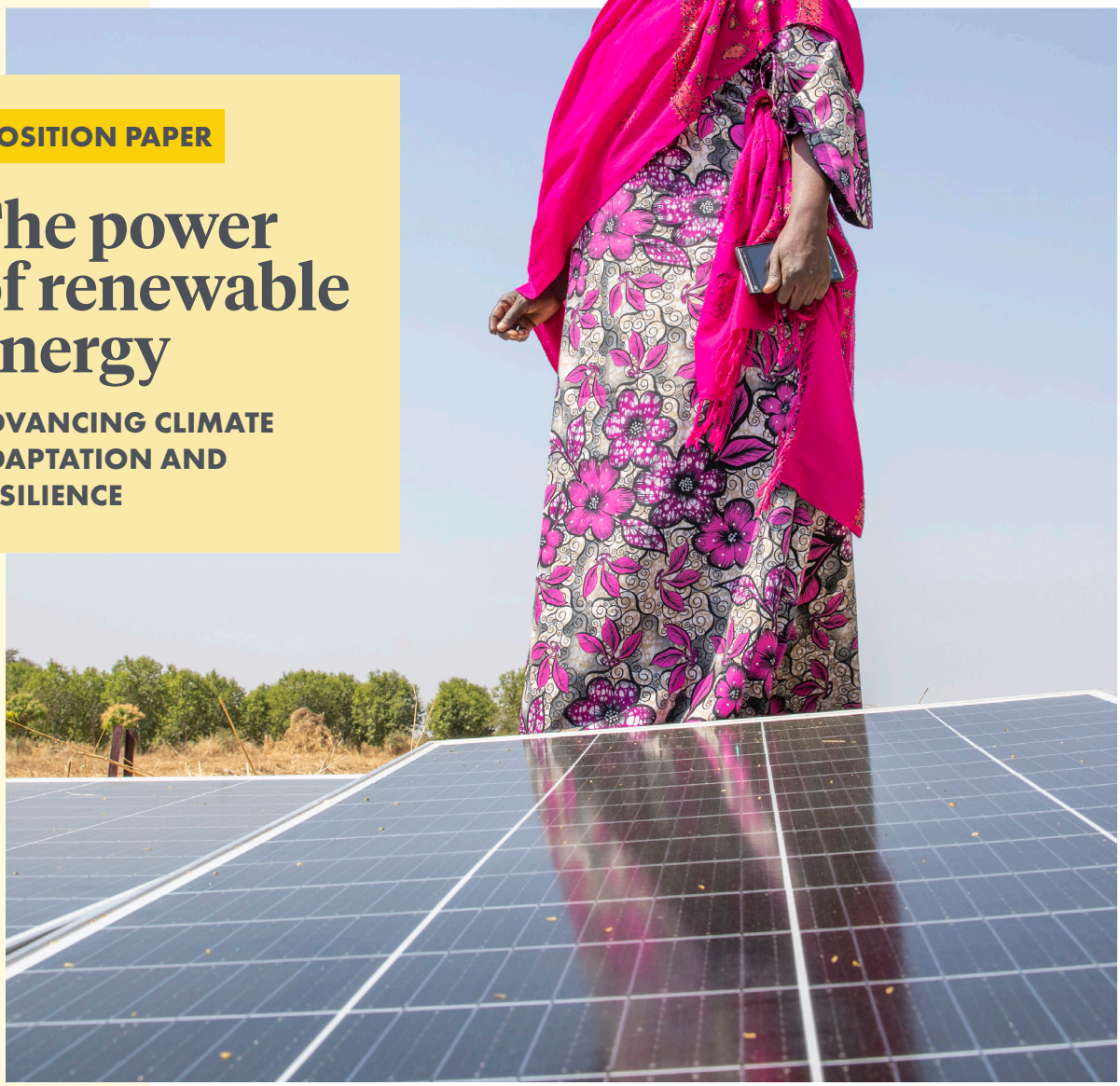
# Climate: Possible



POSITION PAPER

## The power of renewable energy

### ADVANCING CLIMATE ADAPTATION AND RESILIENCE

January 2024, Girei, Nigeria. Ezra Millstein/Mercy Corps

MERCY CORPS

**The impacts of climate change have reached crisis levels in much of the Global South. Climate-related disasters and dire environmental conditions are devastating communities, weakening critical infrastructure, threatening lives and livelihoods, and forcing millions to flee their homes in search of safety and better opportunities[1].**

May 2024, Sheder, Ethiopia. Jjumba Martin/Mercy Corps

Urgent relief and support for recovery after each emergency is not enough. As this crisis intensifies, we need to partner with communities around the world as they work to adapt to the impacts of climate change and build resilience for the long term.

Currently, progress toward climate adaptation goals is falling woefully short. From a civil society perspective, insufficient investment in climate adaptation is the primary culprit. Many donors and investors cite the lack of evidence-based solutions that have the potential to support adaptation and resilience at scale as the main barrier. The result is a deadlock, where adaptation progress is continually and significantly outpaced by the impacts of climate change.

**This does not have to be our reality. Impactful, scalable approaches to climate adaptation exist.**

## Mercy Corps has worked with local communities for over four decades to meet complex challenges with comprehensive, innovative solutions.

From proactive and rapid emergency response to regenerative agriculture and renewable energy sources, our programming helps people cope with the immediate impacts of climate-related events, adapt to changing conditions, and create a more resilient future for all.

We launched the **Climate: Possible campaign** because we know what climate resilience looks like and we understand what it takes to get there. Each of the position papers in our Climate: Possible series articulates proven and high-potential solutions to climate challenges, drawing on Mercy Corps' extensive experience, evidence, and insights gathered from operating in the most fragile, climate-vulnerable contexts.

As climate change impacts millions of people globally, with the marginalised groups affected the most, reliable and affordable sources of clean energy are critical for households, communities, and businesses to adapt to a changing environment and cope with compounding stresses on their livelihoods, infrastructure, and social cohesion. While progress towards global climate adaptation goals remains insufficient, the integration of renewable energy offers a transformative path forward.

December 2018, Vieques, Puerto Rico. Mercy Corps

However, achieving this potential requires more than just technological innovation; it demands the establishment of an enabling environment where regulatory systems, funding mechanisms, and supportive policies converge to facilitate the widespread adoption of renewable energy solutions.

This paper underscores the essential role of renewable energy in bolstering resilient food systems and enhancing disaster preparedness. By drawing on practical examples and evidence-based insights, it highlights the changes necessary to scale up renewable energy as a core component of climate adaptation strategies.

**David Nicholson**
*Chief Climate Officer, Mercy Corps, September 2024*

# How the clean energy transition can drive adaptation

The clean energy transition—or decarbonisation of our global energy systems—is the centrepiece of global climate policy and investment, and the acceleration of this transition is non-negotiable if we are to achieve the goals of the Paris agreement and avoid the more severe climate change scenarios. To date, energy funding streams have focused on decarbonisation in high-consumption markets[2], while overlooking the pressing need for universal access to clean, affordable, and reliable energy.

Though universal access to energy is documented as goal 7 of the United Nations Sustainable Development Goals (SDGs)[3], early progress towards this goal has stalled, and according to UN projections, upwards of 660 million people, especially those most vulnerable to the impact of the climate crisis, will still lack access to reliable and affordable electricity services. Furthermore, nearly two billion people will continue to rely on fuels like charcoal and biomass for cooking, which not only degrades environmental ecosystems but also poses health risks, further eroding community resilience.

Closing this energy access gap is not only crucial to human development and progress but also increases adaptation capacity and reinforces climate justice – especially when this energy is clean or renewable. Modern energy services enable a wide range of proven adaptative capacities, such as access to information services, water management, and food storage.

In many regions, the burden of energy poverty disproportionately falls on women and girls, who are often responsible for gathering fuel and managing household energy needs. This burden not only impacts their health and safety but also limits their opportunities for education, income generation, and participation in community life[4]. Additionally, energy poverty disproportionately affects other marginalised groups, such as low-income households, people with disabilities, and individuals belonging to certain race, ethnicity, or caste, further exacerbating existing inequalities[5]. Increasing access to energy has proven to be an effective way to advance gender equality and social inclusion[6], which, in turn, is considered one of the most impactful ways to build household and community resilience and adaptation outcomes[7]. With cleaner fuels and renewable energy services now more affordable than ever, the goals of increasing access and lowering carbon emissions are very much aligned.

While the understanding that investment in clean energy can bolster adaptation and provide mitigation co-benefits has been growing, action at the necessary scale remains insufficient[8]. International public financing for clean energy in developing countries has significantly declined—from $24.8 billion in 2017 to $10.8 billion in 2021—falling far short of the $2 trillion needed annually by 2030 to meet global energy transition targets and achieve SDG

**EXPANDING THE NARRATIVE**

Mercy Corps seeks to expand the energy transition agenda from one that predominately prioritises decarbonisation in high income contexts to one that also:

- Recognises access to energy directly contributes to adaptation capacity.
- Aligns energy investments with resilience and adaptation goals to avoid unintended consequences.
- Intentionally seeks to accelerate the achievement of universal access to energy goals as a core objective, with a focus on climate and conflict-vulnerable communities and marginalised communities.
- Keeps climate justice at the centre of the transition to ensure inclusion of, and tailored support for, populations most impacted by the climate crisis.

7. Even among these investments, not all clean energy strategies effectively support climate adaptation. Poorly designed investments can even lead to maladaptive practices that further disadvantage already marginalised communities, exacerbating vulnerabilities rather than enhancing resilience[9].

While Mercy Corps recognises the urgent global need to accelerate decarbonisation in the energy sector, our experience in emerging markets and humanitarian contexts has highlighted a disconnect between access to energy investments and the climate change agenda. We see significant opportunities to advance adaptation and climate justice goals through a more intentional focus on access to energy as part of the global energy transition agenda.

In this paper, we seek to highlight the most significant opportunities to expand this agenda and to provide guidance to policy makers and funders for how to harness these. We focus on two specific areas where access to energy has potential for significant impact: the productive use of energy in food systems and enhancing disaster preparedness through both early and long-term response strategies.

## Productive use of energy in food systems

A major impact of climate change is the increase in food insecurity in many parts of the world due to shifting rain patterns and increased drought. Sub-Saharan Africa, South Asia, and Southeast Asia are home to 80% of the global population most vulnerable to crop failures and hunger as direct consequences of these climate shifts[10].

In areas where centralised electricity generation is unreliable or inaccessible, distributed renewable energy—such as household solar, mini-grids, and solar water pumps—is often the most (or only) viable option. These sources of renewable energy

can have a direct and immediate impact on improving food systems, enhancing their resilience to climate change and increasing productivity, which benefits both farmers and consumers. Distributed renewable energy plays a crucial role in ensuring food production, water resource management, storage, and transportation that can withstand extreme weather events as well as scale to meet the growing demands of an increasingly volatile climate.

Across this range of solution sets, we identify some key markets to deploy renewable energy to build more reliable, resilient food systems:

## ENHANCING CLIMATE-SMART WATER USE IN FOOD PRODUCTION

Proper irrigation is a proven way to increase yields and create more reliable growing seasons[11]. Solar-powered irrigation systems are becoming increasingly accessible and economically viable, boosting agricultural productivity and supporting multi-cropping while offering socio-economic benefits like job creation and rural electrification. However, without proper assessments and farmer training in water management, there is a risk of over-extraction of water resources, as the marginal cost of pumping additional water is virtually zero, which can lead to groundwater depletion. Environmental considerations are also crucial, as the production and disposal of solar panels involves toxic materials and rare minerals[12].

By applying evidence-based approaches to programmes and initiatives that promote solar-pumping solutions, new irrigation

**MERCY CORPS IN ACTION**

August 2023, Geita Region, Tanzania. Mercy Corps

### AN EVIDENCE-BASED APPROACH TO SOLAR IRRIGATION

In Tanzania, Mercy Corps worked with a major solar water pumping manufacturer to pilot the use of large solar pumps in farming communities. Three pumps were distributed among 30 smallholder farmers, and about half reported positive outcomes—30% were able to grow new crops, 20% increased yields, and 20% saw higher incomes. However, scaling the project proved challenging. The resulting yield increases were insufficient to cover the repayment costs of the pumps, additional training in water management was needed to prevent over-extraction, and an unexpected, severe drought, exacerbated by climate change, rendered one pump inoperable by depleting a reservoir. This experience highlights the importance of factoring in long-term climate impacts when designing irrigation systems for economic viability and sustainability.

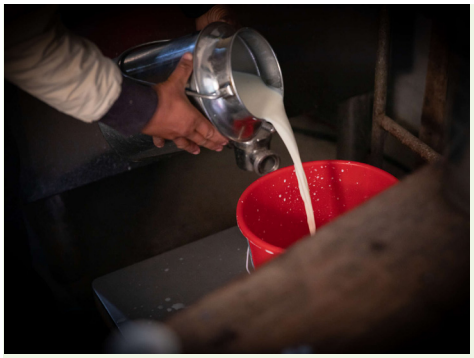
systems can provide long-term water resource management that supports sustainable agriculture without compromising ecological balance.

Building on these lessons, Mercy Corps is now implementing a project in Uganda with 2,200 smallholder farmers, of whom 30% are female, and 450 solar-powered water pumps sold through monthly instalments. This project benefited from a comprehensive environmental impact and water resource analysis conducted during the planning stages, alongside extensive stakeholder engagement. The initiative also includes demonstration sites to train farmers on climate-sensitive water use and employs remote data logging technologies to monitor water extraction in real time. These and other programme enhancements and modifications will be tracked to ensure the project creates sustainable and resilient impacts for farmers.

### SUPPORTING POST-HARVEST COLD AND DRY STORAGE TO INCREASE FOOD SAFETY, DIMINISH FOOD WASTE, REDUCE EMISSIONS, AND CONTRIBUTE TO LIVESTOCK VACCINATION

In sub-Saharan Africa, up to 40-50% of perishable produce is lost before reaching

**MERCY CORPS IN ACTION**



### INCREASING ACCESS TO REFRIGERATED COLD STORAGE

In Kenya, Uganda, and Nigeria, Mercy Corps has supported 6 private companies with technical assistance and grants amounting to USD $1 million to develop sustainable technologies and commercially viable business models that bring cold chain solutions to agricultural communities—such as walk-in cold rooms and energy efficient fridges. These include technologies at harvesting areas, collection centres, and small businesses selling produce. As a result, 1,200 individuals could access cold chain technology, creating 125 jobs and raising USD $3.8 million in additional investments.

In the Karamoja region of Uganda, Mercy Corps recently refurbished a milk collection centre to assist local cattle farmers. The centre meets its energy needs, including refrigeration, with cost-effective solar power. As part of the project, the centre installed new equipment, and members of the cooperative received technical and food safety training. The centre can chill 2,000 litres of milk in under 2 hours, serving the entire district by functioning as a collection and distribution centre.

Through new programming that embraces lessons learned, Mercy Corps and our partners in Uganda are leveraging the considerable potential of solarising chilling centres, as the dairy sector currently represents 6.5% of the country's agricultural gross domestic product and has grown 11% from 2018 to 2022[13]. The Dairy Development Authority of Uganda mentions dairy production as a major activity in the cattle corridor, a stretch of rangeland covering more than a third of the country.

November 2021, Mauri, Nepal. Ezra Millstein/Mercy Corps

consumers due to inadequate cold chain infrastructure[14]. This lack of reliable storage not only reduces the income of 470 million smallholder farmers by as much as 15% but also exacerbates food insecurity, wastes valuable resources like water, land, and energy, increases emissions from production and waste, and leaves a significant ecological footprint[15]. Outdated cold chain technologies further amplify these inefficiencies. To address these challenges, some countries are implementing National Cooling Action Plans, fostering cross-sector collaboration to advance cold chain solutions. Solar-powered refrigeration systems are emerging as a key innovation, utilising solar panels to power cold storage units. These systems can significantly extend the shelf life of produce, reduce post-harvest losses, and preserve product quality[16].

## OPTIMIZING TRANSPORTATION

Transportation is a key element in food supply chains, significantly contributing to global greenhouse gas (GHG) emissions. A 2022 report from *Nature* reveals that emissions from food-miles account for about 3.0 gigatons of CO2e annually, which is 3.5 to 7.5 times higher than previous estimates. This makes transport responsible for approximately 19% of total food-system emissions, including those from production and land-use change. The transport of fruits and vegetables alone contributes 36% of food-miles emissions, releasing nearly twice as much GHG as their production[17].

In West and Central Africa, transportation challenges are particularly acute, with the highest international transport costs and excessive transit times globally. The cost to transport a container within this region averages $2.43 per kilometre, 1.5-2.2 times higher than in South Africa and the United States. For land-locked countries, transport costs represent 45% of the value of imports and 35% of exports, far exceeding global averages[18]. These high costs are compounded by inefficient logistics

**MERCY CORPS IN ACTION**

### ENHANCING RURAL CONNECTIVITY WITH RENEWABLY POWERED E-MOBILITY

In Zimbabwe, Mercy Corps is negotiating a partnership with a women-led, last-mile provider that custom-builds electric tricycles and bespoke batteries. The e-mobility company produces low-cost, renewably powered electric tricycles built for unpaved, off-road environments to connect rural producers to aggregation centres. This partnership is expected to significantly reduce transportation costs and emissions, thereby improving market access for rural producers. When transportation is necessary, we increasingly consider e-vehicles that also allow farmers to rent the service from reputable companies.

services, poor infrastructure, and older trucks, which consume more fuel and incur higher maintenance costs.

While energy investments in food systems hold great potential, they can lead to maladaptation if not approached through a climate-change lens or as part of a broader adaptation strategy. Such risks are particularly evident in what has been referred to as "parachute aid"—programmes constructed without regard for the larger system or long-term environmental sustainability or future climate risk. Fortunately, there has been a substantial movement in the humanitarian development area toward a more deliberate emphasis on market system development. Programmes that take a comprehensive, market-driven approach—one that considers environmental impacts—are more likely to succeed in terms of adaptation.

## Distributed renewable energy to improve disaster preparedness and response

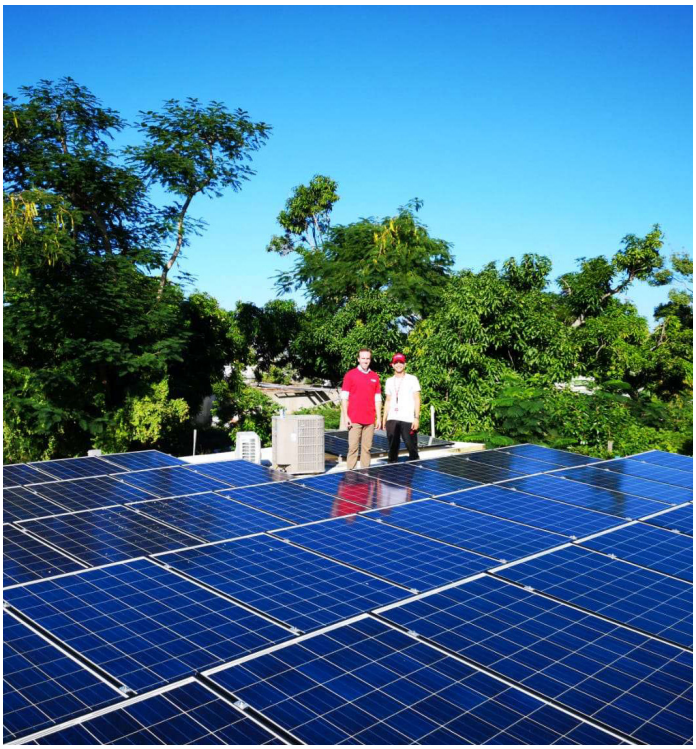
The ability to anticipate and cope with increased risk[19] of extreme weather events and associated crises is a fundamental element of any household or community climate change adaptation strategy—often referred to as 'resilience'. Key capabilities for resilience to extreme weather events include early warning, post-event communications and security systems, access to finance, basic health services, and clean water provision. Reliable and affordable energy services are foundational to ensuring reliable access to any of these services.

Beyond community and household resilience, distributed renewable energy also offers the potential for more effective and cleaner humanitarian response to acute and protracted crises. The climate crisis is driving human displacement as incidences of conflict over resources rise and the limits of adapting in place for certain populations become clear. The UNHCR projects that by 2024, there will be over 130 million forcibly displaced persons, doubling the number from just 12 years ago[20]. Climate-related disasters triggered more than half of new reported displacements in 2022, and nearly 60% of refugees and internally displaced people now live in countries that are among the most vulnerable to climate change[21].

These stark figures underscore the importance of including support for displaced people as a core adaptation and resilience objective to achieve climate justice. Currently, over 80% of the population in displaced camps lack access to electricity, and only 19% have access to clean cooking solutions, often relying on hazardous and unhealthy fuels like biomass and kerosene[22]. Formal settlements for displaced people are almost entirely run on an estimated 11,000 diesel generators. This model limits aid agencies' ability to extend power to households or businesses due to high marginal costs and generates significant and avoidable emissions[23], creating a negative feedback loop.

Within these challenges, we see several high-impact opportunities to expand the

December 2018, Vieques, Puerto Rico. Mercy Corps



focus of investment in the energy transition, enhance the effectiveness of support to people displaced by the climate crisis, and build the adaptive capacity of the humanitarian system.

## SUPPORTING COMMUNITIES TO PREPARE AND RESPOND QUICKLY TO DISASTERS

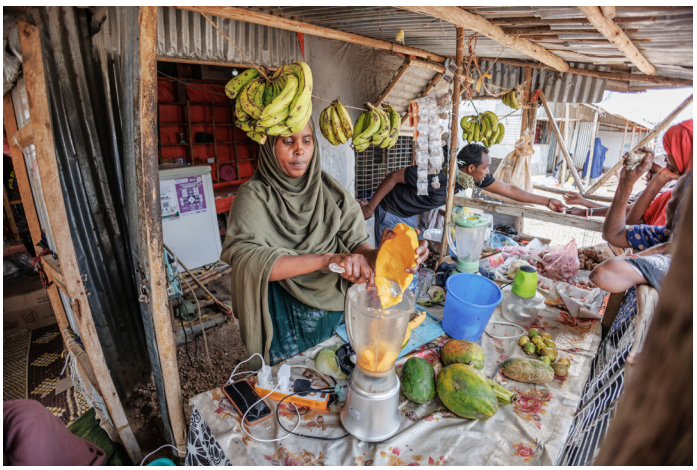
Distributed renewable energy solutions can play a critical role in reducing the vulnerability of communities to disasters. These decentralised energy systems—as self-reliant power systems—can provide a more resilient power supply during and after extreme weather events. This ensures the continuous provision of essential services, such as water, food storage, and other public services (e.g., health, public facilities), and enables access to climate and meteorological data, early warning systems, and post-disaster communications. These technologies enable first re-

**MERCY CORPS IN ACTION**

### STRENGTHENING HURRICANE PREPAREDNESS AND RESPONSE IN THE CARIBBEAN

Our Caribbean Resilience Initiative (CRI) supports islands and territories in the Caribbean by partnering with community organisations and building Resilience Hubs to provide reliable access to critical resources in the preparedness and early response phases during hurricane seasons. These include distributed renewable energy services to power small appliances, provide water purification, and emergency communication. Access to energy at the Hubs goes beyond the assurance of power when the main electrical grid goes out during or after a disaster[24]. For example, due to the presence of reliable electricity, the Resilience Hubs not only provide direct services to the community but also function as "response hubs" that provide Wi-Fi for essential coordination as well as radio signal for communication to track and report storm progress and power for reconnaissance missions. The 18 Hubs implemented so far deliver health and social services year-round and help over three million people meet basic needs and sustain their livelihoods during disasters.

May 2024, Sheder, Ethiopia. Jjumba Martin/Mercy Corps



sponders to maintain critical contact with external resources through charged cell phones, satellite phones, short-wave radios, and the internet. They also power drones for damage assessments and search-and-rescue operations, and lighting that allows first responders and volunteers to effectively organise and distribute food and goods to those affected by disasters.

Expanding the deployment of DRE systems requires a suitable regulatory environment, local markets for technologies, local skills for installation and maintenance, and robust governance systems to ensure ownership and management is clear and equitable. The specifics of programmes to address these areas depend heavily on the context, but always rely on strong partnership between government, market actors, and civil society.

## INCREASING ACCESS TO CLEAN ENERGY SERVICES FOR DISPLACED PEOPLE

Interest in and solutions for increasing access to clean energy in displacement settings is growing among humanitarian organisations, traditional donors, new

**MERCY CORPS IN ACTION**

### PROVIDING CLEAN ENERGY IN SITUATIONS OF DISPLACEMENT

Through the Enter Energy Initiative—Mercy Corps' humanitarian energy flagship programme—we are fostering public-private partnerships for the supply of sustainable energy services in communities affected by displacement. The final goal is to boost financially and environmentally sustainable socio-economic outcomes for populations affected by displacement by increasing their access to clean energy as well as decarbonizing the humanitarian operations that support them.

Ethiopia is home to over 4.7 million forcibly displaced people and it is estimated that less than 7% of those people have access to energy. To help address this challenge, Enter Energy Ethiopia co-founded Humanitarian Energy Plc, a local private enterprise, to deliver the country's first private solar PV-powered mini-grid under the current mini-grid legislation (Directive 268/2020), serving the refugee community of Sheder, Jijiga area. Through the solar-powered 254 kWp mini-grid, 17,600 refugees and 3,000 host community members, small businesses, community institutions, and humanitarian organisations have gained access to clean, reliable, and sustainable energy.

**MERCY CORPS IN ACTION**

### BOLSTERING E-WASTE MANAGEMENT IN THE HUMANITARIAN SECTOR

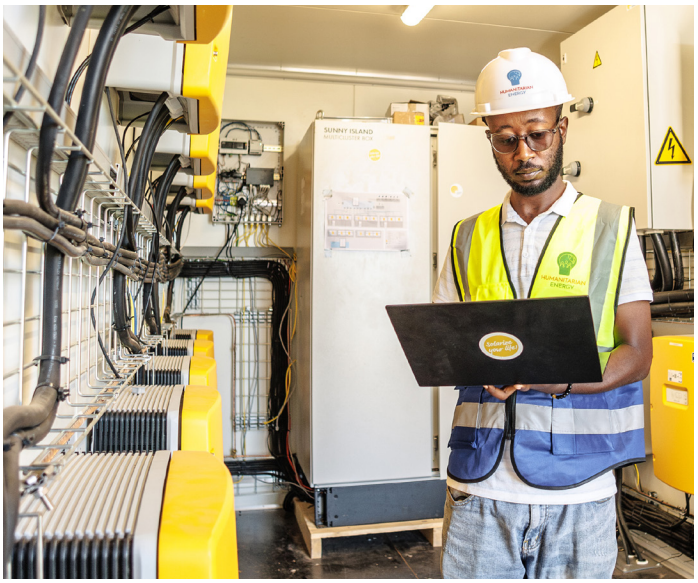
As our commitment to increase access to renewable, sustainable and affordable energy products and services grows, our footprint for e-waste deepens. In collaboration with IOM, Mercy Corps has set up the first repurpose and repair centre in the refugee settlement of Bidibidi, Uganda, which has recently scaled up after a successful piloting phase. Here, we have set up product-collection and awareness-creation systems, employing 10 community mobilisers and seven technicians across Bidibidi and the host community. The team uses household visits, community meetings, and road drives to collect broken lanterns, and to sensitise the communities about the dangers of poor e-waste handling. The collected items end up at the main repair centre, where technicians use a circular economy model to pick viable parts from broken lanterns to extend the life of others.

investors, and private sector energy companies. The Global Platform for Action on Sustainable Energy in Displacement Settings (GPA) has helped raise the visibility of this issue, convening a wide array of stakeholders around the topic. By increasing energy access in displacement situations through financially sound and environmentally conscious methods, the humanitarian sector can support the climate resilience of displaced and host communities. There are proven models that support the diversification of livelihood opportunities using renewable energy, spanning from the food value chain (e.g., agricultural and livestock production) to micro-and small-sized enterprises, to waste management and recycling.

Aid agencies and other local actors can support and subsidise these applications to increase uptake and use. Clean cooking is also part of the equation, as it supports increased climate resilience by diminishing the reliance on scarce biomass sources for vital cooking. More generally, by increasing productivity through renewable energy and decreasing reliance on biomass, we have seen improvements in relationships between displaced and host communities.

However, by increasing access to solar equipment, the humanitarian sector is also responsible for producing e-waste, which is an under-recognised part of the distributed energy puzzle, and displacement settings are often particularly ill-equipped to correctly process e-waste material, resulting in more severe environmental and health impacts. Fortunately, efforts are underway to address this issue, such as the GOGLA e-waste toolkit, which supports off-grid solar companies and other stakeholders in managing e-waste more effectively within humanitarian energy projects[25].

May 2024, Sheder, Ethiopia. Jjumba Martin/Mercy Corps



# Call to action

To meet the urgency and magnitude of global climate adaptation needs, we advocate for maximising adaptation strategies that have shown promise. The clean energy revolution presents an unparalleled opportunity to accelerate energy access for the hardest-to-reach communities, driving adaptive, climate-smart, and equitable development, while paving the way for a low-emissions future.

The examples outlined in this paper illustrate the immense potential we've identified, yet they remain small in scale in relation to the magnitude of adaptation needed. Significant investment, innovation, and supportive policies are essential to scale these efforts and other similar initiatives. Working at scale requires a broadening of the focus of existing investments in the energy transition, and the proactive inclusion of energy in adaptation planning and programme design. From increased private and philanthropic investment to ambitious Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), and other adaptation strategies, renewable energy must be recognised not only as a tool for decarbonisation but also as a critical component of climate adaptation.

Based on our experience and deep engagements with project partners, businesses, governments, and communities, we call on our partners, funders, and ourselves to:

### EMBED ENERGY INTO ADAPTATION PLANNING AND PROGRAMMING

It is critical to encourage governments to incorporate energy as an adaptation strategy within their NDCs and NAPs as they evaluate and update these plans to meet the Paris Agreement's long-term objectives. Furthermore, local governments and civil society organisations should incorporate clean energy initiatives into community and municipal adaptation plans to ensure that these programmes are comprehensive and integrated, effectively addressing the entire range of adaptation needs.

### FUND SUBSIDIES TO STIMULATE MARKETS IN THE HARDEST TO REACH AND MOST UNDERSERVED GEOGRAPHIES AND COMMUNITIES

Subsidies are a standard practice in rural grid electrification across wealthier markets and are becoming more common in developing markets[26]. Creating and funding smart, scalable subsidies for energy targeting low-income households and vulnerable communities, particularly in remote and underserved communities, can greatly enhance energy access.

August 2023, Geita Region, Tanzania. Mercy Corps

Expand risk capital for innovation: Financing local innovation and entrepreneurs who are closest to the specific challenges can be highly effective, as they are often best positioned to identify and implement solutions based on their local insight and knowledge. Additionally, supporting their connections with quality assurance entities helps ensure that standards are maintained, even in remote areas.

### INVEST IN FILLING EVIDENCE GAPS

More data on how clean energy can enhance resilience is needed to effectively inform programming and shape funding and finance strategies. This includes measuring the necessary subsidies and delivery methods to promote renewable markets, as well as developing and codifying viable, reproducible, and scalable business models that integrate renewable energy into climate preparedness and response plans across various regions.

### GO BEYOND ACCESS

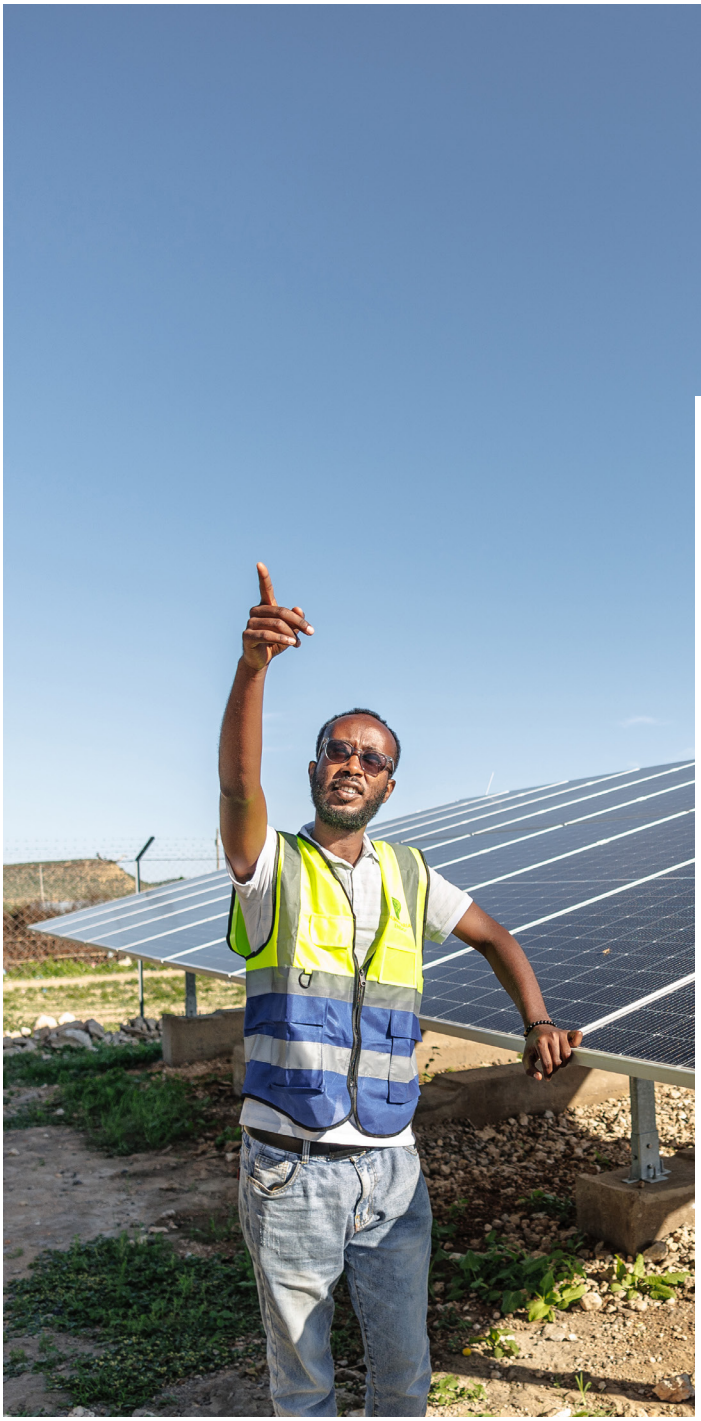
While access to electricity is a crucial first step, it is essential to provide training and other complementary support activities to new energy users. This ensures that the positive impacts of energy provision are maximised, while also minimising the risk of maladaptive practices emerging.

### EMBED GREATER RISK MANAGEMENT STRATEGIES ACROSS ALL ENERGY INTERVENTIONS

To avoid maladaptation, all energy investments and initiatives must be guided by climatic, environmental, and conflict risk assessments. This includes building e-waste systems alongside energy market expansion to avoid future waste issues.

### CENTRE CLIMATE JUSTICE

Engaging frontline and marginalised communities and other stakeholders in planning and decision-making processes is essential to ensure that solutions are tailored to their unique knowledge and experiences, thereby maximising the chances of success.



May 2024, Sheder, Ethiopia. Jjumba Martin/Mercy Corps

## The path forward is clear

By embedding these strategies into our collective efforts and increasing funding available, we can transform the role of renewable energy from a mere tool of de-carbonisation into a cornerstone of global climate adaptation.

Now is the time to act decisively, scale these solutions, and ensure that no community is left behind in the transition to a resilient, low-emissions future.

# Acknowledgments

Cecilia Ragazzi, Chris Browne, Anyse Pereira, and David Nicholson authored this paper.

Thank you to the following Mercy Corps country and programme teams for sharing their insights and expertise: Caribbean Resilience Initiative, Energy4Impact, Enter Energy Ethiopia, and Mercy Corps programmes in Tanzania, Uganda, and Zimbabwe.

For more information, please contact:

**Cecilia Ragazzi**
*Director, Energy Access*
cragazzi@mercycorps.org

**Chris Browne**
*Head of Learning, Monitoring, Evaluation and Data Management*
cbrowne@mercycorps.org

**Anyse Pereira**
*Senior Climate Change Strategy Officer*
aspereira@mercycorps.org

**David Nicholson**
*Chief Climate Officer*
dnicholson@mercycorps.org

# Endnotes


1. UNEP. (2023). Climate change and water-related disasters. Retrieved from UNEP - UN Environment Programme website: https://www.unep.org/topics/fresh-water/disasters-and-climate-change/climate-change-and-water-related-disasters

2. IEA. (2024). World Energy Investment 2024. In https://iea.blob.core.windows.net/assets/60fcd1dd-d112-469b-87de-20d39227df3d/WorldEnergyInvestment2024.pdf

3. UN (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. Resolution Adopted by the General Assembly on 25 September 2015, 42809, 1-13

4. Pinho-Gomes, A.-C., & Woodward, M. (2024). The association between gender equality and climate adaptation across the globe. BMC Public Health, 24, 1394. https://doi.org/10.1186/s12889-024-18880-5

5. Cong, S., Nock, D., Qiu, Y. L., & Xing, B. (2022). Unveiling hidden energy poverty using the energy equity gap. Nature Communications, 13(1), 2456. https://doi.org/10.1038/s41467-022-30146-5

6. https://www.unwomen.org/sites/default/files/Headquarters/Attachments/Sections/Library/Publications/2019/World-survey-on-the-role-of-women-in-development-2019.pdf

7. IRENA (2021), Bracing for climate impact: Renewables as a climate change adaptation strategy, International Renewable Energy Agency, Abu Dhabi.

8. IRENA (2021), Bracing for climate impact: Renewables as a climate change adaptation strategy, International Renewable Energy Agency, Abu Dhabi.

9. IPCC, 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001

10. World Bank. (2022). Climate explainer: Food security and climate change. Retrieved from World Bank website: https://www.worldbank.org/en/news/feature/2022/10/17/what-you-need-to-know-about-food-security-and-climate-change

11. Fernandes-Silva, A. A., Ferreira, T. C., Correia, C. M., Malheiro, A. C., & Villalobos, F. J. (2010). Influence of different irrigation regimes on crop yield and water use efficiency of olive. Plant and Soil, 333(1-2), 35–47. https://doi.org/10.1007/s11104-010-0294-5

12. FAO (2018), The benefits and risks of solar-powered irrigation - a global overview,

13. Komugisha, R. J. (2022). Dairy Industry in Uganda 2022-2023. Retrieved August 23, 2024, from Researchtecglobal.com website: https://www.researchtecglobal.com/report/dairy-industry-in-uganda-2022-2023#:~:text=Revenue%20generated%20from%20exports%20of

14. The Rockefeller Foundation (2017), Food Loss & Waste Africa - Intelligence Report 9

15. Osabohien, R. (2022). Soil technology and post-harvest losses in Nigeria. Journal of Agribusiness in Developing and Emerging Economies. https://doi.org/10.1108/jadee-08-2022-0181

16. UNEP and IEA (2020). Cooling Emissions and Policy Synthesis Report. UNEP, Nairobi and IEA, Paris

17. Li, M., Jia, N., Lenzen, M., Malik, A., Wei, L., Jin, Y., & Raubenheimer, D. (2022). Global food-miles account for nearly 20% of total food-systems emissions. Nature Food, 3(6), 445–453. https://doi.org/10.1038/s43016-022-00531-w

18. TRALAC Trade Law Center . (2016). Transportation costs and efficiency in west and central Africa. Retrieved from https://www.tralac.org/discussions/article/9364-transportation-costs-and-efficiency-in-west-and-central-africa.html

19. Pidcock, R., & McSweeney, R. (2022). Mapped: How Climate Change Affects Extreme Weather around the World. Retrieved from Carbon Brief website: https://www.carbonbrief.org/mapped-how-climate-change-affects-extreme-weather-around-the-world/

20. European Commission. (2023). Forced displacement. Retrieved from https://civil-protection-humanitarian-aid.ec.europa.eu/what/humanitarian-aid/forced-displacement_en website: https://civil-protection-humanitarian-aid.ec.europa.eu/what/humanitarian-aid/forced-displacement_en

21. https://www.unhcr.org/uk/news/stories/climate-change-and-displacement-myths-and-facts

22. Clean Cooking Alliance. (2021). Air Pollution, Health, and Clean Cooking Factsheet. Retrieved from https://cleancooking.org/wp-content/uploads/2023/07/Air-Pollution-Health-and-Clean-Cooking.pdf

23. Global Platform for Action. (2021). Fossil Fuel Powered Generators in Humanitarian Operations Produce High CO2 Emissions | Global Platform for Action. Retrieved 2024, from humanitarianenergy.org website: https://www.humanitarianenergy.org/news/latest/fossil-fuel-powered-generators-in-humanitarian-operations-causes-high-co2-emissions

24. "Final Evaluation of the Mercy Corps Puerto Rico Resilience Hubs Program", carried out by Cultural Practice, LLC. Prepared by Deborah Caro and Catherine Meola, March 8 2020

25. https://www.gogla.org/what-we-do/circularity/e-waste-toolkit/

26. https://unctad.org/news/investing-energy-transition-countries-need-more-balanced-policies