



## Critical Concepts and Research Needs in Humanitarian Energy

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*Publication date:*  
2021

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Haselip, J. A., & Rosenberg-Jansen, S. (2021). *Critical Concepts and Research Needs in Humanitarian Energy*.

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# Critical Concepts and Research Needs in Humanitarian Energy

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GPA Working Paper 2021



GLOBAL PLATFORM FOR ACTION



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# Introduction

The world faces a growing humanitarian challenge: over 80 million people are now forcibly displaced from their homes by multiple crises and protracted conflicts (UNHCR, 2021). Over 26 million people have been forced over borders as refugees and 45 million people are internally displaced within their countries. Within this context, displaced people lack access to clean cooking solutions and are often not able to access modern electricity to meet their needs. The realities of living without modern access are extreme (Mercy Corps and GPA, 2020). Many people still cook over three-stone fires using firewood and live in the dark at night. Small enterprises run by displaced people are not able to access the energy they need to run their businesses, provide local jobs, or drive local economic development. Community facilities such as schools, hospitals, WASH facilities, and refugee community spaces are without reliable power. Humanitarian facilities, offices, compounds and registration spaces use expensive and polluting diesel fuel. These factors reduce the quality of life of refugees and displaced people, cause financial and environmental pressures on humanitarian agencies and host communities, and contribute to global climate emissions (UNHCR, 2019; UNITAR, 2018).

COVID-19 has worsened pressures on humanitarian energy provision. Both in the short-term, as electricity for health clinics and to refrigerate vaccines has largely been unavailable, and in the long-term as displaced communities will face a harder journey for recovery without access to energy. Investment

in sustainable energy during the humanitarian response to the COVID-19 pandemic continues to be important as a means to help mitigate infection risks (for example through providing sufficient and clean water via pumping systems), and to and improve the medical response (for example through securing cool chains via refrigeration). It can also enable affected populations to become more resilient when facing the economic crisis developing as a result of the impacts of the pandemic (GPA, 2020).

The landscape of humanitarian energy has evolved rapidly over the past ten years. There has been a proliferation of institutions and organisations working on sustainable energy for displaced people, and a considerable number of new policies and projects have been created since 2015 (Rosenberg-Jansen, 2020). Understanding humanitarian energy needs in context requires new research and primary evidence (Grafham, 2020). Even in 2021, we lack a comprehensive overview of how many people have access to energy within the humanitarian contexts (Bisaga and Rosenberg-Jansen, 2020). Crisis-affected populations, such as refugees and displaced people, are often left behind in energy access discussions (Lahn and Grafham, 2015). Sustainable energy in displacement settings is frequently piecemeal and based on free distribution rather than market-based mechanisms (Bellanca, 2014; Gunning, 2014). Additionally, energy access is often thought of more in terms of products rather than access to energy services (Grafham et al.,

2016; Lehne et al., 2016). Global progress towards Sustainable Development Goal 7 (World Bank, 2017) has rarely included displaced people (Moving Energy Initiative, 2017). These are just a few of the pressing research topics which need urgent attention to support the long-term planning in the 'new normal' of humanitarian crisis (Sova, 2018). Much more evidence will be needed on all these topics and others to support inclusive policy-making and sustainable energy planning for the displaced (UNITAR, 2018).

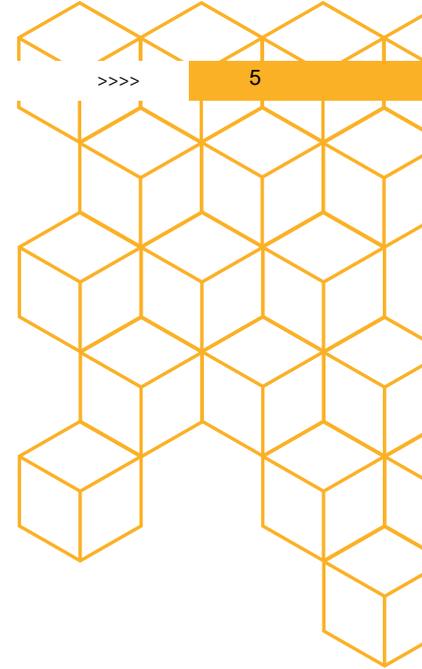
Within this context, there has been particularly slow progress on gathering data on humanitarian energy access. This is partly a function of a lack of standard procedures and limited guidance on data collection to measure energy access rates or understand the energy needs of displaced communities (Haselip, 2019). But the complex nature of humanitarian response has further complicated this issue. To support the build-up of energy data within the humanitarian sector, the Global Platform for Action Coordination Unit (GPA) and partners such as Chatham House have been working with humanitarian sector partners to map out the types of energy indicators and data processes that can lay the foundation for a harmonised data collection and analysis in forced displacement settings (Rosenberg-Jansen and Archimi, 2020).

This report provides a summary of some of the key issues for research, evidence, and data in the humanitarian energy sector. It also outlines the priority activities identified by the GPA Research and Evidence Group. The purpose of this document is to connect a number of emerging themes and research ideas on humanitarian energy, with the aim of fostering a collaborative approach for research in the sector. A number of topics are presented:

- Research Priorities Identified by the GPA Research and Evidence Group.
- New Primary Research Topics.
- Analysis and Academic Research Topics.

In the area of humanitarian assistance, we believe that research should have a practical, as well as academic, value, and be demand-driven and action-based in order to make a difference. Therefore, when scoping specific research-based projects to gather or analyse data and evidence it is important to bear in mind the goals of the research and the purposes that data and evidence will serve. These are central to developing a coherent theory of change for any specific project and ensuring clarity of the project's outcomes and the difference it is intended to make. We first need to clarify the basics of why we need to map previous, ongoing and planned research on specific topics or locations. Who requires the data and evidence? What will it be used for? Once we have clear answers to those questions, we can proceed with confidence that specific projects in the area of data and evidence are likely to be of value, and make a difference.

The GPA structure is able to support projects in developing impact-orientated research, by matching academic and supply-side research and private-sector actors who can gather and analyse data and evidence, with the humanitarian agencies and 'demand-side' actors who are responsible for implementing specific projects on the ground. For example, if a large humanitarian agency has been tasked with reversing deforestation in and around a new refugee settlement, they can call upon one of the GPA members to design and conduct an appropriate study, to gather relevant data and evidence on household energy consumption, income and preferences. From that basic data various options can be explored, for example investment in market creation for alternative fuels, more efficient stoves and community-run reforestation programmes (Rivoal and Haselip, 2018). The sections below outline the sector-wide priorities on evidence and research in humanitarian settings, as developed as part of the GPA process to collectively identify current research challenges.



# GPA Research and Evidence Group

## Priorities and Work Plan Areas

Producing new research and data is critical for the development of humanitarian energy projects and programmes to ensure that the sector has high-quality accurate evidence it can rely on to make decisions. Leaving no-one behind in humanitarian energy programmes requires that existing energy assessments are inclusive and deliver real-change for people living in displacement settings. Developing a standardised, common set of indicators which can be used across and within humanitarian organisations is critical to measuring and understanding this change. And finally, embedding learning at the heart of stakeholder practices will enable these changes and improvements to last. The GPA Research and Evidence Group has identified the four priority areas outlined below in collaboration with researchers and practitioners across the humanitarian energy sector:

1. **Collaborate to develop primary research** and core data on the assessment of appropriate technologies, socio-cultural factors and community adoption of renewable and sustainable energy (GPA recommendation V01). Led by a collection of partners, including DTU, UNITAR, UNHCR, IOM, NGOs, Academic Partners, and Chatham House: GPA Coordination Unit managing initially.

2. **Conduct a full review of existing tools for energy assessments** in displacement contexts (GPA recommendation V10). Led by NORCAP, DTU, UNHCR and IOM initially.

3. **Develop standards and a common set of measurable indicators** for energy assessments (GPA recommendation V13). Led by a collection of partners, including MECS, Se4ALL, UNITAR, and Chatham House: GPA Coordination Unit facilitating the process.

4. **Embedding learning in humanitarian energy programming** and working with practitioners to use data and evidence within their programming (GPA recommendation V29). Led by DTU and UNITAR initially.

The GPA has also produced a longer list as part of the full work plan development which sector stakeholders can participate in. All priority areas and the full work plan are available for working group members to support development across different research topics. The first set of priority areas on primary research and data requires many stakeholders to come together and work through partnerships and collaborations to deliver innovative, usable research. Any interested development, energy access, or humanitarian partners are welcome to be involved: sector stakeholders are welcome to contribute to these topics and are actively encouraged to become directly involved with the research and development work that underpins them. To learn more about how to contribute, please contact: [Sarah.RosenbergJansen@gmail.com](mailto:Sarah.RosenbergJansen@gmail.com) and [James.Haselip.jhas@dtu.dk](mailto:James.Haselip.jhas@dtu.dk).

## New Research Topics

The section below provides an overview of some of the emerging research topics in the humanitarian energy sector. These have been developed in collaboration with sector professionals and academic partners and are intended to be a starting point for discussion. These areas are not meant to be in any way exhaustive, rather they represent a selection of research topics around which new research and funding proposals could be developed. Each section provides an overview of the topic area, potential institutions for collaboration or who have already worked on this area, and suggested research questions and methods.

### Humanitarian Energy Investment Chain: Understanding Evidence in Context

Overall, energy investment and private sector challenges are not well understood within the humanitarian sector and, as a result, facilitation and technical support are needed to support humanitarian organisations and private sector partners in developing appropriate energy programming. The topic of energy and markets in humanitarian settings needs substantive investment in order to produce investment data and facilitate practical projects (Haselip, 2019). Without investment in these spaces, the wider humanitarian sector will likely be slow to reform, have limited learning from the energy access sector, and progress on sustainability will continue to be slow, uncertain, and intermittent (Bisaga and Rosenberg-Jansen, 2020). Similarly, within the

context of COVID-19, humanitarian institutions should be supported to build back better and invest in clean energy which reduces emissions and climate impacts over time (GPA, 2020). Within these broad recommendations, some specific elements will require initial investment in order for this set of problems to start to be addressed:

- Primary data collection and analysis of energy data on markets and investment modes in humanitarian settings.
- Development of an “assessment to investment” pipeline which operations and humanitarian responders can use in both emergency and protracted responses to guide their sustainable energy interventions.
- Technical resourcing to support humanitarian agencies and their partners learn about energy access, energy for enterprises, and market-based solutions.
- Matchmaking between humanitarian organisations and energy experts, who can support detailed programme design, programme implementation, and delivery of sustainable energy products and services. For example, through the UNHCR Clean Energy Challenge process (De Bourbon de Parme and Haselip, 2020).
- Resources to support mentoring of staff within humanitarian organisations to design and deliver sustainable energy programming.
- Networking and advocacy activities to develop

awareness and knowledge on humanitarian energy needs and supply mechanisms.

*Research questions:* What delivery modes and business models prove successful in supporting sustainable energy investments in humanitarian energy? What are the key pieces of investment and markets-based data needed for humanitarian practitioners and the private-sector? What tools and action-based research would be useful for energy partners to undertake in order to support the humanitarian sector effectively? What practical outputs and advocacy materials would be needed on humanitarian energy to ensure effective investment by both UN agencies and the private-sector?

*Potential Collaborative Approaches:* Technical research and knowledge partners, such as Technical University of Denmark (DTU) and international coordination partners such as the Global Platform for Action for Sustainable Energy Solutions in Situations of Displacement (GPA), are well placed to support organisations and funders who wish to learn about and collaborate on issues within energy markets for humanitarian settings. Additional collaborators: UNITAR, Chatham House, GOGLA, Acumen, GDC, ESMAP, UNHCR and IOM. Methods and approach: global research partnership to understand how to develop markets-based information and investment priorities within the humanitarian energy sector. Types of activities: Analysis of financial mechanisms, including investment tools, RBF, de-risking, smart subsidy options, financing gap assessments. Primary research and data collection, market analysis and evidence energy assessments, analytical work on business models and delivery partnerships, digital research and lean data processes.

### **Quantitative Data in Humanitarian Energy: What is it and where can it be used?**

Baseline data on humanitarian energy is not widely

available. What energy 'data' is currently available is not well understood and there are limited sources of quantitative data that are usable for sector participants (Rosenberg-Jansen and Archimi, 2020). Research and evidence on this topic could provide considerable information for humanitarian practitioners – to support on-going energy programmes, to inform the design and commissioning of humanitarian programmes, and to provide measurements on what is working to deliver energy in displacement settings. Similarly, baseline data and feasibility assessments are not widely available for private sector partners to guide their investments.

Quantitative evidence is critical in supporting decision-makers and implementers in delivering sustainable energy as part of humanitarian programmes and projects. It is also important to be able to understand how people use energy as part of a highly complex humanitarian system. Without good information and clear data, humanitarian agencies, NGOs, the private sector, and local governments will be unable to respond effectively (De Bourbon de Parme and Haselip, 2020). The energy needs of refugees and displaced people will likely not be well understood, nor will community priorities be incorporated into decision-making. In addition to this, markets and private sector suppliers will not have the information they need to invest in humanitarian energy projects or work with other organisations to develop market-based solutions. Data is critical for all these reasons, as without good evidence programmes will struggle to be successful and action on humanitarian energy will find it difficult to achieve global change.

Quantitative data and evidence should be developed alongside clear knowledge sharing, training and learning opportunities to ensure that new information can be used by decision-makers. In the long term, it is hoped that the sector will be able to develop new data on energy access in displacement settings to enhance development outcomes, scale-up impact, inform national and international policy, and provide evidence for humanitarian actors.

*Research questions:* What are the types of energy data in humanitarian settings and how can it be used effectively? How can data sharing approaches be developed and information shared between humanitarian organisations and practitioners? How can humanitarian practitioners be supported to use quantitative data and evidence more effectively?

*Potential Collaborative Approaches:* DTU, UNHCR, WFP, FAO, research organisations such as Imperial College London, quantitative data specialists, HDX. Methods and approach: developing quantitative, shareable data sets and analysis tools for humanitarian practitioners and data users.

### Productive Uses, Livelihoods and the Role of Energy for Small Businesses in Humanitarian Settings

Productive uses and energy enterprises have been the subject of considerable research in development settings. In humanitarian settings, increasing evidence on the role of energy for small businesses is starting to emerge, and further evidence on what ownership and community-based models for productive uses of energy is needed in refugee and displacement settings (Rosenberg-Jansen, 2019). Research on this topic could focus on the energy needs of enterprises in displacement settings, as well as the legal frameworks, business support environment, national policies and regulations that can be developed to support productive uses of energy (Thomas et al., 2021). For example, new evidence is needed on formal and informal economies in refugee camp settings and how these economies are supported by energy could be used by humanitarian operations to better understand how to support energy livelihoods as part of CRRF commitments to support the economic integration of displaced communities into the host country economy.

In particular, new research is needed on sources of

income and levels of energy spending within camps. This could be linked to international labour market discussions, such as if refugees and displaced people bringing wealth and income to certain areas. A number of important questions spring to mind here, for example: How much do displaced people pay for access to energy, are alternative business models able to support more affordable access, and how can purchasing power be harnessed to ensure that vulnerable communities have better access to services and energy? What types of small businesses already exist within displaced settings, that both use and supply energy? Would higher levels of energy access be an asset to small businesses and help entrepreneurship and self-reliance develop within camp and non-camp settings? How are the topics of energy and enterprises, livelihoods and jobs interwoven in humanitarian situations?

*Research questions:* How can productive uses of energy and energy-based livelihoods be better supported in settings of displacement? What are formal and informal economies in refugee camp settings and how are these economies supported by energy? How is income and expenditure linked to energy in settings of displacement?

*Potential Collaborative Approaches:* University of Bristol, SNV, GIZ, Oxford Refugee Economies programme, Endevo micro-enterprises in humanitarian energy settings project, SELCO Foundation, Shell Foundation. Methods and approach: qualitative and markets-based research on productive uses, understanding how productive uses of energy and income and spending levels fit with new private-sector business models.

### Greening Operations and Sustainable Mini-grids

Mini-grid models for sustainable energy for humanitarian operations are beginning to emerge: some examples of solar mini-grids are already

available in Jordan (IRENA, 2019). However, the procurement mechanisms and business models for such interventions are not always clear (Gibson, 2020). More evidence and data is needed to demonstrate the business case for such programmes for humanitarian operations (Grafham and Lahn, 2018). Further research could provide much needed evidence on the facts and figures for greening operations.

Building on this initial research, pilot and trial projects with humanitarian organisations could provide examples of humanitarian operations switching from diesel to more sustainable energy sources and hybrid mini-grids. Emissions data, carbon reductions, and energy efficiency data could help to support UN commitments to greening operations (Gibson, 2020). Such research would provide useful information for both the private sector and humanitarian organisations by delivering in-depth research in priority countries to support Greening the UN objectives (UNEP, 2019).

An important part of this research is to understand how humanitarian operations can be supported to improve their delivery mechanisms to deliver sustainable energy for displaced populations. While many field and national humanitarian operations would like to be able to switch to more efficient and cleaner energy sources, institutional procurement mechanisms and internal policies and practices can hinder their realisation. Increasing evidence and supporting capacity building on this topic could enable humanitarian organisations to reshape their responses and switch to cleaner sources of energy more effectively.

*Research questions:* What are the business models and key data needed for sustainable mini-grids in humanitarian settings? How can pilot projects and demonstration examples be used to scale-up greening humanitarian operations? How can humanitarian operations be better supported to use procurement mechanisms to deliver sustainable

energy for displaced populations?

*Potential Collaborative Approaches:* UNDP, UNITAR, HEED Coventry project, Imperial College London. Methods and approach: quantitative and qualitative research on humanitarian energy procurement practices, quantitative data on energy consumption and diesel costs in displacement settings, and empirical and analytical evidence on business models and alternative delivery partnerships.

## Clean Cooking in Humanitarian Settings

Clean cooking is a hugely complex topic, with many pilots and programmes trying to deliver sustainable, safe energy to people in displacement settings (Barbieri et al., 2017). To date, many of these programmes have been unsuccessful and only a few examples of approaches taken to scale exist (Vianello, 2016). Learning from these failed and successful programmes is critical for future programming and to ensure that clean cooking solutions can be delivered across a range of displacement settings (Rivoal and Haselip, 2018). Secondary research could investigate the lessons learned from these approaches, and seek to provide an in-depth study of what has worked and what did not.

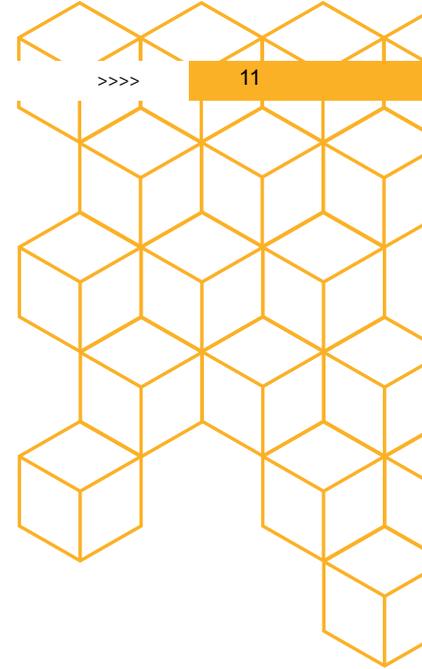
Electric cooking has the potential to change the clean cooking sector and the lives of millions of people (Bisaga and To, 2021). Research could be undertaken on the types of stoves, cookware, and electricity sources needed in displacement settings. For example, considering the large-scale delivery of solutions, investment pathways, and interdisciplinary approaches between innovation professionals, engineers, and ethnographic researchers. Research could examine electric cooking in terms of connections to grids, mini-grids, or small-scale renewable technologies. The role of energy storage would also need to be better understood.

Clean cooking is an important area for hundreds of millions of people across the developing world, including in humanitarian contexts. Cooking is a highly gendered area and any new research in this topic would need to be gender sensitive (Rosenberg-Jansen et al., 2018). Ethnographic and lived experience research could contribute to further understandings of how women engage with energy and clean cooking technologies.

*Research questions:* What can we learn from clean cooking approaches in humanitarian settings? What role could electric cooking play in energy for displacement? How can the lived experience of women in displaced settings inform clean cooking programmes within humanitarian organisations?

*Potential Collaborative Approaches:* MECS programme and Loughborough University, Clean Cooking Alliance, GIZ. Methods and approach: In-depth research trial in priority countries, techno-economic studies of electric cooking pilots in refugee settings, qualitative and ethnographic work to understand participatory and inclusive approaches to clean cooking.

# Analysis and Academic Research Topics



There are several research topics already being covered by sector participants. These are outlined in the table below.

Topics	Countries Covered	Type of Research
1 Research needs and priority country topics for analytical and technical support: <a href="#">GPA</a> and UNITAR.	Global research + coordination. Indicator mapping Djibouti case study.	Research and Evidence Group lead by the GPA coordination unit. Advice on evidence sources, data collection and analysis, and future research collaborations. Data coordination and indicators mapping work during 2020 and 2021. Potential new projects from 2021 onwards.
2 Humanitarian Engineering and Energy for Development ( <a href="#">HEED</a> ) project at Coventry University	Rwanda and Nepal	Academic project (value £1 million). Focusing on computer science, physical sensing, renewable energy recommendations tool (RERT), and energy survey data.
3 Modern Energy Cooking Services ( <a href="#">MECS</a> ) humanitarian programme at Loughborough University	Sub-Saharan Africa and global	Academic project (value £40 million). Focusing on analysis of clean cooking solutions, testing of pilot technologies, and innovation.
4 <a href="#">Energy Enterprises</a> : Targeted data collection analysis and dissemination to show commercial potential of displaced people.	Uganda, Kenya, Rwanda, India and Nepal.	Potential new Bristol University collaboration with SELCO Foundation and Clarke University Uganda.
5 <a href="#">UNHCR</a> energy data survey and monitoring data sets.	Ten focus countries	UNHCR data on impact of existing UNHCR energy projects in selected countries.

Topics	Countries Covered	Type of Research
6 <a href="#">IOM</a> Energy needs assessment framework	Global but two focus countries	IOM new data collection and analysis framework by the end of 2021 through the Displacement Tracking Matrix (DTM).
7 <a href="#">UNDP DTU</a> Humanitarian Energy in Research	Tanzania and global	New projects hopefully starting during 2020 - 2021
8 Renewable Energy for Refugees ( <a href="#">RE4R</a> ) – global and research activities	Jordan and Rwanda	Ongoing until Feb 2021
9 Moving Energy Initiative ( <a href="#">MEI</a> )	Burkina Faso, Jordan and Kenya	Research project (value £5 million). Phase II completed. Project funding closed.
10 <a href="#">Mini-grid</a> research and energy system optimisation	Rwanda case study	Imperial College London academic project focusing on system optimisation and mini-grid system design.

### New Potential Research Topics

There is a considerable need for new information and evidence in humanitarian energy and the table below suggests some specific areas for open discussion. Many of these areas are already topics of considerable research in the broader energy access sector, so could learn from those analyses and approaches to understand issues specifically in contexts of displacement.

Research Gap	Potential New Data and Evidence Area for Humanitarian Energy
Energy technologies	<ul style="list-style-type: none"> <li>• Appropriateness of technologies solar street lights, solar lanterns, or solar cooking stoves options for renewable biomass and biogas, wind generators, micro-hydro, geothermal, and waste recycling.</li> <li>• How communities perceive and use kerosene or traditional biomass and firewood within different country contexts.</li> <li>• Potential for smart micro-grids in humanitarian settings.</li> <li>• What are the barriers to delivering decentralized clean energy services at scale and how information, business models and innovative financing can address developing country energy access gaps?</li> </ul>
Productive use and income generating opportunities	<ul style="list-style-type: none"> <li>• How energy access can improve economic opportunities.</li> <li>• How energy is used by businesses and in informal trade mechanisms.</li> </ul>

Research Gap	Potential New Data and Evidence Area for Humanitarian Energy
Community resilience and inclusive participation	<ul style="list-style-type: none"> <li>• How communities adapt and use energy resources currently in different contexts.</li> <li>• Inclusive participation and how beneficiary co-design can be developed: What tools and mechanisms are available to incorporate beneficiaries into the planning and provision of renewable energy service provision in refugee settings?</li> <li>• Understanding the ethnographic evidence base for displaced communities and behavioural change opportunities.</li> </ul>
Infrastructure systems and institutional use	<ul style="list-style-type: none"> <li>• Processes and infrastructure systems in refugee camp settlements.</li> <li>• Political economy analysis of humanitarian sustainable energy policy and practice.</li> <li>• Institutional power, systems, and renewable energy supply options in refugee camps.</li> </ul>
Energy and inclusivity	<ul style="list-style-type: none"> <li>• How are displaced people involved in energy planning?</li> <li>• Qualitative analysis of humanitarian systems, participation practices, and empowerment projects. Direct action research to support displaced people in engaging in humanitarian energy programming.</li> </ul>
Energy for health, education, protection and SGBV needs	<ul style="list-style-type: none"> <li>• Negative health impacts of cooking in displacement settings.</li> <li>• Evidence on the connection between energy, protection, gender issues, and sexual and gender-based violence.</li> <li>• Energy for power schools, health centres, administrative buildings and for street lighting.</li> <li>• Understanding the link between energy and gender in displacement settings.</li> </ul>
Environmental impacts	<ul style="list-style-type: none"> <li>• CO2 and emissions levels from current energy use.</li> <li>• Data on the negative environmental impacts of diesel, kerosene, and reduce the costs associated with conventional generation in displacement settings.</li> </ul>
Monitoring and evaluating	<ul style="list-style-type: none"> <li>• Tools and methodologies for monitoring, evaluation and learning for energy programmes in humanitarian settings.</li> </ul>
Knowledge, learning and skills training	<ul style="list-style-type: none"> <li>• Specific training and knowledge sharing within practitioner, researcher, academic and field staff communities.</li> </ul>

# References and Acknowledgements

## Acknowledgements

Initial inputs for this paper were developed during the GPA kick-off workshops in Berlin in 2018 and during research discussions in The Hague during 2019. Peer-review and inputs have been provided by the GPA Research and Evidence Group who convene once a quarter online to share evidence, results and learning from across the sector. If you wish to become part of this group, please email: Sarah.RosenbergJansen@gmail.com.

Thanks to Thomas Fohgrub, Aimee Jenks, Sadiq Zafrullah, Owen Grafham, Hajar Al-Kaddo, Iwona Bisaga, Philip Sandwell, Peter Thomas, Sam Williamson, and Elena Gaura and the HEED project, for inputting to the concepts underpinning this paper.

Please cite this document as: Rosenberg-Jansen, S. and Haselip, J. (2021) Critical Concepts and Research Needs in Humanitarian Energy. GPA Working Paper. UNITAR, Geneva Switzerland.

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Please cite this document as:

Rosenberg-Jansen, S. and Haselip, J. (2021) Critical Concepts and Research Needs in Humanitarian Energy. GPA Working Paper. UNITAR, Geneva Switzerland.

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