Humanitarian Engineering and Energy for Displacement (HEED)

Finding the uncomfortable solution: responsible innovation in humanitarian energy

Benjamin L. Robinson, Alison Halford and Elena Gaura | **September 2021**

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More details on the HEED project can found at http://heed-refugee.coventry.ac.uk

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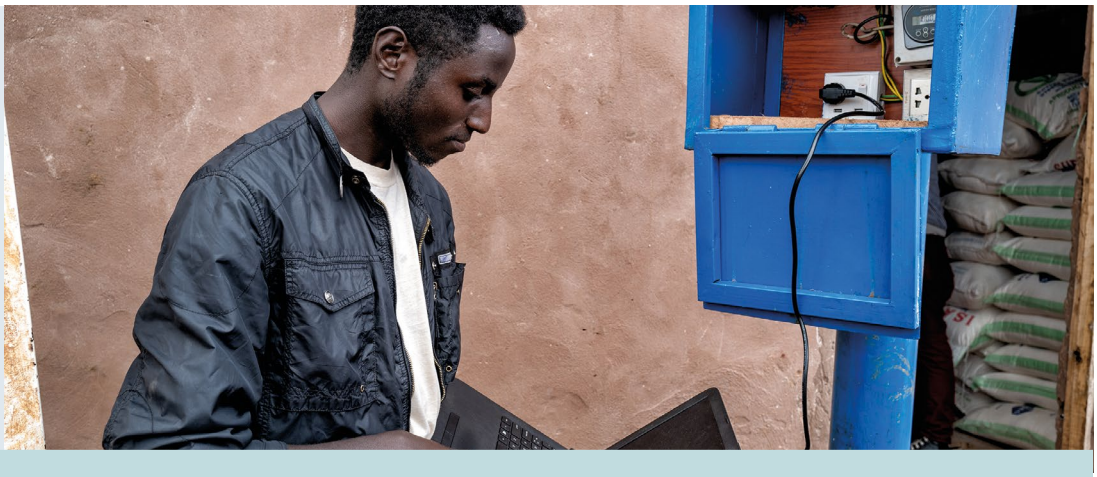

Executive summary

In response to the increasing number of displaced people, the humanitarian sector is exploring innovation as a framework to improve the delivery of the Sustainable Development Goals (SDGs). Traditionally, the focus on camp settings and short term solutions have resulted in a humanitarian response that is slow to adapt to the rapidity of technological innovation (Betts and Bloom, 2014). For example, 87.8% of African's in Sub-Saharan Africa have a mobile phone (World Bank, 2019), yet 80% of displaced people living in camps in this same region still cook over open fires which are linked to long term health and environmental effects (Grafham and Lahn, 2018).

As a result of the lessons learned from the Humanitarian Engineering and Energy for Displacement (HEED) project around the different perceptions of innovation between key energy stakeholders, this paper looks to engage with questions around ensuring innovation in the humanitarian sector, and more specifically humanitarian energy, is responsible. How can we define responsible? Is responsible innovation a theoretical nicety or can it ensure a just energy transition as outlined by the SDGs? What does responsible innovation look like in reality? Building to our underlying **research question: what is the state-of-the-art in responsible innovation for humanitarian energy and how is it implemented at project level?**

We engage with these questions by first reviewing the current literature to identify existing approaches and understandings towards responsible innovation. Second, framed by EPSRC's Anticipate, Reflect, Engage, Act (AREA) framework, we explore how theories of best practice translate into practical methodologies that are accessible to humanitarian agencies, practitioners and the displaced people themselves. Third, drawing upon empirical research conducted with global leaders in the Humanitarian and wider Innovation Sectors, we acknowledge challenges that stifle innovation, methods and frameworks that shape innovation, current methods of best practice, and what is both foregrounded and backgrounded when observing responsible innovation.

The AREA framework provides an internationally recognised and established method for establishing current best sector practice and provides a series of recommendations for not only future research-based humanitarian energy projects but also practice in the field.

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Key recommendations

Recommendation #1 – Anticipate impacts by conceptualising responsible innovation in the humanitarian setting by connecting definitions with understanding. Before we can anticipate the impacts of innovation and the responsibility of these actions, we must first conceptualise innovation in humanitarian energy. We can then link definitions of innovation with an understanding of why innovation methods are used. Once these links are established, we can then frame innovation responsibly, identifying a range of tools and actions that reflect the socio-cultural context of the project and promote community engagement.

Recommendation #2 – Reflect, recognise and address how cultural context and hierarchies of knowledge shape responsible innovation. Consider how to challenge established frames of reference around innovation that reproduce cultural privilege and knowledge silos. Ask who can and/or should drive RI, who decides engagement in innovation practice? And how does this link into the ethics of innovation in the displaced setting?

Recommendation #3 – Meaningful engagement requires an understanding and appreciation of the energy needs, awareness, skill and risks to the forcibly displaced. Implement four overarching steps in understanding meaningful engagement when practising responsible innovation,

1. See energy **needs** as evolving demands that require continual re-evaluation in collaboration with communities.
2. Improve **awareness** of innovation by communicating in culturally appropriate frames of reference.
3. 3) Develop **skills** that aim for transformative exchange between key stakeholders – community knowledge is embedded into the design process.
4. 4) Address **risks** by prototyping, piloting and testing with constant monitoring to allow for the complexities of the displaced setting.

Recommendation #4 – Identify existing and future beneficiaries of responsible innovation when planning humanitarian energy products and services. Responsible innovation in humanitarian energy is about reframing debates on energy structures in the humanitarian setting to clarify who should and can benefit from this practice. Responsible innovation that can respond to existing and future beneficiaries of energy services and products will only occur when best practice is widely shared, failings are communicated, community knowledge is respected, and energy is recognised as a human right.

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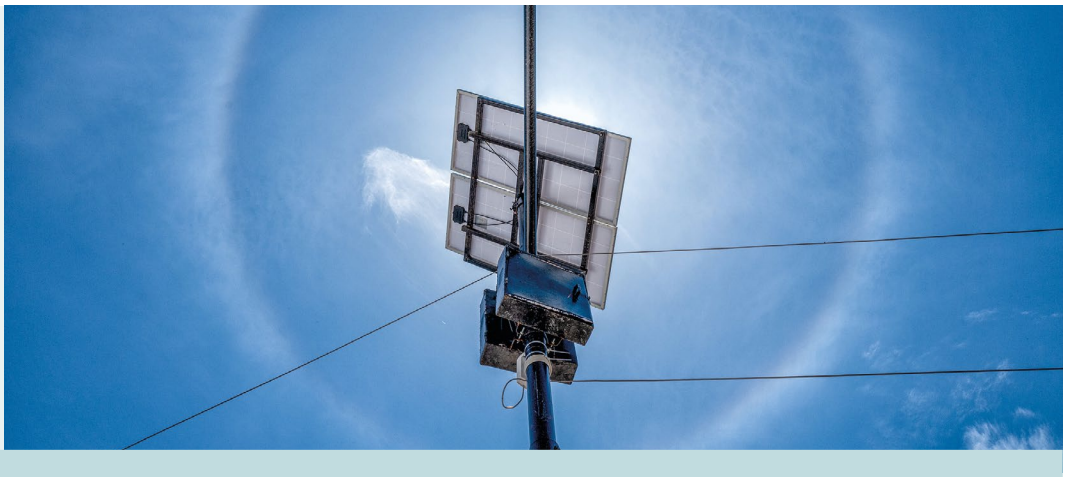

1. Background

Why engage with concepts of responsible innovation?

Whilst working with and engaging with vulnerable populations, especially in situations of forced displacement, it is critical to be responsible for any innovations that change, modify, or impact the lives of the intended target population. The range of complex socio-cultural, economic and financial factors that often act as barriers to the adoption and sustained use of energy technologies (for lighting, cooking, cooling, heating and mobility) are intensified by the camp setting due to the diverse range of nationalities and internal camp power structures. To improve the planning, deployment and longevity of energy systems, more understanding is needed on how to engage responsible innovations in these complex contextual environments.

This briefing paper adds to the ongoing discourse around innovation in Humanitarianism. This paper is the first to directly link the conceptual Responsible Research and Innovation framework (Stilgoe et al., 2013) within the humanitarian energy response. Interrogating *Responsible Research and Innovation* means questioning how methods of knowledge creation can facilitate inclusivity to generate and encourage the translation of innovation concepts into methods of best practice. Creating these methods of best practice is critical in ensuring the repeatability and scalability of translating innovations into practice. Innovating in the humanitarian setting is not without difficulties. The four overarching humanitarian principles (Humanity, neutrality, impartiality, independence) may be in tension with principles of innovation, for example, where for-profit organisations have a vested interest in the adoption of their own technologies.

Given the human and reputation risk of causing harm through irresponsible innovation with the most vulnerable populations on our planet, a robust methodological approach must be taken to ensure that humanitarian actors 'do no harm' and take responsible risks. Emerging from the experiences of the Humanitarian Engineering and Energy for Displacement (HEED) project, this paper seeks to contribute greater understanding around responsible innovation to improve access to energy in complex settings.

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For example, in Nepal, despite HEED's best efforts to engage in community consultation about the distance of the advanced solar street lights to each household (both an innovation in process and technology), energy interventions exacerbated internal camp inequalities. Where lights are an indication of socio-economic status, households that were further away from the light still felt aggrieved by others whose houses were adjacent to the lights. These lessons, amongst others, caused HEED to ask how responsible innovation is engaged and applied by other key stakeholders in the Humanitarian Energy sector to enable best sector practice to improve and evolve.

The Humanitarian Engineering and Energy in Displacement Project

HEED, the Humanitarian Engineering and Energy for Displacement, is an interdisciplinary team based at Coventry University, in partnership with the international development charity Practical Action and Scene Connect. For the past four years, HEED has worked with Congolese refugees in three camps in Rwanda (Gihembe, Kigeme, and Nyabiheke) and internally displaced persons in Nepal to understand their energy needs, usage, and aspirations, followed by a number of sensor-based energy solutions. The HEED project highlighted the gaps in understanding between different key energy stakeholders. These included different perceptions on what constitutes innovative practice, how innovation is constructed and which definitions of innovation should be adopted. Further exploration of these questions is needed in order to understand how to close this gap resulting in more effective energy technologies and services which address the energy needs and aspirations of refugee and internally displaced communities.

Conceptualising responsible innovation in the humanitarian setting

Betts and Bloom (2014) define humanitarian innovation as "a means of adaptation and improvement through finding and scaling solutions to problems, in the form of products, processes or wider business models (p.5)". Innovation can occur in product or process, innovation is not the same as invention, and innovations may be 'game changing' or incremental. Innovation process can be linear (design, manufacture, use, discard) or circular where "repurposing, adaptation, reconfiguration and customisation (p.4)" are core innovation processes (Cross et al., 2019). This links more broadly into the ongoing discourse around circular economies as promoted by the European Union (2019). These board categorisations of innovation for humanitarianism establish current understanding in exploring these concepts in the context of Responsible Research and Innovation as well as in Energy. However, humanitarian innovation should promote a 'do no harm' approach and address power asymmetries (Humanitarian Policy Group, 2016, OCHA, 2019). Likewise, throughout the project cycle responsible innovation practices must also consider data ownership (Taylor and Broeders, 2015), the role of existing bias (Sovacool et al., 2018) and the techno-centric nature of innovation (Hartley et al., 2019).

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Responsible Research and Innovation (RRI) (Table 1) as a formative (Stilgoe et al., 2013) and evaluative (Hartley et al., 2019) model frames the academic research sectors' contribution to methods of best practice when dealing with innovations that can have significant impacts in wider society. Utilised by the Engineering and Physical Sciences Research as a framework for 'doing no harm', the core values of RRI are critical in the humanitarian sector where the implications of incorrect steps have significant impact on communities when at their most vulnerable. Linking the RRI framework to the humanitarian response will assist in strengthening how formal concepts of responsible innovation are translated into practice. Arguably, the practice of RRI has shifted from conceptual to an operational approach to innovation. In adopting an often outward focus on key stakeholder engagement, researchers may overlook the introspective or inwards approach, which is necessary to create a "more inclusive space of knowledge production (p.672)" (Koch, 2020). Additionally, despite being marketed as a global solution to responsible innovation, Koch (2020) highlights the European dominance in developing the RRI framework and its Euro-centric focus. Unsurprisingly, RRI has had limited applications in the global south and currently no application in the humanitarian or humanitarian energy setting.

Table 1: Responsible Research and Innovation Framework (Engineering and Physical Sciences Research Council, 2013)

	Researcher activity
Anticipate	**Describe and analyse** intended and unintended impacts (including economic, social, environmental impacts). Think about possible trajectories: what else might the research lead to?
Reflect	**Reflect** on the purposes, motivations and potential implications (what is known) as well as uncertainties, risks, assumptions, areas of ignorance, dilemmas (what is not known). Question existing framings and understands others' framings Reflection requires openness and leadership, and must be institutionally embedded.
Engage	**Open up** anticipate and reflect to a wide range of publics, stakeholders and institutions, and debate them in an inclusive way to allow for re-framing of issues. Engagement needs to be institutionally embedded. Engagement should be held early enough to be constructive, but late enough to be meaningful, and should be driven by normative (the right thing to do) and substantive (improves nature and trajectory of innovation) motivations.
Act	**Take action** to allow these processes to influence the direction, trajectory and pace of the research and innovation process, responding to a wide range of publics, stakeholders, social needs and societal grand challenges.

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2. Methods

The lead author conducted three focus groups between the 11th and 24th of August 2021. The sample was ten women and eight men, with ten based in the global north and eight in the global south. We chose 18 key stakeholders that directly interact with innovation practices in the humanitarian energy sector through a range of roles from high-level UN members to field-level practitioners. The focus groups were conducted over Microsoft Teams, which lasted an hour, and informed consent was given before recording the focus groups. The transcription and coding process was conducted using NVivo12, allowing an expansive coding framework by adding sub-nodes to most accurately capture nuisances of participant responses. (QSR International, 2019). The methodological framework was qualitative, using a phenomenological approach (Bryman, 2004, Creswell, 1997, Kielmann et al., 2012). Although thematic analysis is usually an inductive process (Braun and Clarke, 2021), we chose a mainly deductive thematic coding process using the existing AREA factors.

The overarching aim of this method was to introduce the AREA framework to Humanitarian Energy, which has the potential to facilitate greater inclusivity when programming, resulting in a better understanding of the impact of innovations on vulnerable communities. We did not add or modify the AREA framework during analysis as other researchers are engaged with developing these concepts in more detail (Robinson et al., 2021, Unsworth, 2021). We acknowledge that while focus groups can aid in the co-creation of knowledge and address power asymmetry in the interview process, there are also limitations. One being, hidden power generated by organisational hierarchies may silence some in the discussion, while disclosure may have negative consequences for some within the sector. To address those concerns, confidentiality was critical to the storage, processing, and dissemination of the findings. The data was anonymised, and all recordings were destroyed once transcribed. Additionally, we acknowledge any bias and positionality (Sovacool et al., 2018) in the data collection and analysis that may have resulted from HEED team members facilitating the discussion as contributors to the Humanitarian Energy sector.

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3. Recommendations

The following recommendations draw upon findings from three focus groups, conducted with humanitarian energy technical specialists, policymakers, academics, NGOs and practitioners and the HEED team. Utilising the AREA framework as central to the discussion, we asked the groups what **Anticipate** factors could assist in definitions, methods of anticipation, and aims of responsible innovation in Humanitarian Energy. We then sought to **Reflect** upon barriers to innovation and responsible innovation, as well as understand who should and can drive innovation. Next, the group explored how to create and facilitate meaningful **Engagement** with responsible innovation, a process that is instrumental in translating abstract conceptual understanding into practice. Lastly, we encouraged them to interrogate **Act** as a series of considerations on what responsible innovation will look like in the future.

The focus groups allowed us to gather a wider range of opinions, experiences and perspectives that could evaluate and identify best practice around methods of responsible innovation in Humanitarian Energy. Moreover, engaging a broad range of actors within the sector allowed us to see the connections and disconnections between these groups. This highlighted the challenge in gaining consensus on responsible innovation and how to implement meaningful innovation in the Humanitarian Energy sector.

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Recommendation #1 – Anticipate impacts by conceptualising responsible innovation in the humanitarian setting by connecting definitions with understanding

Before we can anticipate the impacts of innovation and the responsibility of these actions, we must first conceptualise innovation in humanitarian energy. We can then link definitions of innovation with an understanding of why innovation methods are used. Once these links are established, we can then frame innovation responsibly, identifying a range of tools and actions that reflect the socio-cultural context of the project and promote community engagement.

What is innovation in humanitarian energy?

Unsworth (2021) suggests innovation is an elusive term with multiple definitions based upon the personal, organisational or contextual perspective standpoint of the individual. Innovation can be as simple (and context specific) as "adding a plug socket to a solar powered streetlight" (Energy Field Officer) in the forced displacement camp setting. Alternatively, seek to advocate for systemic change by asking questions such as, "how can innovation and digital transformation support changing the way that the United Nations works?" (Global Innovation Policy Expert). One participant illustrated this broad nature of innovation by defining it as:

> Anything which is new or different to the mainstream practice in a given setting […] it's not necessarily something that's brand new to the world or brand new to the humanitarian sector. *Innovation Expert*

Many of the participants stated process and/or methodological innovations were the innovation priority due to first, their "often overlooked nature [as] the dark matter of innovations" (Innovation Officer). Second, there are significant systemic barriers to innovation such as competing interests, administrative blockages and the comfortability of pursuing higher risk innovation. This was especially highlighted in the technical and policy focus group where a Global Humanitarian Energy Policy Expert stated,

> On the cooking side, we need new or innovative products, but for everything else this is more about the processes. This is more about how organisations are dealing with energy, if they do it all, and how we can support them in getting new ideas and new solutions into them and mainstreaming into their processes. *Global Humanitarian Energy Policy Expert*

Innovation is thus not only about creating new processes and products but also about learning and communicating past failures resulting in the mainstreaming and adaption of existing practice. Whilst participants' perspectives on innovation resulted in a multitude of definitions, one underlying thread connected them all, improving technologies, systems, and practices (such as engaging with private sector actors) currently being used by all key stakeholders in the Humanitarian Energy sector. This often means increasing the risk of failure resulting in innovation requiring an "uncomfortable solution" (Humanitarian Energy Practitioner). However, and somewhat unexpectedly, forcibly displaced peoples are often left out of the process of finding this uncomfortable solution.

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Where does this path lead – why should we innovate?

Core to the humanitarian energy sector is the provision of energy solutions and services to the forcibly displaced. Not unexpectedly, all the participants see innovation as a path to placing these people at the centre of this process resulting in "easier, faster, more efficient, more equitable" solutions (Humanitarian Energy Researcher & Practitioner). There is a significant demand for innovative energy products and services that react to the existing and future needs of forcibly displaced peoples. Yet, a significant counter-argument emerged from the focus group discussions centred around, what was defined by the groups as innovation fatigue: "does [innovation] becomes so all-inclusive and tries to cover all things because we want to brand everything is innovative, that it loses some of its potency" (Humanitarian Energy Practitioner).

This counter argument becomes especially relevant when considering who drives innovation; is it the forcibly displaced peoples themselves or funding organisations wanting to remain relevant to current sector trends? We will unpack this question further when exploring narratives around the **Reflect** element.

How does innovation practice in humanitarian energy remain responsible?

When framed with responsibility, focus groups stated that innovation practices in the Humanitarian Energy sector are centred around two factors: understanding context (through sensitisation processes or sensitivity analysis) and creating rectification pathways, which allow the realignment of assumptions and expectations, funder purpose and forcibly displaced people needs.[1] This framing primarily aims to place forcibly displaced people at the centre of the innovation process. To effectively undertake responsible innovation, the participants shared a number of key practices:

Data-driven decision making

Shaping a space where, as a Humanitarian Energy Practitioner stated, it is possible to "measure those systemic nonlinear changes", resulting in evidence or data-driven understanding of what does and does not work. This view is supported by Betts and Bloom (2014), who present a framework for analysing ethical principles in Humanitarian innovation focused on three levels, individual (demand-driven and user-centred, open-source, informed consent), community (do no harm, representative consultation, sustainability and local ownership) and system (proven impact, accountability, humanitarian principles, no conflict of interest).

1 A concept explored in more detail by Robinson, B.L., Clifford, M.J. & Jewitt, S. 2021. TIME to change: an evaluation of practical action Nepal's results based finance program. *Energies*, **14**. in their energy planning framework.

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Recognising the duality of unintended consequences

Where it is possible to measure and understand the consequences of innovation, aided by existing anticipatory tools specific to the humanitarian sector, it becomes imperative to recognise the duality of unintended consequences. As an unintended consequence, in some cases, this can introduce a new set of inequalities or exacerbate existing conditions. The unpredictability of innovation consequences means that considerations around possible negative impacts have to counter-balance innovation and sustainability within a specific context. Otherwise, changing societal structures may have significant negative consequences.

> But in an alternate universe, it could have had the exact opposite consequences where women could have been stigmatised and chastised right for what they're doing? Fortunately, that didn't happen, but we have to be mindful that sometimes there are those things might be happening in the background that might not be talked about. *Humanitarian Energy Researcher & Practitioner*

Ethics and inclusivity are key

Due to the high-risk nature of innovation practice, the uncertainty of the impacts of innovation combined with the vulnerability of forcibly displaced peoples, critical discussions around ethics and inclusivity are foundational in responsible innovation. Mackenzie et al. (2007) considers that: "Unethical research, even if it is conducted with the intention of benefiting refugees, may exploit, disempower and endanger those whom it is intended to assist" (p.317). As one participant highlighted.

> I don't feel we [both in the focus group and more widely in the sector] have spoken enough about the ethical implications of private sector engaging in humanitarian settings. And I think that is a big big question, and it worries me greatly on a personal and professional level just because of the difference in [the] sector. *Humanitarian Energy Academic*

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Recommendation #2 – Reflect, Recognise and Address how cultural context and hierarchies of knowledge shape Responsible Innovation

In this next section, we challenged the participants to examine their epistemic understanding of "the who" of innovation: Who can and/or should drive RI, who decides who is engaged in innovation practice, who's definition of innovation do we all use, and how does this link into the ethics of innovation in the displaced setting. Based upon their own experiences of innovation, we then asked the participants to discuss the barriers to implementing innovation processes and practices.

WHO drives innovation?

Focus group participants recognised that concepts of innovation are often driven by the global north, essentially through funders and development agencies based in Europe. Participants were aware it was not common practice to challenge how social and cultural locations shape perceptions of innovation, so euro-centric concepts and understandings of innovation are often in tension with methods of practice in the field context. In extreme cases, perpetuating these disconnected concepts of innovation feeds into historic socio-cultural discourse resulting in privileging certain voices (not the voices of the forcibly displaced).

> What we see in our work is that innovation is, in kind of this context, it's almost a construct of northern based institutions, and the way that that language is interpreted by local and national NGOs, the types of organisations I work with, is just very different. *Innovation Expert*

Given this understanding of innovation as a narrative informed by global north ideals and power structures, questions are raised about who drives innovation?

There was an overarching understanding in the discussions that innovation should be driven by the needs of the forcibly displaced peoples themselves. Yet, the question "how do we enable more local voices to drive that innovation agenda and to actually drive the innovations themselves?" (Innovation Expert) could not be concisely answered.

Innovation practices informed by traditional systems/knowledge hierarchies of power that do not place forcibly displaced people at the centre are problematic. This realisation caused significant concerns around ethical inclusion:

> But how do we ethically do engage? How do you do that ethically when we know that nine at out of 10, 99 out of 100 [innovative] projects might not progress. *Humanitarian Energy Academic*

> How do we ensure that innovation does not close the space for communities affected by crises or local and national NGOs from innovating, making decisions, taking control and taking back the power? *Innovation Expert*

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Innovation within organisations can be driven by individuals who champion new, different and disruptive methods of value creation. This is often not part of an organisational strategy but a "pet project" (a personally pursued objective, independent of organisational strategy) motivated by a moral agenda around more effectively helping forcibly displaced peoples. However, as illustrated by one Innovation Expert, many individuals working in this space do not have the capacity to drive this change due to other commitments; "People just don't have the bandwidth to take on another, essentially pet project, which is what innovation tends to be because of the nature of our jobs, our roles and our funding" (Innovation Expert).

The barriers to (responsible) innovation

The understanding that innovation is primarily not driven by the displaced may result in the energy needs of forcibly displaced peoples being marginalised or becoming secondary to competing project agendas. For example, the overlap between humanitarian energy projects, both inter and intra-organisationally as well as across sectors, could result in competing innovation objectives. This is commonly seen through a disconnect between head and field offices.

> What I see is a disconnect in the strategies from head offices and the practice in the actual refugee camps. So, for example, there might be sort of a very clear energy strategy […] But what you often see is that the head of the local offices focus on priorities of their office and they're not necessarily always waiting for these new innovations or new ideas. *Humanitarian Energy Funder*

In addition to administrative barriers, which may introduce tension between those who have the power to make the decision and the people trying to innovate, field staff are required to engage in new ways of delivery. One participant stated that innovation could be constrained by familiarity, overruling innovation practices as they are typically high-risk and uncomfortable, especially in a co-creation process with many voices; "We ended up excluding those [innovations] by doing that co-creation process." (Humanitarian Energy Practitioner).

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Treating innovation as an uncomfortable solution requires navigating the politics of failure. A reluctance to disclose the consequences of flawed thinking or decisions slows the processes of communicating, resulting in the repetition of existing mistakes (and less innovation) – "I think letting go is so important, projects often fail, and we keep them going and want them to work, and they just don't." (Humanitarian Energy Researcher & Practitioner).

This is linked to the short-term grant mentality; time is needed for iteration of innovation. Seemingly, for some, the private sector is one solution to short-term funding constraints due to having wider availability and variety of funding strategies for innovation. For others, the relationship between humanitarian and private sector is often misunderstood and mismatched for the very same reason that projects are time and financially limited.

> I can't remember how many times I've heard the phrase "I'm not making a financial commitment beyond the project timeline, I'm unable to factor in that solar will repay over seven years when we've only got a three-year agreement". *Global Innovation Policy Expert*

> We shouldn't see the private sector as someone like a monster who just want to come and beat everything; we should see it as a partner that wants to make things happen. *Humanitarian Energy Expert*

In addition to how projects are to overcome these above innovation barriers, rather than scaling existing innovation, many incentives (in the form of grants) focus on creating new innovations. However, as stressed by one Innovation Expert, the barriers to innovating differ significantly from those scaling those innovations, but these two aspects are not currently treated separately. This feeds into the lack of sector-wide understanding of why we innovate and what constitutes innovation, contributing to arguments challenging the sustainability of humanitarian innovation (Currion, 2019).

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Recommendation #3 – Meaningful engagement requires an understanding and appreciation of the energy needs, awareness, skill and risks to the forcibly displaced

This section sets out four overarching steps in understanding meaningful engagement when practising responsible innovation, where participants considered prototyping, piloting and testing combined with constant monitoring are key to success.

Needs: continually understanding and review energy need

Participants championed information gathering specific to the innovation, which allows for evidence-based decision making and linked to the importance of measuring change: "within the tradition, and the respectable matters that this community has" (Humanitarian Energy Expert). This includes placing the displaced in the decision-making process to effectively identify if energy needs correlate with existing data or new data gathering is required.

> It's mostly important that you sit with them and include them from the early stages of developing your project to ensure that it's affordable, applicable, user friendly and can be maintained in the long run in any case. *Humanitarian Energy Expert*

This process was not seen as a singular occurrence but continual and evolving. For participants, this was instrumental in learning and reacting to changing forcibly displaced people energy needs.

> Evaluation is often at the end of an intervention, and then we go and we use that as the basis of analysis, whereas actually, it needs to be embedded throughout in order to get continual feedback and to really monitor what is going on. *Humanitarian Energy Academic*

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Of central importance when considering innovation practice is to understand and react to immediate needs, but energy stakeholders must also consider the aspirational energy futures of the displaced to ensure that these innovations do not immediately become obsolete. In terms of energy access, current focus is around reactively providing cooking technologies or lighting. Instead, energy provision must be proactively treated as a basic need and fundamental human right to living with dignity.

Awareness: communicating innovation through awareness creation

Understanding the needs and aspirations alone is not sufficient without effectively communicating innovation, as innovations, by their nature, are often unknown solutions within a specific context. As reinforced by a Humanitarian Energy Expert, community sensitisation is key when bringing any new technology, process or practice to forcibly displaced communities, otherwise a lack of understanding can immediately derail any innovation.

> But we also need to have that awareness creation, and if it's a specific product like lighting or like a cooking solution, there needs to be that awareness for the end user to be able to understand […] how much it impacts their life. *Private sector energy partner*

> What does that actually mean for communities? What is innovation to them? How do we interpret innovation onto those smaller scale levels at community levels to the people that, ultimately, we are there to support? *Humanitarian Energy Academic*

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Skill: transformative skill exchange

Meaningful engagement allows a transformative exchange of skills between key stakeholders resulting in the improvement of existing practice. This approach towards innovation equips forcibly displaced peoples with the skills to thrive (be it technical, process, or practice training), as well as educating the drivers of innovation on how to better solve energy issues that reflect the complexity of the displaced setting.

> There's a huge lack of skills [in the forcibly displaced people setting] […] even when you find the right skills they are used to working for NGOs and so in terms of the expectations they're not really aligned with other sectors. *Private Sector Energy Partner*

Risks: understanding risk

A critical component to remaining responsible with innovations is understanding the associated risks. This involves balancing reactive practice as well as proactive mitigation methods around a number key areas of risk identified in the focus group discussions:

- Prioritise building **ethical, equitable and inclusive partnerships**. Top-down theories and typologies often negate the agency of forcibly displaced peoples as drivers of innovation and negate opportunities for self-reliance, self-determination and autonomy.

> Those voices get lost in translation and part of it is about equitable partnerships which need to be nurtured and again, this comes to this whole system of that you know a 18 month or two year project isn't long enough to build and maintain and nurture those partnerships. (Humanitarian Energy Academic)

- Integrate **flexibility and adaptability** into innovation though organisational support by creating spaces to innovate and have flexibility in funding. As stated by one Innovation Officer, innovation can only occur with the understanding that failure is possible.
- Understand routes to **scale**. To transition past tokenistic gestures of innovation to scalable innovation that address barriers to change (Scriven, 2016), organisations need to identify formal and informal routes to scale during or before the prototyping and piloting process. As several participants noted, because displaced communities are currently innovating independently of any formalised support these innovations often go unrecognised as they don't fit with the dominant narrative of innovation. Thus, more avenues are needed to provide access to funding, facilities and knowledge exchange that support driven innovation by communities.

> Just to all understand, refugees or displaced people will not wait for us as a humanitarian agency to give them the service because if they need something they will go for it and they will try to manufacture it and(sic) to make it happen. (Humanitarian Energy Expert)

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Recommendation #4 – Identify existing and future beneficiaries of Responsible innovation when planning humanitarian energy products and services

When participants were asked about paths forward for responsible innovation in humanitarian energy, several narratives emerged as part of **act** in the AREA model. One narrative was the idea of a conceptual future where methods of best practice were widely shared, failures communicated, epistemic limitations are acknowledged, and energy recognised as a human right. By undertaking the focus groups and disseminating the key themes from the discussion, this paper initiates the process for creating this conceptual future.

> I think it looks more feasible. It doesn't look like a mountain, right? It just seems like different ways of working or possible […] but, fundamentally, it's a culture shift that must be enabled by a lot of other things around it. *Innovation Expert*

Another narrative was around how many participants were not so optimistic about the future, conceding that the realities of creating system-wide change on a global scale currently lay outside the scope of practical reality.

> I see the future not rosy because of the sea of innovative products, and every organisation have their innovation unit, but I really don't see that these results coming out of these innovation units are somehow mainstreamed into the sector. I think we have probably too much "innovation" out there. *Global Humanitarian Energy Policy Expert*

> Innovation in the UN system has been described by one word and that's fragmentation or fragmented, and we're trying to change that. Internal change, getting ourselves in a better place to do innovation. I think that's our immediate future, but I don't know. I can't say anything about the long-term future. *Global Innovation Policy Expert*

Whilst responsible innovation has an undeniable role in shaping policy, practices, or service provision in the delivery of energy to displaced people, often the motivation to engage with these concepts does not necessarily result in better, more efficient, effective energy technologies or services for the forcibly displaced. Responsible innovation in humanitarian energy is about reframing debates on energy structures in the humanitarian setting to clarify who should and can benefit from this practice.

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4. Conclusion

This paper highlights the applicability of the Responsible Research and Innovation framework (AREA) to the Humanitarian Energy sector to clarify key concepts and map future activities. We utilise this framework to conduct thematic analysis on the focus group discussion data, categorising the findings into four categories, anticipate, reflect, engage and act. Anticipate stresses the importance of understanding what is meant by innovation, why innovation is needed and how to frame innovation responsibly in the Humanitarian Energy sector. Reflect engages with the 'who' of innovation and how different epistemic understandings of innovations (and responsible innovation) can result in mismatched priorities between drivers and receivers of innovation. Additionally, the participants reflected on the core barriers to practising innovation. Engage focused directly on the operationalisation of responsible innovation for humanitarian energy stating four key steps, acknowledging and addressing the research gap and/or actual needs, awareness creation (with forcibly displaced peoples), creating and sharing skills, and understanding risk. Despite concerns around failings in the delivery of responsible innovation in the displaced setting, there is an awareness in the sector of how this framework can facilitate meaningful change. Applying these recommendations is one strategy, amongst others, that can aid energy organisations, practitioners, academics, and other stakeholders in developing practices that synergises displaced communities voices with project aims. This paper helps to close the gap in perceptions of innovation identified by the HEED project as a major structural barrier to successfully reacting to the energy needs and aspirations of displaced communities.

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5 References

Betts, A. & Bloom, L. 2014. Humanitarian innovation: the state of the art. Geneva: United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

Bryman, A. 2004. Social research methods. Oxford: Oxford University Press.

Creswell, J.W. 1997. Five qualitative traditions of inquiry. Qualitative inquiry and research design: Choosing among five traditions.

Cross, J., Douglas, M., Grafham, O., Lahn, G., Martin, C., Ray, C. & Verhoeven, A. 2019. Energy and displacement in eight objects: Insights from Sub-Saharan Africa. Moving Energy Initiative. London: Chatham House. ISBN: 978 1 78413 364 1

Currion, P. 2019. The black hole of humanitarian innovation. *Journal of Humanitarian Affairs*, **1**(3): 42–45. doi: 10.7227/JHA.024

Engineering and Physical Sciences Research Council (EPSRC). 2013. Framework for responsible innovation. Swindon: EPSRC.

European Union. 2019. The circular economy. [link no longer accessible]

Grafham, O. & Lahn, G. 2018. The costs of fuelling humanitarian aid. Moving Energy Initiative. London: Chatham House.

Hartley, S., Mcleod, C., Clifford, M., Jewitt, S. & Ray, C. 2019. A retrospective analysis of responsible innovation for low-technology innovation in the Global South. *Journal of Responsible Innovation*, **6**(2): 143–162. doi: 10.1080/23299460.2019.1575682

Humanitarian Policy Group 2016. Time to let go: Remaking Humanitarian action for the modern era. London: Overseas Development Insitute.

Kielmann, K., Cataldo, F. & Seeley, J. 2012. Introduction to qualitative research methodology: A training manual. Department for International Development. London: Crown Copyright.

Koch, S. 2020. Responsible research, inequality in science and epistemic injustice: an attempt to open up thinking about inclusiveness in the context of RI/RRI. *Journal of Responsible Innovation*, **7**(3): 672–679. doi: 10.1080/23299460.2020.1780094

Mackenzie, C., Mcdowell, C. & Pittaway, E. 2007. Beyond 'do no harm': The challenge of constructing ethical relationships in refugee research. *Journal of Refugee Studies*, **20**(2): 299–319. doi: 10.1093/jrs/fem008

OCHA 2019. Operationalizing collective outcomes: Lessons learned and best practices from and for country implementation. Geneva: United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

QSR International. 2019. Nvivo 12. Burlington, USA: QSR International.

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Robinson, B.L., Clifford, M.J. & Jewitt, S. 2021. TIME to change: An evaluation of practical action nepal's results based finance program. *Energies*, **14**(10): 2891. doi: 10.3390/en14102891

Scriven, K. 2016. Humanitarian innovation and the art of the possible. Humanitarian Practice Network. London: Overseas Development Institute (ODI).

Sovacool, B.K., Axsen, J. & Sorrella, S. 2018. Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. *Energy Research & Social Science*, **45**: 12–42. doi: 10.1016/j.erss.2018.07.007

Stilgoe, J., Owen, R. & Macnaghten, P. 2013. Developing a framework for responsible innovation. *Research Policy*, **42**(9): 1568–1580. doi: 10.1016/j.respol.2013.05.008

Taylor, L. & Broeders, D. 2015. In the name of development: Power, profit and the datafication of the global South. *Geoforum*, **64**: 229–237. doi: 10.1016/j.geoforum.2015.07.002

Unsworth, S. 2021. Innovation in humanitarian energy: what you think is what you get. Humanitarian Engineering and Energy for Displacement (HEED) Project, Coventry University.

World Bank. 2019. Mobile cellular subscriptions (per 100 people) – Sub-Saharan Africa. Washington D.C.: World Bank.

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Humanitarian Engineering and Energy for Displacement (HEED)

Since the introduction of the UNCHR global strategy on Safe Access to Fuels and Energy (SAFE) in 2014, humanitarian responses to refugees and internally displaced people (IDPs) have sought to deliver safe and sustainable energy provision. By focusing on the lived experiences of refugees and IDPs in Nepal and Rwanda to understand energy usage in refugee camps and settlements, the HEED project will develop, and contribute to, innovative responses which address demands for improved energy services.

Our research, led by key experts in the fields of engineering and social science, is looking for solutions that will provide crucial guidance on creative approaches and technologies to clean or fuel-efficient cookers, alternative and sustainable fuels, and solar-powered lighting, which will build the resilience of refugee communities.

Our partners

The HEED project, is led by an interdisciplinary team based at Coventry University, in partnership with the international development charity, Practical Action, and Scene Connect, a social enterprise strengthening communities through the development of ICT products.

Contact us

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