of energy development in the current migration debate.

This paper aims to explore interlinkages between sustainable energy access and migration. Firstly, the paper describes the role energy plays in the migration debate. Secondly, it looks into the links between drivers of migration related to energy access before migration occurs. Furthermore, it presents ideas on the contribution sustainable energy access might make, depending on different migration patterns. Energy plays different roles in different migration decisions, depending on the drivers and duration of migration. This paper also investigates approaches and trends for improving energy access for displaced populations in peri-urban areas (acknowledging that migration is, initially, largely rural to urban) and humanitarian contexts (in the case of forced displacement, disasters and emergencies) after migration has occurred. Finally, it presents recommendations for enabling sustainable energy access in migration settings and puts forward ideas for coordinating migration and energy development policies as a bridge to connect aid and development.

13) Council of the European Union (2016). Outcome of the Council Meeting; 3504th Council Meeting – Foreign Affairs – Development. *www.consilium.europa.eu/en/meetings/fac/2016/11/st14969_en16_pdf(1)/*


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1. The Role of Energy Access in the Migration Debate

Mapping the drivers of migration is a very complex topic. It is often not easy to draw a clear line between voluntary and forced migration. Migration occurs due to a variety of causes, which can broadly be categorised as acute/forced (conflict, violence, natural disasters), structural/forced (poverty, environmental degradation, lack of social services), or voluntary (see *Annex 2* for definitions). *Figure 1* explains the different types of migration according to two variables: the degree of willingness to migrate, and the degree of regulation. This paper focuses on the right quadrants of *Figure 1*, i.e. forms of irregular migration which include unplanned mass migration, economically and socially induced migration due to vulnerability, poverty and lack of economic opportunities, and environmentally induced migration in slow onsets (including due to climate change). Irregular migration places the population in various states of vulnerability, including making it vulnerable to human trafficking, human right violations, gender-based violence, and health risks. Usually this also involves using unsafe routes to avoid controls, therefore putting lives at risk in order to get to the destination point.

Access to energy is a basic human need. This has been acknowledged and recognised with SDG 7, which aims to ensure universal access to affordable, reliable and modern energy services by 2030. This goal also has the target of substantially increasing the share of renewable energy in the global energy mix[14]. 1.06 billion people do not have access to electricity, 3 billion still rely on wood, charcoal, animal and crop waste or other solid fuels to cook their food and heat their homes[15]. All of this is exacerbated in humanitarian settings where 89% of refugees do not have access to adequate lighting[16].

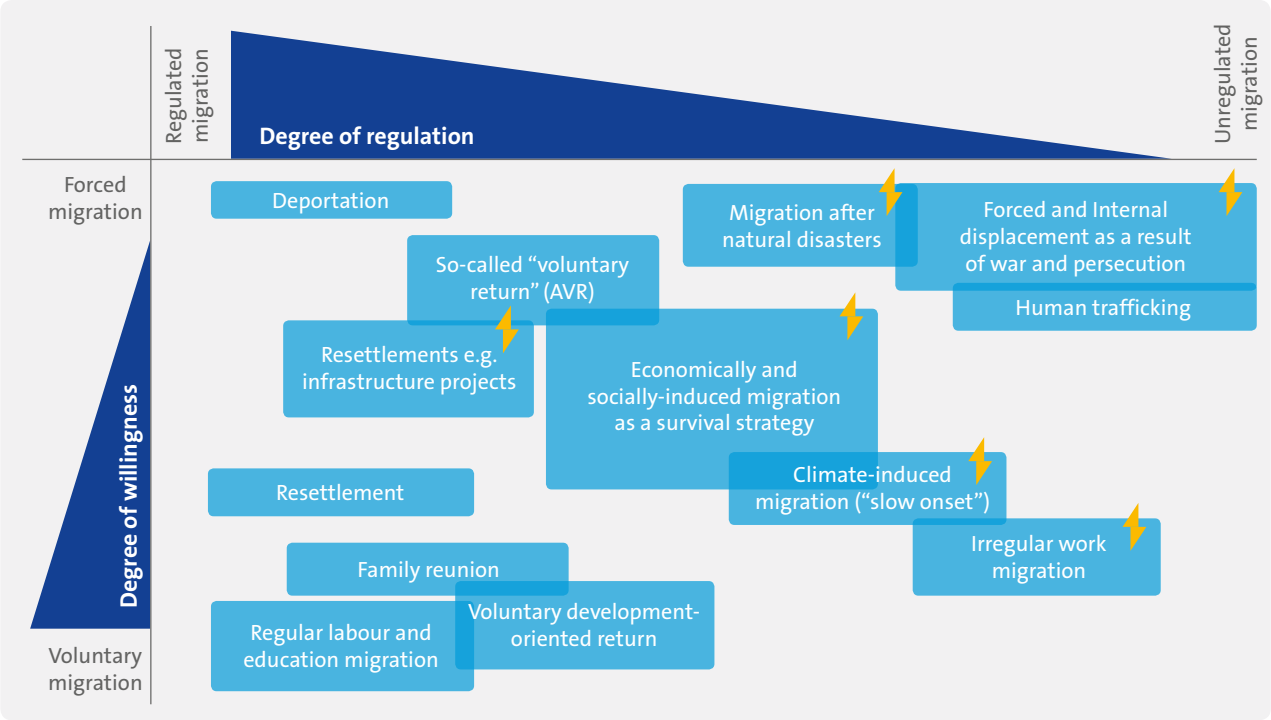
The role of energy access on the decision to migrate can be analysed both before and after migration has occurred. Before migration takes place, modern energy provision contributes to socio-economic development by improving education and health services, and improving livelihoods. Since energy is an enabler which underlies all economic activity, it is posited that sustainable energy access can help improve livelihoods. This, in turn, prevents in the long-run some of the structural causes of irregular migration. Improving energy access is, though, only one among many factors in ending rural poverty and environmental degradation.

14) SDG 7 aims to "ensure access to affordable, reliable, sustainable and modern energy for all". *https://sustainabledevelopment.un.org/sdg7*

15) World Bank (2017). Energy Data Overview. *http://www.worldbank.org/en/topic/energy/overview*

16) Lahn G. and Grafham O. (2015). Heat, Light and Power for Refugees Saving Lives, Reducing Costs. London: The Royal Institute of International Affairs. Chatham House. *https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/20151117HeatLightPowerRefugeesMEILahnGrafhamEmbargoed.pdf*

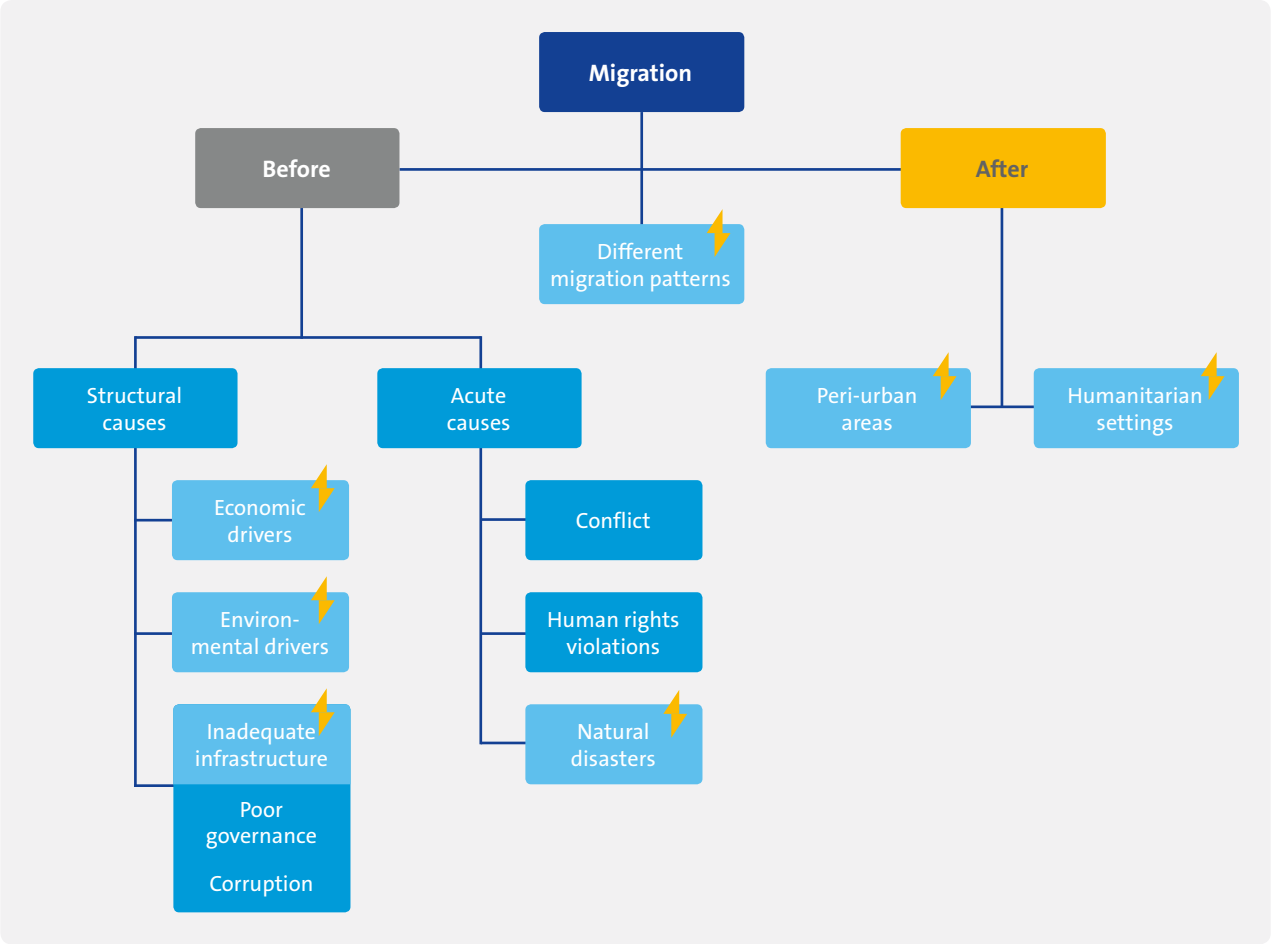
Figure 1 Types of migration



Flashes indicate which types of migration fall within the scope of this paper.
(Source: GIZ conceptual framework)

Once migration occurs, energy plays different roles according to particular patterns, depending on whether it is acute migration, slow irregular migration (i.e. rural to peri-urban areas) or long-term migration. It directly enables basic human needs such as food and shelter to be met, which have to be addressed acutely in humanitarian situations after migration has occurred, i.e. after conflict or disaster (see *Figure 2*).

Figure 2 The role of energy in migration



Flashes indicate the migration scenarios where energy plays a role.

2. The Role of Energy Access before Migration Occurs

There is insufficient data to acknowledge energy poverty as a direct driver of migration. However, it certainly contributes to other recognised drivers such as food insecurity, vulnerability, lack of access to sufficient resources and social services. This section identifies two main root causes of migration as directly related to energy access: economic and environmental drivers.

2.1 Energy and Economic Migration

An "economic migrant" is generally defined as someone who aims to improve his or her standard of living by moving to a different place[17]. Economic drivers of migration, such as rural poverty, food insecurity, insufficient economic opportunities, unemployment and deficient healthcare and education services are exacerbated further by a lack of energy access. Moreover, poverty is characterised not only by unemployment or a lack of regular income, but also by structural conditions such as insufficient infrastructure for basic services (energy access, connection roads, water and sanitation), which can induce migration. Populations tend to migrate to where there are better economic opportunities (e.g. crop yields) or economic activities that usually need energy for production (e.g. food processing, manufacturing, construction, etc.).

Figure 3 explains broadly the economically related push factors of irregular migration, which can be linked to energy poverty, and how improving sustainable energy access helps to attenuate them in the long term. Among other factors, evidence shows that sustainable energy access:

- underpins the creation and upgrading of value chains[18], providing employment and economic opportunities;
- facilitates the diversification of economic structures and livelihoods[19] (see *Box 1* for a guide made by the EUEI PDF about productive uses of energy, which can be adapted and used in migration-prone scenarios and humanitarian settings);
- releases time for paid work, child care, social life, and leisure, particularly for rural women[20] (e.g. time savings from collecting firewood);

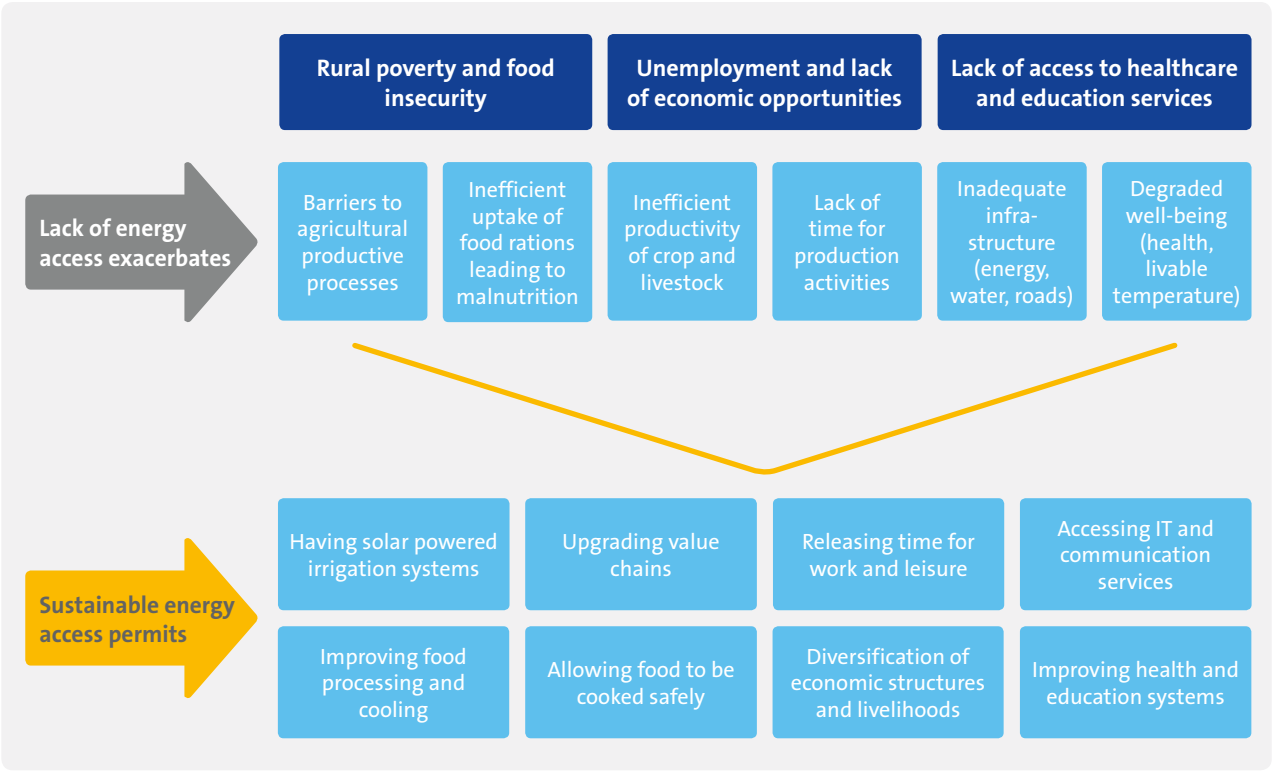
17) International Organization for Migration (IOM) (2003). World Migration 2003 – An Overview of International Migration. *https://publications.iom.int/system/files/pdf/wmr_2003_1.pdf*

18) Attigah,B. and Mayer-Tasch, L (2013): The Impact of Electricity Access on Economic Development – A Literature Review. In: Mayer-Tasch, L. and Mukherjee, M. and Reiche, K. (eds.), Productive Use of Energy.

19) Ibid

20) Pueyo. A. (2016). Productive Uses of Energy: Unlocking Socioeconomic Benefits and Economic Viability of Energy Access Infrastructure. Institute of Development Studies.

Figure 3 Economic drivers of migration



- permits women's empowerment at the household level;
- enhances business productivity (e.g. disposable working hours, management efficiency).

By way of example, according to the Inter-American Development Bank, an increase in energy access for rural households in Brazil from 71% in 2000 to 92.6% in 2010, among other factors, brought about not only a decrease in rural-urban migration but also, in some cases, reversed migration flows back to rural areas[21].

21) Interamerican Development Bank (IDB) (2014). Could Universal Energy Access Help Slow the Growth of Our Cities? *http://blogs.iadb.org/ciudadessostenibles/2014/06/19/could-universal-energy-access-help-slow-growth-of-cities/*

Box 1

Productive Use of Energy (PRODUSE)

This publication delineates step-by-step guidelines for planning, designing and implementing programmes for promoting productive uses of energy. It can be used by power sector practitioners (governments, public and private utilities, service providers, international agencies and financial institutions) dealing with energy access for vulnerable and displaced populations in rural and peri-urban areas. The productive uses of energy offer livelihood opportunities for rural and peri-urban communities and displaced populations, thus stemming the need to migrate as a survival strategy.

http://www.euei-pdf.org/en/flagship-publications

2.2 Energy and Environmental Migration

The definition of an environmental migrant is "persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within or outside of their country"[22]. *Figure 4* presents the role that a lack of energy access plays in environmental drivers of migration and the positive impacts of sustainable energy access.

Two main drivers related to environmental migration are environmental degradation and natural disasters.

Slow environmental degradation tends to be linked to the inadequate management of natural resources, including water, air and soil, and also encompasses drought, deforestation or poorly planned urban development. It also links closely with a lack of access to clean and reliable, modern energy in rural areas, particularly the lack of clean and sustainable fuel products required for cooking, which can accelerate environmental degradation (further). The degree of vulnerability (ability to cope with the effects of environmental hazards) of a community is interlinked with their access to resources.

For example, communities that rely on natural resources for energy consumption (biomass such as wood and charcoal) and on agriculture for livelihoods tend to be more vulnerable. Moreover, the lack of appropriate regulation in the biomass sector brings about the unsustainable exploitation of forests and other resources (see *Box 2* for a biomass energy planning guide produced by the EUEI PDF).

22) International Organization for Migration (IOM) (2014). IOM Outlook on Migration, Environment and Climate Change. *http://publications.iom.int/system/files/pdf/mecc_outlook.pdf*

Box 2

Biomass Energy Sector Planning Guide

Based on EUEI PDF's and GIZ's experiences in African countries, this guide is designed for stakeholders in government institutions, NGOs and donors involved in biomass energy sector management. It outlines the steps for gradual improvements in the management of sustainable biomass energy sector governance, leading to a fully implemented strategy. It is relevant as an example of governance of the biomass sector in rural areas, that can also be used in humanitarian settings or peri-urban areas, taking into account the special needs of host communities and displaced populations.

http://www.euei-pdf.org/en/flagship-publications

All of this is exacerbated by changes in climatic conditions; therefore, the more dependent a country is on the agricultural sector, the stronger the impact climate variations may have on migration. Other factors related to environmental migration show that seasonal or circular migration patterns occur as a coping strategy to deal with climatic variations, which impact agricultural activities.

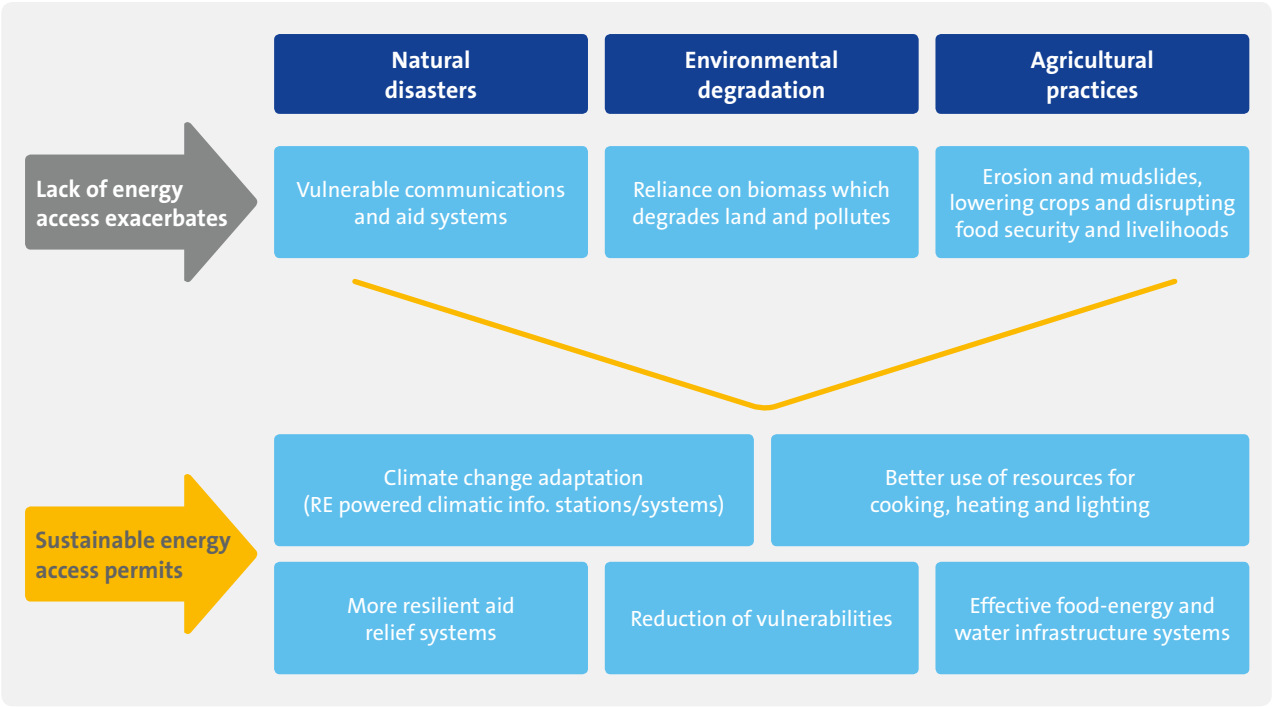
Thus, adaptation mechanisms, including a bigger share of renewable energies in the energy mix and systems that predict climate variations are important to address this underlying vulnerabilities.

Another environmental driver of migration are natural disasters, which occur suddenly and where the level of a population's vulnerability is exacerbated by a lack of access to (sustainable) energy. Sudden migration in such acute situations needs communication systems which rely on electricity to be functional. They are needed for communication among the affected population and to coordinate the aid response. Furthermore, strong, resilient systems of power provision to health facilities are necessary to deal with the human casualties which disasters and conflicts create.

How Sustainable Energy Access Can Help Stem Environmental Drivers of Migration

Access to clean, reliable and sustainable energy enhances the possibilities for rural communities to adapt to environmental degradation. Water provision and food production systems that benefit from sustainable energy can create opportunities for adaptation to climate change in rural and peri-urban areas. For example, fuel-efficient cooking practices require less energy, as do alternative cooking fuels – and both can play an important role in reducing food insecurity, a major migration driver (see *Figure 4*).

Figure 4 Environmental drivers of migration



In light of these connections, it is important to coordinate agricultural policies with investments in water and renewable energy infrastructure[23]. As one of the central consequences of climate change, drought frequency and intensity have increased, thus further necessitating more water infrastructure which is also resilient to changes in the climate. In developing countries, solutions drawing on renewable energy technologies are particularly suitable. Examples of this include solar-powered water pumps[24]. Other possibilities are renewable energy powered climate change information stations that work as tools for screening weather variations in remote areas. They can help to better coordinate the mechanisms of adaptation to climate change, and thus reduce vulnerability and improve agricultural practices according to changing climatic conditions (e.g. rainfall patterns).

Following natural disasters, resilient energy systems can respond better to a crisis. For example, clean energy technologies, especially solar PV power plants, seem a good choice during disaster relief efforts as they do not require fuel supplies to be shipped in or rely on critical grid infrastructure to be operational[25]. The deployment of off-grid renewable energy generation technologies have the advantage of resuming activities at a far faster pace than traditional generation plants. When energy systems have collapsed, off-grid renewable technologies can enable hospitals and other critical public facilities to operate. By way of example: As Hurricane Sandy wreaked havoc in the north-eastern United States in 2012, it was the wind and solar power plants that weathered the storm and were back online quickly. Nuclear and fossil fuel plants, having been shut down for precautionary safety, took days or even weeks to resume operations[26]. In the case of Nepal's earthquake in 2015, which caused major devastation and led to the collapse of several health and education services, the international donor community pledged US $4.1 billion for reconstruction.

23) Important linkages exist between agriculture policy influencing energy demand and the response from the energy policy to facilitate water management and food demand. For more information see: Rasul, G. and Sharma B (2015). The nexus approach to water-energy-food security: an option for adaptation to climate change.

24) For more information see: *http://www.climatetechwiki.org/technology/jiqweb-swp*

25) For an example of a more resilient solar powered system for disaster relief developed in Nepal after the earthquake: *https://www.greentechmedia.com/articles/read/role-for-solar-in-nepal-disaster-relief*

26) Worldwatch Institute (2012). For Vulnerable Regions, Renewable Energy Is Key to Climate Adaptation. *http://blogs.worldwatch.org/revolt/for-vulnerable-regions-renewable-energy-is-key-to-climate-adaptation/*

The early recovery strategy developed by the United Nations Development Programme (UNDP) included scaling-up renewable energy options in remote communities. A significant number of solar power systems (over 50) were installed in temporary government offices and schools, benefiting 4,450 households[27]. Another apposite example is the investment made by the Mid-Atlantic States in the wake of Superstorm Sandy in the installation of strategically located micro-grids to keep critical facilities functioning in the case of another disaster.

The installation of renewables in affected communities can also function as a link to transitioning from aid to reconstruction/development, thus enhancing resilience. For example, in many Nepalese regions organised agricultural cooperatives were given responsibility for the energy systems' maintenance, increasing ownership and enabling new steps towards energy access in rural communities[28].

27) United National Development Programme (UNDP) (2015). Supporting Nepal to Build Back Better – Key Achievements in UNDP's Earthquake Response. *http://www.undp.org/content/dam/undp/library/crisis%20prevention/UNDP_NP_supporting-nepal-to-build-back-better-key-achievements-in-undps-earthquake-response.pdf*

28) Greentech Media (2015). How Solar Is Playing a Role in Nepal's Disaster Relief. *https://www.greentechmedia.com/articles/read/role-for-solar-in-nepal-disaster-relief*

3. The Role of Energy Access after Migration Has Occurred

The following section discusses the role of energy access according to different migration patterns and the significance of energy access in peri-urban areas for displaced populations after migration has occurred. It is then followed by a section on energy needs in humanitarian settings. This explains the challenges of coordinating energy provision at the early stages of aid relief within a long-term approach, and the opportunities of energy development outcomes for host communities.

3.1 The Role of Energy Access on Migration Patterns

In order to understand the complex role that energy development policies can play after migration has occurred, it is important to first understand the different patterns of population movement. Migration might be internal (including rural to rural, rural to urban, urban to rural or urban to urban) or international, temporary or permanent.

The most traditional migration pattern that occurs is rural to urban migration. It is well known that people from rural areas migrate to cities to look for work or other economic opportunities[29]. This pattern of migration is exacerbated when vulnerable rural populations are heavily dependent on agricultural production that is put under pressure due to climate variations and poor governance of resources access, including energy.

From another perspective, international migration generally occurs to the nearest border, while migration across several borders has identifiable routes and drivers that often require significant financial resources and social networks to facilitate it[30] (see *Figure 5*)[31]. More than half of those populations arriving in Europe in 2015–2016 were fleeing Syria, Afghanistan, and Iraq. These are refugees fleeing war and only a few can be considered economic or environmental migrants. Nevertheless, there are overlapping relationships between 'forced' and 'economic' drivers of migration to Europe. People who leave their home countries primarily due to economic reasons can then face conflict or other emergencies in the countries they move to. Some refugees who originally moved because of war and arrived in host countries such as Jordan, Lebanon, Turkey, Greece, Uganda, Kenya or Ethiopia, reported that they had to move on yet again because they were unable to make a living, due to the poor employment prospects, inadequate infrastructure (water, energy and food nexus

29) International Organization for Migration (IOM) (2015). World Migration Report 2015. *http://publications.iom.int/system/files/pdf/wmr2015_en.pdf*

30) For more information see: *http://data.unhcr.org/mediterranean/regional.php* and *http://migration.iom.int/europe/*

31) Thomson Reuters Graphics (2016). Europe's Migration Crisis. *http://graphics.thomsonreuters.com/15/migrants/index.html*

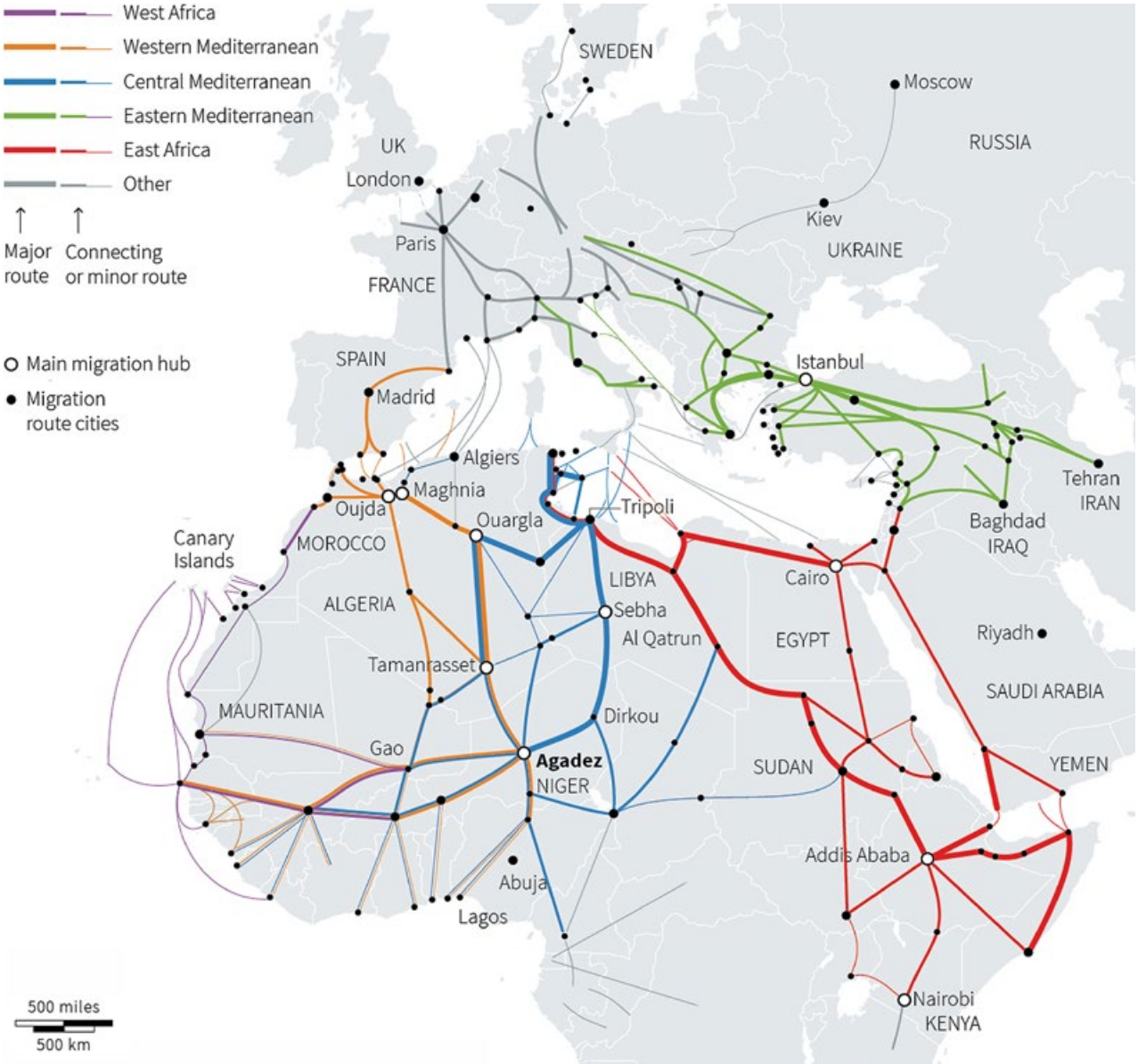


Figure 5 Migratory routes across Africa and Europe

Source: Reuters Graphics

systems), and the lack of access to healthcare and education[32]. In a recent study conducted by the Mediterranean Migration Research Programme (MMRP), it has also been found that the routes migrants use are often shared with refugees fleeing war and a third of respondents interviewed in Greece said that had moved on for what might typically be understood to be economic reasons[33].

When populations arrive in peri-urban areas or humanitarian settings, they often face harsh conditions, exacerbated by a lack of access to energy. Without access to energy it is more difficult to have access to heating, cooking food, health and education services. Improving energy services in humanitarian settings, and from a wider perspective, to complement energy development planning in peri-urban areas, can increase levels of safety, comfort and economic opportunities. It can, therefore, in some cases, also reduce the drivers for further migration. Additionally, it can assist with the integration of displaced populations by helping the host communities/countries cope with additional resource pressures (see *Figure 6*).

3.2 Energy Access in Peri-Urban Areas

The majority of displaced populations in urban areas (around 82% of persons of concern to the UNHCR) live outside camps, in urban rented accommodation and informal settlements[34]. Estimates by UN Habitat (2003) show that in sub-Saharan Africa, about 72% of urban residents live in peri-urban areas or slum-like conditions[35]. As more people migrate to urban centres in search of jobs and better social amenities, or due to environmental degradation, extra pressure is put on city infrastructure and job availability.

Constraints on urban housing and city resources, e.g. water and energy, decrease the quality of life for those living in urban or peri-urban contexts. The vulnerable migrants that arrive to peri-urban areas and informal settlements face inadequate housing; they are kept in a state of permanent transition, under constant threat of eviction and at risk from outbreaks of disease and various abuses[36]. Strains

32) Crawley, H., Düvell, F., Jones, K., McMahon, S. and Sigona, N. (2016). 'Destination Europe? Understanding the dynamics and drivers of Mediterranean migration in 2015', MEDMIG Final Report. *http://www.medmig.info/wp-content/uploads/2016/12/research-brief-destination-europe.pdf*

33) Ibid

34) UNHCR, the UN Refugee Agency (2014). UNHCR Global Trends – Forced Displacement in 2014. *http://www.unhcr.org/statistics/country/556725e69/unhcr-global-trends-2014.html*

35) UN-Habitat (2003). The Challenge of Slums: Global Report on Human Settlements 2003. London and Sterling, VA: Earthscan Publications

36) University of Oxford Refugee Studies Centre (2010). Forced Migration Review – Adapting to Urban Displacement. *http://www.fmreview.org/sites/fmr/files/FMRdownloads/en/urban-displacement/FMR34.pdf*

Figure 6 The role of sustainable energy access in migration patterns

Migration patterns	Role of energy access
Short distance/acute migration (e.g. war, natural disasters)	Contributes to provision of **relief infrastructure and aid services** (heating, cooking, cooling medicines, communication systems)
Slow irregular: rural-urban (peri-urban)	Enhances **agricultural processes** (cooling, storage), food security, **employment opportunities for young population** in rural areas, thus, contributing to prevent migration
Long-term – international migration (e.g. "economic migrants")	Enables **social infrastructures in host countries**, incl. **peri-urban areas** (water management, health, education) thus stemming (further) migration

on energy infrastructure can also be considered an out-migration push factor. Authors such as Marchiori claim that an increase in the urban population can drive down wages, and combined with a reduction of "amenities" this can trigger out-migration at the international level[37]. A study conducted in the peri-urban areas of Nairobi, about migration determinants, found that living in a structure connected to electricity reduces the likelihood of moving out. These results indicate that the presence of basic amenities like electricity may reduce the out-migration in peri-urban areas, thereby retaining the residents[38].

Energy provision is therefore important for displaced populations that live in urban and peri-urban areas. From a development policy perspective it is important to support the government, the host communities and the migrants themselves.

37) Marchiori, L., Maystadt, J. F., & Schumacher, I. (2012). The impact of weather anomalies on migration in sub-Saharan Africa. Journal of Environmental Economics and Management, 63(3), 355–374

38) Donatien Beguy, Philippe Bocquier & Eliya Msiyaphazi Zulu (2010). Circular migration patterns and determinants in Nairobi slum settlements. Volume 23, Article 20, pages 549–586 Published 10 September. *http://www.demographic-research.org/volumes/vol23/20/*

The Role of Energy Development Policies in Stemming Migration Flows

In cities, where energy access in urban and peri-urban areas is limited, energy development policies need to support local governments in dealing with large populations arriving into informal settlements, which increase resource pressures. In Lebanon, for example, the substantial population increase as a result of the Syrian refugee crisis raises demands for water, electricity and waste management – all basic services that cities already struggle to provide. Nearly 71% of host communities surveyed perceived that conditions had worsened in their municipalities[39]. Local governments face a stark choice. They can either resettle inhabitants; a move, which can imply large-scale evictions and which, if, done in an unsystematic, intransparent manner, may eventually push populations and create more irregular migration. Alternatively, they can legalise the settlement, and pay for the instalment of basic sewage and electricity services.

According to a study conducted by the EUEI PDF on future energy scenarios for sub-Saharan African cities, the development of energy programmes in peri-urban areas presents various challenges and requires the support to different stakeholders. These include national and

39) Mercy Corps (2014). Engaging Municipalities in the Response to the Syria Refugee Crisis in Lebanon: Recommendations to inform donor funding, implementing agency practice, and national government policy. Policy Brief. Beirut: Mercy Corps Lebanon

municipal governments, civil society and the private sector. This support ranges from capacity building and policy advice for institutions, to skills development, access to finance, and technology transfer to businesses and the population[40]. It also requires vertical integration (national, sub-national and municipalities) of governance processes, which involves different stakeholders such as civil society leaders, electric utilities and other public infrastructure services.

This process of electrification by means of participatory urban development planning can include migrant populations (e.g. technical energy training and maintenance service of new energy infrastructure), which can thus contribute to their integration. However, this approach implies the recognition of tenure and a 'right to the city', which needs to be extended to all urban residents regardless of how long they have lived there – or the circumstances under which they arrived. Legal recognition helps vulnerable migrants to protect themselves and promotes positive social and economic behaviour. For example, migrants are more likely to pay utility bills, generating revenue for municipal governments, if not constrained by discriminatory regulations[41].

An interesting example of providing energy to the urban poor, while at the same time promoting the integration of migrant populations and host communities, whilst also involving them in the planning process, is Mozambique's electrification programme in Maputo's peri-urban areas (see *Box 3*). Legalisation of informal settlements in a planned, transparent manner can provide dignifying conditions to displaced populations arriving in cities.

40) EUEI PDF (2017). Future Energy Scenarios for African Cities: Unlocking Opportunities for Climate Responsive Development. Eschborn. *http://www.euei-pdf.org/en/flagship-publications*

41) Overseas Development Institute (ODI) (2017). Mass displacement and the challenge for urban resilience. *https://www.odi.org/sites/odi.org.uk/files/resource-documents/11202.pdf*

3.3 Energy Needs for Humanitarian Relief

After migration occurs for the over 125 million people affected by conflict-related crises and natural disasters, the situation is often that they have even less access to energy than in their places of origin. With a huge shortage of funding as well as limited policies on sustainable and clean energy provision within the humanitarian community, current energy practices in camps are often inefficient, polluting, unsafe for users, and damaging to the surrounding environment[42].

Approximately 11% of refugees have reliable access to electricity for lighting, while 89% of those in camps rely on firewood for cooking and heating[43]. Dependency on fuels is estimated to be a cause of premature death for some 20,000 displaced people each year. Wood equalling around 49,000 football pitches worth of forest (64,700 acres) is burned by displaced families living in camps

42) Lahn G. and Grafham O. (2015). Heat, Light and Power for Refugees Saving Lives, Reducing Costs. London: The Royal Institute of International Affairs. Chatham House. *https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/20151117HeatLightPowerRefugeesMEILahnGrafhamEmbargoed.pdf*

43) Ibid

Box 3

Electricidade de Moçambique (EdM) Prepayment Project

City/Town Matola and Maputo
Country Mozambique

As a result of thirty years of armed conflict in Mozambique, unprecedented migration to urban areas has occurred. The majority of vulnerable migrants establish themselves in informal settlements. Out of Maputo's population of 1.3 million, 70% live in informal settlements with limited or no access to modern energy services. For the electrification of Matola, a slum situated 12 km from Maputo, first customers in the informal settlements who would benefit from the project were identified. Then a pre-paid meter system was implemented, with a progressive financial approach. This saw the utility paying for connections and, subsequently, receiving grid expansion credits paid for by the government. As an outcome 5,000 households benefited from better service quality as well as better control of the family budget. The installation of pre-paid meters also stimulated voluntary demand reduction and led to improved revenue collection, whilst improving livelihoods for vulnerable migrants.

Source:
www.unhabitat.org/downloads/docs/7803

each year.[44] The Moving Energy Initiative (MEI)[45] reports that humanitarian agencies, national governments and NGOs spend significant amounts of money on operational activities in camps, which themselves require energy to deliver essential services such as infrastructure equipment, water pumps, street lights, and facilities such as schools, training centres, hospitals and camp offices.

Generally, electricity for camp management comes from inefficiently maintained diesel generators, which have high running costs. An example of this is the Dadaab refugee camp in Kenya where 99 diesel generators are used by UNHCR, and approximately US$2.3 million is spent every year just in providing energy for UNHCR's own administration and operations[46]. Taking this into consideration, it becomes apparent that providing sustainable energy access with a long-term approach will save money and, additionally, builds sustainable development outcomes for host countries. However, several challenges exist for long-term energy planning in humanitarian settings.

The Challenge of Transition and Coordination of Energy Provision in Humanitarian Settings

One of the main challenges to providing durable solutions of energy access to displaced populations lies in the different approaches taken by humanitarian and development actors. On the one hand, humanitarian agencies try to meet the acute needs of displaced populations in the fastest possible way, mostly providing free resources directly to the populations. On the other hand, development practitioners approach crises with a mandate of transitional assistance, aiming for outcomes in the mid to long-term, working through governments and the private sector. These differences present a barrier in planning and coordinating energy services in a sustainable manner.

A common challenge is the political instability and legal status of the populations (including mobility and work permits). In some cases, local political leaders see sustainable energy access in humanitarian settings as a threat to the stability of their own countries because it indicates that the settlements are becoming formalised. This, in turn, may place additional pressure on limited budgetary resources, and also could undermine the government's political credibility. Furthermore, many host communities face challenges of poverty and low energy access themselves, similar to those encountered

44) UN Division for Sustainable Development (2016). Leaving no one behind: Energy for humanitarian response and sustainable development. More information: *https://sustainabledevelopment.un.org/?page=view&nr=2016&type=13&menu=1634*

45) See the Chatham House web site for more information about the Moving Energy Initiative. *https://mei.chathamhouse.org/?section=intro*

46) Lahn G. and Grafham O. (2015). Heat, Light and Power for Refugees Saving Lives, Reducing Costs. London: The Royal Institute of International Affairs. Chatham House. *https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/20151117HeatLightPowerRefugeesMEILahnGrafhamEmbargoed.pdf*

by migrants (see *Annex 4* for a chart with the challenges for linking relief, rehabilitation and development in energy provision for displaced populations).

Alternatives to Improve Energy Provision in Humanitarian Settings with a Long-Term Perspective

The concept of Linking Relief Rehabilitation and Development (LRRD)[47] has been in place in the EU since the 1980s, stemming from times of acute food crises in Africa. Its aim is to link short-term relief measures with long-term development programmes, and to create a more sustainable response in crisis situations. It is especially useful for avoiding aid dependency by building resilience capacities within the population[48].

In order to be applied, the LRRD approach needs an elaborated degree of coordination between stakeholders (governments, international donors, private actors etc.) as well as a long-term flexible planning. It can be a valuable support mechanism for the prevention of potential new conflicts (e.g. struggles for access to resources between vulnerable migrants and host communities). It should incorporate both vulnerable populations of the host country and migrants as beneficiaries of the programmes, highlighting the possible long-term benefits for the host community and thereby enhancing the country's stability.

When it comes to sustainable energy access programmes, there are clear interlinkages between what can be done for migrant and for host communities. Lessons learned from a review of cases in refugee camps of more than a year in duration[49] also show that a more holistic approach to energy provision in humanitarian settings can have benefits for both the refugees and host communities. For example, in peri-urban and rural areas reliable energy access is required for food preparation, lighting, water and sanitation systems, as well as health facilities – all of which are also required in humanitarian settings. Thus, implementing these programmes can serve not only displaced populations but also host communities. As a result, development practitioners often argue that sustainable energy access with long-term planning saves financial resources and facilitates the process of resettlement and/or the integration of refugees into the host community – further underlining the need for a long-term approach.

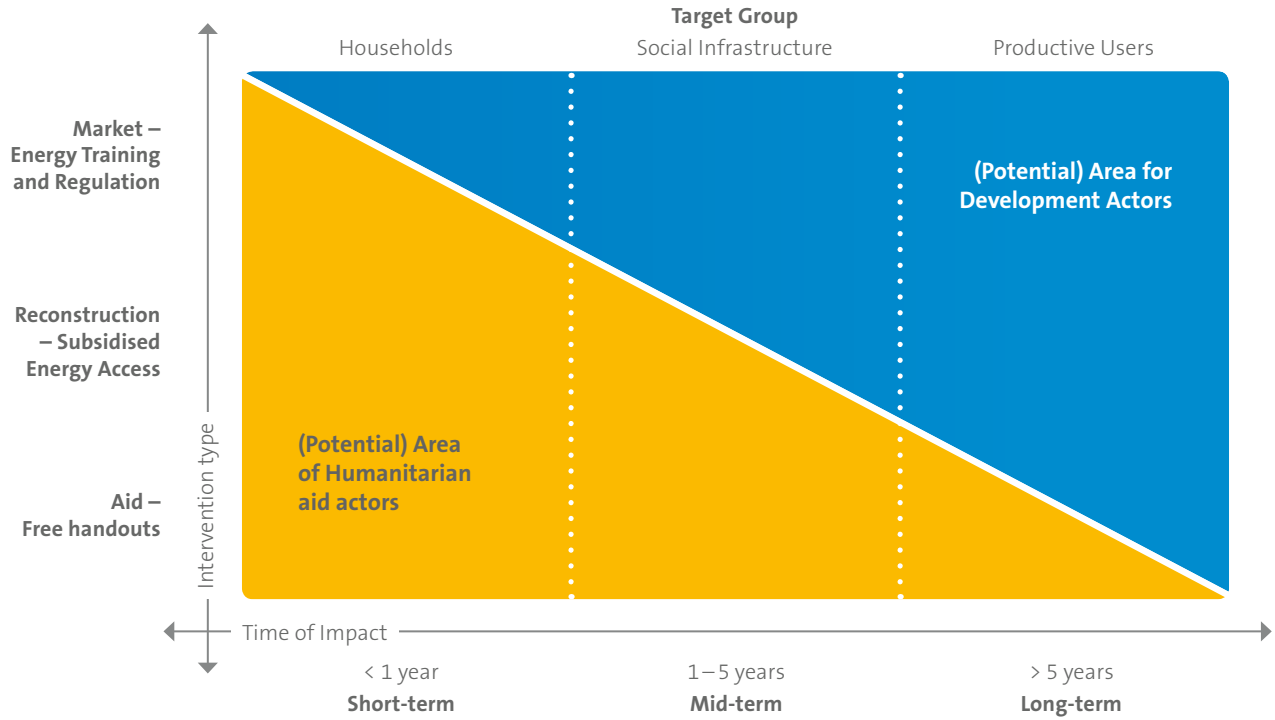
47) See *Annex 2* for definition

48) See *Annex 4* to see a table that presents categories for implementing the LRRD approach and the challenges identified for sustainable energy access in humanitarian settings. For more information see: Morales H (2016). Energy Provision in Refugee Settings – Linking Relief, Rehabilitation And Development. The London School of Economics and Political Science

49) Ibid

Figure 7 presents a coordination model of aid and development in the energy sector. It shows the potential areas of intervention for aid and/or development actors according to the time of impact (short, medium, long), the intervention type (free handouts, subsidised energy access, market based) and the target group (households, social infrastructures or productive uses). The model particularly shows an interesting bridge in interventions for social infrastructure provision of energy, which may take shorter than a year to deploy but also remain for longer periods of time, thus positively impacting vulnerable migrants and host communities equally (see *Boxes 4* and *5*, and *Annex 3* for examples of this type of interventions).

Figure 7 Energy access in aid-development transition: a coordination model



Box 4

Access to public lighting in Zaatari camps, Jordan

Zaatari camp hosts Syrians fleeing the civil war, approximately 150,000 people. The lack of electricity in the camp at night represents a threat for the security of women and children who need to use cooking and toilet facilities.

Through a multi-stakeholder partnership between the UNHCR and Electriciens Sans Frontiers, Sunna Design, a French manufacturing company, introduced a breakthrough technology for solar PV streetlights that offers unequalled resistance to extreme heat and has 10 years of durability. 100 Sunna ISSL+ streetlights have been installed throughout the camp, more specifically around the toilet and cooking facilities.

This had an impact on the reduction of the risk of sexual and gender based violence. The refugees reported a reduced perception of crime incidences and an improvement of their lives, enabling more community gatherings and social activities.

See *Annex 3* for more information.

Box 5

Solar power drinking water pumps, Kenya

The refugee camp of Dadaab depends on the infrastructure provided by UNHCR and other agencies. Power is only available from several large diesel generators, which run 24 hours per day. The only source of water is from boreholes 130 m deep.

Findings of an UNHCR energy assessment to explore the use of renewable energy indicated that solar energy was a sustainable solution for pumping water due to the good solar irradiation (10 hours of sunshine daily).

The project installed by Epicenter Trading Co. Ltd. replaced diesel generator powered pumps with a solar PV powered pump, which led to savings of operation costs and diminished the risk and complexity of water supply. On average, annual operation cost went down by 70% and by 60% including the capital cost of the system. These positive effects balanced out initial starting problems, such as the difficulty of adapting to a new technology as well as the lack of maintenance experts and training courses in O&M.

See *Annex 3* for more information.

Lessons Learned from Sustainable Energy Access Programmes for Displaced Populations

Drawing on a series of interviews conducted amongst development and aid practitioners working on energy access for displaced populations, and a literature review of best practices[50] the following lessons were identified:

- Start with a coordinated approach to energy planning, with a common assessment and the active involvement of possible stakeholders (aid/development actors, the private sector, local populations and local authorities) (See *Figure 7*).
- Renewable energy provision can support social infrastructure, e.g. health centres, schools, training centres, refugee camp offices and refugee reception centres. These can work as anchor clients given their regular demand of power, which can serve to de-risk private investment (see *Box 6* for a guide that helps develop effective interventions for supporting energy market development).
- Invest in local infrastructures which serve both migrant and host communities. This represents an opportunity for long-term planning in energy access (e.g. building solar farms that employ the migrant or displaced and local populations increases the supply of energy and lowers energy costs). (See *Box 8* and *Annex 3* for further examples.)
- Sustainable access to electricity enables the use of ICT as learning tools in schools and in training centres, which help support future livelihood opportunities for refugees and host communities (see *Annex 3*).
- It is important to retain budget for research on improved energy planning. Research enables a better understanding of the political economy of the refugee camps. This can facilitate understanding of consumers' energy preferences and their ability to pay, enabling the design of business models that respond to the needs of displaced populations.
- Nonetheless, in many settlements displaced people and refugees are already paying for energy. There is a need for improved financing mechanisms for energy initiatives in humanitarian settings that maintain a long-term investment approach.
- Engage local energy contractors and stakeholders according to options identified in the local context to build ownership.

50) Ibid

Box 6

Instant Network School in Dadaab Refugee Camp, Kenya

UNHCR in partnership with Vodafone foundation established 13 Instant Network Classrooms located in three, secondary schools, six primary schools and four vocational training centres. Each class room was powered with solar PV, batteries and back-up generators, and endowed with satellite or mobile networks, suite of contents and other online resources.

20,000 students benefitted from the project. 214 computers were able to be connected in 39 schools and four vocational centres, effectively increasing formal access by 100% in schools and doubling the number of available computers to vocational learners. Powering classrooms with renewable energy technologies helped to the advancement in computer studies, which have become a highly valued and demanded course in the community.

See *Annex 3* for more information.

Box 7

Building Energy Access Markets

This guide aims to improve the understanding of how decentralised energy markets operate, while illustrating how to increase energy access and investment in different settings.

It can be adapted and used by aid and development professionals at policy and practitioner level in order to support energy market development in humanitarian or peri-urban settings.

http://www.euei-pdf.org/en/flagship-publications

Box 8

Solar Farm in Jordan

The UN's refugee agency (UNHCR) has partnered with the IKEA Foundation, alongside Jordanian renewable energy company Mustakbal, to construct a solar farm to serve both the Azraq Refugee Camp and its surrounding villages, employing a mix of local and Syrian workers.

Set up with funding from the Brighter Lives for Refugees campaign, the farm will eventually cover the energy needs of 60,000 refugees. It will also reduce CO_2 emissions by 3,500 tons per year which would otherwise be generated from fossil fuel consumption.

Source:
http://www.unrefugees.org/2016/01/ikea-brighter-lives-for-refugees-campaign-raises-33-4-million-for-renewable-energy-sources-for-refugee-families-2/

See *Annex 3* for more information.

4. Conclusions and Recommendations

As outlined in this paper, the link between energy and migration is complex and can be explored from various perspectives. Before migration occurs, the role of energy as a facilitator for environmentally sustainable economic development may represent ways of stemming the economic and environmental drivers of migration in the long-term. Particularly in rural-urban migration patterns, sustainable energy access in rural and peri-urban areas offers increased employment opportunities through economic diversification and upgrading value chains. Additionally, more efficient systems of food production and processing, as well as water management, can allow for better coping mechanisms and increased capacity to respond to crises (relief systems).

After migration occurs, migrants that arrived in host countries reported that they may seek means of onward travel because they do not have opportunities to develop their own means of living in the reception countries – and energy is a central factor in enabling them to do so[51]. Therefore, special attention should be paid to managing local energy development planning and coordinating migration policies in host countries.

One of the most important roles energy access has in the migration debate is to facilitate environmentally sustainable socio-economic opportunities for poor rural populations or displaced persons that arrive in informal urban settlements or humanitarian settings. This is an important area where the humanitarian and development agendas intersect. There are real opportunities to support the development of national agendas to improve energy access and the proportion of renewables in the energy mix in host countries. Proper energy investments and practice – whether related to supply or demand infrastructure – can assist countries in managing the additional pressures brought by the migration crisis and, therefore, support a longer-term integration programme. Some of these opportunities include the construction of renewable energy infrastructure systems, improving climate resilience, the development of productive uses of energy to enhance livelihoods in urban settlements and food production and storage in rural areas.

In order to stem the drivers of migration, it is important to tailor policies according to migration patterns and enable energy sector specialists to take part in providing sectoral expertise, while also formulating durable solutions. New participatory models of energy governance for energy access in peri-urban and rural areas close to camps are needed. Financial models can then be adapted to the difficult conditions of vulnerable populations. Improving energy access itself may not stop further migration – but when combined with a suite of interlinking measures by the governments of host countries (such as giving displaced people the right to work and improving the

51) Crawley, H., Düvell, F., Jones, K., McMahon, S. and Sigona, N. (2016). 'Destination Europe? Understanding the dynamics and drivers of Mediterranean migration in 2015', MEDMIG Final Report. *http://www.medmig.info/wp-content/uploads/2016/12/research-brief-destination-europe.pdf*

local perception of the situation by generating co-benefits for host communities) conditions improve and migrants may be persuaded to stay. Further, ensuring that onward migration is possible within a regulated framework ensures their safety and helps stabilise situations.

Partnerships between migration policy projects such as the displacement centres/camps in host countries and vocational training, green growth and energy transition promotion can boost developmental outcomes, thus generating co-benefits. This is also a way of coherently integrating migration policies with development cooperation policies.

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Annex 2 – Glossary of Key Terms

Acute causes of migration: are those that force people to leave their country, such as war, persecution or natural disasters. These people are then legally protected under international human rights conventions. Temporary shelters and camps often house refugees for either short or extended time periods and require access to sustainable energy sources[52].

Economic migrant: a person leaving his/her habitual place of residence to settle outside his/her country of origin in order to improve his/her quality of life. This term is also used to refer to persons attempting to enter a country without legal permission and/or by using asylum procedures without bona fide cause. It also applies to people settling outside their country of origin for the duration of an agricultural or tourist season, appropriately called seasonal workers[53].

Energy services: Modern energy access is defined as an individual or household having reliable and affordable access to clean cooking facilities, a first connection to electricity, heating and/or cooling and then an increasing level of electricity consumption over time to reach the regional average[54]. It enables basic human needs such as food and shelter to be met. Modern energy services also contribute to socio-economic development by improving education and public health. Since energy is an enabler which underlies all economic activity, it is posited that sustainable energy access can help improve livelihoods, which, in turn, addresses structural causes for migration.

Energy for Social Infrastructure (ESI): is defined as the provision of energy for community services contributing to well-being, e.g. energy for health centres and schools, communal street lighting or communal water pumps. An improvement in the power supply can make a contribution to saving lives and improved health care and education at the same time.

Environmental migrant: persons or groups of people who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad[55].

Forced migration: a migratory movement in which an element of coercion exists, including threats to life and livelihood, whether arising from natural or man-made causes (e.g. movements of refugees and internally displaced persons as well as people displaced by natural

52) IOM Key Migration Terms. *http://www.iom.int/key-migration-terms*

53) International Organization for Migration IOM (2003). World Migration 2003. *https://publications.iom.int/system/files/pdf/wmr_2003_1.pdf*

54) International Energy Agency IEA, (2014). World Energy Outlook 2014

55) International Organization for Migration IOM (2014). Outlook on Migration, Environment and Climate Change, Geneva

or environmental disasters, chemical or nuclear disasters, famine, large-scale infrastructure projects such as dams, deforestation etc.).[56]

Internal vs external displacement: displacement occurring within or outside of national borders.

LRRD (Linking Relief Rehabilitation and Development): "The basic idea of LRRD is to link short-term relief measures with longer term development programmes in order to create synergies and provide a more sustainable response to crisis situations"[57].

Migration: the movement of a person or a group of persons, either across an international border, or within state boundaries. It is a population movement, encompassing any kind of movement of people, whatever its length, composition and causes. It includes migration of refugees, displaced persons, economic migrants, and persons moving for other purposes, including family reunification[58].

Productive Uses of Energy (PUE): are those which increase income or productivity; "(...) agricultural, commercial and industrial activities involving electricity services as a direct input to the production of goods or provision of services"[59]. PUE could be associated with agro-processing, basic industries such as carpentry, tailoring, welding and looming, refrigeration or mobiles charging[60]. According to Bellanca[61] the need to plan beyond lighting and cooking towards productive usage of energy has been overlooked by practitioners. Bellanca argues that access to energy should be seen as the beginning of a process to stimulate several impacts for productive uses as well as for welfare-improving services. Also, she recalls on the importance of developing appropriate productive uses of energy trough seed capital, capacity building and technology transfer. Improved provision of basic energy services contributes to independence and self-determination of the population's living conditions.

Refugee: a person who, "owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political

56) IOM Key Migration Terms. *http://www.iom.int/key-migration-terms*

57) European Parlament (2012). Linking relief, rehabilitation and development: Towards more effective aid. Policy Brief

58) European Commission. Migration and Home Affairs. Glossary. *https://ec.europa.eu/home-affairs/e-library/glossary/men*

59) Brüderle et al. 2011:13

60) Ibid

61) Bellanca, R., Bloomfield, E. and rai, K. (2013). Delivering energy for Development: Models for Achieving Energy Access for the Worlds Poor, Rugby, UK: Practical Action Publishing p. 160

opinions, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country"[62].

Structural causes of migration: are multifarious including unequal distribution of rights, land and natural resources, few socio-economic opportunities, rural poverty, lack of access to energy, food insecurity, environmental degradation and poor governance, especially in the rural areas[63].

Vulnerability: the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. Vulnerability varies significantly within a community and over time[64].

62) UNHCR (2016). UNHCR viewpoint: 'Refugee' or 'migrant' – Which is right? *http://www.unhcr.org/55df0e556.html*

63) FAO (2016). Migration, agriculture and rural development. *http://www.fao.org/3/a-i6064e.pdf*

64) The United Nations Office for Disaster Risk Reduction. UNISDR. Terminology. *https://www.unisdr.org/we/inform/terminology*

Annex 3 – Examples of Energy Provision for Social Infrastructures in Refugee Camps

Project Name/Location/Time	Description	Approach
Access to public lighting in refugee camps, Jordan		
Jordan. Zaatari. 2012–present. Main Source: WAME, 2015	Zaatari camp hosts Syrians fleeing the civil war. In 2012, 45,000 people lived in the camp (now approx. 150,000). The lack of electricity in the camp at night represents a threat for the security of women and children who need to use cooking and toilet facilities. Actors involved: UNHCR, ESF (Electriciens Sans Frontières) and Sunna Design, a French manufacturing company. Sunna Design decided to introduce a breakthrough technology for solar PV streetlights that offers unequalled resistance to extreme heat. It has 10 years of durability.	The product has been developed after researching the needs with community participation. They installed the streetlights above facilities and alongside the pathways.

This annex presents a small collection of ongoing and finalised projects that work on providing energy for vulnerable migrants in humanitarian settings.

	Challenges	Results	Lessons learned
	1. The extreme weather conditions were an important challenge. The appropriate technology needed a heat-resistant product able to guarantee lighting throughout the night and the years. 2. Collecting money needs a special permit and has to be managed by the local electrical companies. Prepaid metering also needs institutional arrangement and a legitimate partner willing to participate. 3. The smart metering systems are also a challenge because they make the population appear more permanent (Lahn et al. 2015:20).	100 Sunna ISSL+ streetlights have been installed throughout the Zaatari camp, more specifically around the toilet and cooking facilities. This had an impact on the reduction of the risk of sexual and gender-based violence. The refugees reported a reduced perception of crime incidences and an improvement of the lives of refugees, enabling more community gatherings and social activities (Merieau & Gebre Egyziabher 2012).	Multi-stakeholder partnerships are important to bring in the private sector and to introduce innovative solutions specifically tailored to the context. Solutions for providing energy for social infrastructures or public spaces may diminish the perception of insecurity and increase the quality of life in the camps. The introduction of new sustainable technologies reduces the maintenance cost.

Project Name/Location/Time	Description	Approach
Instant Network Schools, Kenya		
Dadaab Community Technology Access Centre (CTA) Kenya, Dadaab Refugee Camp. Project start: 2013 (camp erected in 1992). Main sources: UNHCR, 2015; Badsah, 2013	UNHCR in partnership with Vodafone foundation established 13 Instant Network Classrooms located in three secondary schools, six primary schools and four vocational training centres. Each class room was powered with solar PV, batteries and back-up generators, and endowed with satellite or mobile networks, suite of contents and other online resources.	The approach implemented was human-centred. It involved community consultation about their ideal learning environment. The Instant Network School model was tailored to the particular context. It focused less on the technology and more on developing a cohesive system with a strong emphasis on content and capacity building. Vodafone Foundation's staff, including volunteers, travelled to the camps to assist with the setup of the electrical systems and trainings. All Instant Network Schools are built on existing Information and communication technology projects to create synergies among the local community. Schools are offering additional training programmes after school hours, charging a small fee to create ownership and a flair for business.

	Challenges	Results	Lessons learned
	Deconstructing traditional models of teaching, and culturally embedded models of lecturing alone has proved to be very difficult.	20,000 students benefitted from the project. Powering classrooms with renewable energy technologies helped to the advancement in computer studies, which have become a highly valued and demanded course in the community. 214 computers were able to be connected in 39 schools and four vocational centres, effectively increasing formal access by 100% in schools and doubling the number of available computers to vocational learners. 145 secondary school students enrolled within a week to IT skill classes. The project has helped with children's retention in school and led to an increase in primary school enrolment.	Partnerships with private actor Foundations, when built in a transparent way, are beneficial in a long-term setting. The leverage from private actors is significant to deploy new approaches. The access to power coming from renewables lead to an increase in the impact of educational projects that are based on new technologies. Vocational Training in Information and Communication Technologies employing renewable energies offers opportunities for livelihoods (e.g. providing remote basic ICT services).

Project Name/Location/Time	Description	Approach
Solar Farm, Jordan		
Azraq. April 2014–present. Main source: Lahn et al. 2016	The refugee camp has a population of 54,605. It was opened by UNHCR and the Jordanian government. The area around the camp has a limited connection to the national grid. Electricity is provided to the base camp through diesel generation for administrative facilities and NGOs. The camp presents a controlled environment with little economic activity and low income. As a response to the lack of energy access a multi-stakeholder partnership was developed to build a solar farm that provides energy to the camp and the nearby host communities.	The solar farm was developed with funding from the German Development Bank (KFW) and the IKEA foundation in coordination with UNHCR, the Jordanian Government, and Mustaqbal – a private Jordanian company. It is intended as a market based approach in order to build ownership. The energy generated by the solar farm will feed the national grid coping with the energy demand overflows. Refugees were trained and hired to build the solar farm.

	Challenges	Results	Lessons learned
	The sustainability of financing this large project is a big challenge due to the transience of residence of the refugee population. The installation of meterings is a highly political factor due to its permanent character in a temporal camp. Lack of clarity in renewable energy regulation is a constraint for implementation in humanitarian settings.	1. Provision of electricity for refugees and at the same time a lasting legacy for local populations. The Government committed to a daily 12 hours of electricity supply to the camps. 2. Reduction of the pressure on the electricity grid. 3. Cost reduction for the camp's electricity bill: The cost of the amount of electricity generated by the farm and fed back into the grid is deducted from Azraq camp's electricity bill. 4. Employment of three highly qualified Jordanians and 20 Syrians.	An important factor is to negotiate with the host governments. Finding an alignment between needed acute solutions and the host country priorities is important to ensure that humanitarian interventions can benefit the refugee population while at the same time facilitate the transition to longer-term development goals. It is important to make partnerships with the 'right actors'. In this case it meant developing assessments of the right governmental agency in charge of energy provision and of the most appropriate and capable private actors.

Project Name/Location/Time	Description	Approach
Solar powered drinking water pumps, Kenya		
Dadaab IFO-II Refugee Camp. Installation of pumps in 2012 (camp erected in 1992). Main Source: Lorentz 2013	The project was installed by Epicenter Trading Co. Ltd. It is located in Dadaab and the "largest refugee camp in the world". Dadaab depends on the infrastructure provided by UNHCR and other agencies. Power is only available from several large diesel generators, which run 24 hours per day. The only source of water is from boreholes 130m deep.	Findings of an UNHCR energy assessment to explore the use of renewable energy indicated that solar energy was a sustainable solution for pumping water. The project has replaced diesel generator powered pumps with a solar PV powered pump. The region has a good solar irradiation (10 hours of sunshine daily).

	Challenges	Results	Lessons learned
	Lack of maintenance experts and training courses in O&M. The adaptation to new technologies is a difficult process.	Savings of operation cost, diminished risk and complexity in water supply: The system is expected to provide an annual saving of about US$10,000 compared to a diesel generator of a similar capacity. Annual operation cost are reduced by 70% and by 60% including the capital cost of the system.	High operational cost savings validate the higher investment in solar technologies quickly.

Annex 4 – The Challenge of Providing Sustainable Energy Access in Humanitarian Settings by Linking Relief, Rehabilitation and Development (LRRD)

Elements for LRRD	Description
1. Politics	Detailed evaluation and planning for specific political contexts
2. Coordination among stakeholders (international, national and local)	Coordinated context evaluation and planning coordination among agencies, local governments and others
3. Participation of the beneficiaries in the design	Sense of ownership for the beneficiaries and integration with host communities to design innovative solutions
4. Technical aspects	Technological assessment for adapting technology, priority to local availability
5. Flexibility – adaptation (including budgets)	Long-term planning especially for humanitarian agencies
6. Market perspectives	Market possibilities tied to livelihoods possibilities
7. Ownership	Measures interconnected with national, regional, local institutions and policies

	Challenges
	▶ In some hosting countries there is a lack of policy regulation to provide coordination with production and distribution utilities to implement sustainable energy projects. ▶ The legal status of the population to work and perform economic activities is burdensome. In some hosting countries there is a passive role to have a mid-long term planning.
	▶ There is not a clear lead agency for energy provision in refugee settings due to the lack of an energy cluster in the humanitarian United Nations system. ▶ Data on energy consumption is collected by various agencies, which disaggregates the information. ▶ The different approach of humanitarian and development practitioners impedes coordination to transition from relief to long term development interventions. ▶ Different project approaches are not always easy to combine (highly subsidised support in humanitarian aid context versus development cooperation approach that requests for own contributions by beneficiaries).
	▶ Cultural preferences can impede the adoption of certain technologies (e.g. solar cooking, people prefer the taste of traditional cooking stoves). ▶ Lack of ownership of public goods make populations to deteriorate or stole public lighting.
	▶ Different levels of technical capacities within the communities are an impediment to adopt new available technology. ▶ Sometimes is difficult to Identify appropriate local providers.
	▶ Uncertainty is a barrier for further planning. Humanitarian agencies have a one-year budget planning and renewable energy takes longer periods of time to deploy. EMS would not work if the refugees are going to be resettled.
	▶ Lack of data on consumer preferences and energy demand on the camps is an impediment to deploy energy market systems.
	▶ Local authorities should lead and appropriate their resilience and coping strategies. ▶ Insufficient institutional structures put constraints on the implementation of long-term development plans.


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