



©2021 UNICEF Malawi/UN0480606

Renewable energy solutions improve children’s health and wellbeing in Malawi

This case study highlights efforts to achieve multiple Sustainable Development Goals, including Good Health and Well-Being (SDG 3), Clean Water and Sanitation (SDG 6) Affordable and Clean Energy (SDG 7), and Climate Action (SDG 13).



Summary

UNICEF Malawi and its partners are prioritizing renewable energy solutions for children and communities across the country to access clean and affordable electricity, with a focus on hard-to-reach, rural communities unable to access the national electricity grid.

Reliable electricity is critical to enable basic primary healthcare, store, and deliver vaccines and other medication, make available clean water and sanitation facilities, create a comfortable learning environment, and offer essential services to meet the needs of children and their families during the day and at night. This case study shows how UNICEF Malawi is accelerating outcomes for children from renewable

energy systems, especially as growing climate change impacts threaten current and future energy services. It highlights approaches to promote long-term sustainability of these systems and the benefits of working across sectors to address multiple child rights in the most vulnerable areas in Malawi.

Introduction

→ Of the nearly 19 million people in Malawi, nearly 83 percent of the population live in rural areas¹ and more than half are under the age of 18. By 2030, the child population is expected to grow to nearly 16 of 30 million.² This young population creates a potential to spur development in the country, however only if their rights to good health, well-being, and education are met so they can fully contribute to Malawi's future.

Across the country only 10% of households have electricity³ with wide disparities between urban and rural locations. Only 4% of households in rural areas have access.⁴ While there are strong governmental commitments to improve electricity access, the demand far exceeds the installed capacity with new generation capacity urgently needed. And where electricity is available, it is not always reliable—both in urban but especially in rural areas impacting schools, health facilities, and households.

In Malawi, hydro-powered energy solutions provide 95 percent of electrical energy,⁷ climate projections show that water insecurity from land use change, deforestation, siltation, drought, and climate variability threaten production. As such, alternative solutions are critical to support essential services, especially for the poorest and most vulnerable communities living in areas hard-to-reach by the national electric grid. Moreover, grid extension in such areas is possibly slower and more expensive than decentralised renewable energy systems, especially considering the continuing efficiency and price gains and innovation in the sector.

To ensure quality health care for all (see box), major hospitals in Malawi are connected to the main electricity grid. However, due to power outages, they all rely on back-up power from diesel generators to ensure 24/7 power availability. This comes as additional cost to the healthcare facilities while also simultaneously contributing to greenhouse gas emissions and contributing to air pollution.

Similarly, many of the outreach health facilities supporting the rural population are not connected to grid and have limited or no reliable power source. Without reliable energy, these health facilities struggle to adequately address children's health needs, as well as those of their families.

In 2019, the Ministry of Health and Population released the 'Power for Health' Masterplan for Malawi with support from UNICEF and the United Nations Development Programme (UNDP).⁸ The guide provides a road map for integrating renewable energy and energy efficiency in the health sector, to be led by the Government of Malawi (GoM).⁹

As described in more detail below, UNICEF played a key role in its development by commissioning facility level demand assessments, generating data and evidence on energy demand of healthcare facilities, including from the vaccine cold storage, mapping healthcare facilities and providing key recommendations. These technical data and evidence underpin the Power for Health Masterplan.



In 2015, the Government of Malawi committed to improving electricity access through the **Sustainable Energy for All**⁵ initiative, with a goal to achieve nationwide access to electricity by 2030.



The 2017-2022 Government of Malawi **Health Sector Strategic Plan II**⁶ commits to providing universal quality healthcare delivery for all citizens.



UNICEF Malawi is promoting and implementing **child-centred renewable energy solutions** that bring measurable, long-term benefits to all from birth to adulthood.

It operates through a convergent strategy that recognizes the multifaceted benefit of good health on children's

- ▶ cognitive and physical development,
- ▶ capacities to learn and protect themselves,
- ▶ access to education, and
- ▶ ability to gain additional assets that help them build a healthy, fulfilling life

It also assessed power use and requirements at major hospitals, which forms an important part of the analysis.

The 'Power for Health' Masterplan illustrates that a desire for sustainable energy solutions is growing in the country, and its recommendations continue to inform policy planning efforts.



Across the country only **10% of households** have electricity with wide disparities between urban and rural locations. **Only 4% of households in rural areas have access.**

UNICEF Approach

A Focus on Social Structures

To reduce health issues facing children due to the lack of electricity in hard-to-reach areas, UNICEF Malawi and its partners are developing child-centred, renewable energy solutions that are adapted to existing social structure for improving essential services.

This focus on the community context lends itself to working across sectors, such as health; education; disaster risk reduction (DRR); water, hygiene, and sanitation (WASH), social protection, etc. As an example, when developing energy solutions for healthcare facilities, DRR and WASH experts work alongside the community to assess and plan for climate impacts and disaster risk. Especially for drought-prone districts where hydro-electric production is limited or absent, decentralized solar energy solutions decentralised solar solutions could ensure more reliable, clean, and sustainable energy and safe water access.

For improving children's health through energy solutions, attention on social structures means to first prioritize reaching the most vulnerable communities who are not being serviced by traditional energy solutions (e.g., the national power grid). Second, it means to ensure energy solutions match the local context and needs, as provided through community collaboration for and with children. A partnered approach also helps programmes account for co-developing strategies and offering technical training to ensure a community can sustain renewable energy solutions.

Operating through a Cross-Sectoral, Life-Cycle Approach

In 2019, UNICEF Malawi shifted its 2019-2023 country programme strategy¹⁰ to a horizontal and integrated structure where the technical expertise in renewable energy spans across multiple sectors (i.e., promoting solar solutions for water and sanitation, public spaces, schools, and health facilities). The strategy promotes programming through a life-cycle approach—rather than by sector as is common in development—through three pillars focused on early childhood, school-age children, and child-friendly community resilience. The approach led to the establishment of a Technical Task Force within UNICEF Malawi that could focus on sustainable energy solutions in multiple sectors.

As an example in the health sector, in 2018 in partnership with UNDP and the GoM, UNICEF spearheaded and conducted an Energy Needs Assessment (ENA).¹¹ It focused on 39 healthcare facilities across Malawi to define the energy demand as well as to gauge how renewable energy systems are currently being managed to meet user needs and deliver reliable energy services. It also assessed non-technical barriers to sustainability in operations and maintenance (O&M). For instance, poor coordination by those tasked with energy governance; inadequate or absent financial sustainability and business models to support ongoing O&M, and expansion of renewable energy

A Focus on Solar for Immunizations

UNICEF Malawi's Technical Task Force explored the unique requirements for immunizations (including for Covid-19) by researching the feasibility and cost for using decentralized renewable energy to run national and sub-national vaccine cold rooms/cold chain systems.¹² The analysis provided critical evidence for how much kilowatts-hour of electricity can come from renewables verses other sources.



UNICEF found that national cold rooms could be sustained with 75% energy from decentralized solar energy solutions.

The other 25% requires other sources such as from the grid or diesel use.

systems from healthcare facilities to nearby communities; and limited solar equipment standardization.

During the ENA exercise, the team developed an energy-demand assessment methodology for healthcare facilities that allows solar-power solution designers to offer best possible solar energy solutions. It does so by determining local conditions (infrastructure, resources, environment, climate and disaster risks, etc.), electrical power availability and distribution, network connectivity, energy loads, and more. With the close cooperation and participation of GoM, government staff members gained capacities to conduct similar ENAs for future project sites.

In addition, it also put more attention on strengthening the capacities of local partners and government officials in supply chain ordering, monitoring, technical oversight, and more to help ensure sustainable operations and maintenance. The partnerships and capacities developed through attention on healthcare facilities are designed to support solar energy investments in other sectors.

Through this integrated approach, UNICEF Malawi also found that methods developed for one sector and the resulting knowledge transfer best practices for sustainable energy more easily. For instance, overcoming barriers for child development in education (i.e., children need reliable lighting for homework and chores), ensuring child protection (i.e., street lighting is important for children's safety, especially girls, after dark), and aiding in climate resilience (i.e., supporting local electric water pumps so children, especially girls, are not absent from school if having to fetch water from sources increasingly affected by drought).

Working across sectors also allows for a consolidated community-based approach to using renewable energy, as previous efforts have resulted more of a piecemeal approach where installation operated independently. Having more strategic plans across sectors means communities can more readily access technical expertise for multiple installations, as well as identify reliable, scalable, easy-to-use, and affordable solar systems and suppliers. Additionally, it can create opportunities for UNICEF to convene public and private sector partners to identify the most appropriate solutions (i.e., grid extension/mini-grid, standalone solar, etc.) and catalyze investment for children across social sectors.

Programmes & Outcomes

→ To improve the quality and reliability of social services to children and to accomplish sustainable development goals in health, WASH, and education, UNICEF is leading on multiple renewable energy programmes.


The following three examples highlight a focus on safe drinking water and improved sanitation, sustainable and reliable electricity at healthcare facilities, and inter-agency collaboration aimed at influencing government policies towards child-centred renewable energy solutions.


Climate Resilient Sustainable Solar-Powered Systems in Rural Malawi

With limited access to both safe drinking water and improved sanitation facilities,¹³ approximately two thirds of Malawi's population is at risk of vector-borne diseases. This equates to more than six million children at risk of diarrhoea, cholera, and pneumonia, with the number likely to increase as the population grows and climate change impacts limit access to safe water (e.g., drought can affect local access to safe drinking water and energy sources that provide clean water).


To address these issues, UNICEF Malawi worked across sectors to develop resilient, sustainable, and safe water systems that could remain functional throughout the year and withstand extreme weather events. Through a climate risk analysis, it developed a system for using solar-powered deeper boreholes for multi-use systems (see box). The climate analysis included a comprehensive hydrogeological investigation and an assessment of the current and future yield of each source and any climate risks to water availability (e.g., risks for drought, flooding, and extreme weather events) and viability for future maintenance based on the data and risk assessments.

Realizing that a key barrier to renewable energy use is system sustainability, UNICEF Malawi also worked with community members to understand and address reasons for why past solar-powered water systems had struggled. They found gaps in training, support, oversight, and supply chains. UNICEF responded by working with communities to:

 From 2017 to mid-2021, nearly **230,000 children and community members were reached through 71 solar-powered water systems** at schools, healthcare facilities, and in nearby communities.

 In 2019, **60,000+** women, men, and children reached through solar-powered water systems at temporary shelters during the Cyclone Idai flood response and recovery.

- Solar-Powered Water System Benefits:**
- ▶ Improved student health at school due to clean water and sanitation
 - ▶ Reduced absenteeism due to less illnesses, a safe environment for girls' to manage their menstrual hygiene, and less time spent by children to gather water for their household
 - ▶ Improved hygiene at home for children, reducing illness and disease
 - ▶ Improved quality of child health care services

 **UNICEF Malawi's estimated programming investment** in the 71 climate resilient sustainable solar-powered systems completed and commissioned between 2017 and mid-2021 is **\$10,250,000/USD**.

- ▶ Establish Water Management Committees (WMC) managed by the schools and healthcare facilities receiving the water systems;
- ▶ Develop and incorporate a formalized training process for regular operation and maintenance that could be sustained by the WMCs;
- ▶ Connect the local WMCs to government-supported Water Users Associations (WUAs), who could provide proper skills transfer on the operation and maintenance of the solar powered water supply systems on an on-going basis; and
- ▶ Improve local supply chains for spare parts and technical assistance.

Solarization of Health and Educational Facilities in Malawi

Since 2019, UNICEF has been exploring the viability of renewable energy solutions that can maximize the government's immunization programme in off-the-grid areas of Malawi. The focus on solar-powered, cold chain support for vaccines, medication, and other services aims to ensure equity in healthcare service provision.

Working alongside the Ministry of Health and Population (MoHP)—and supported by the Global Alliance for Vaccine and Immunization (GAVI)—the programme has identified 50 hard-to-reach healthcare facilities (with no power supply or high-power interruptions) that could benefit from facility-wide decentralized solar energy solutions (such as solar PV installation) for providing uninterrupted, sustainable, and clean electricity supplies. Of these, 20 sites have been selected for phase one installation in 2021, with the others under assessment for future installation.

With multiple benefits identified for children and their families from reliable access to energy healthcare facilities (see box), the process to realize solar-powered solutions in hard-to-reach areas in Malawi has taken time.¹⁴ Critical for sustainability is ensuring evidence-based design is not only technical in understanding energy and infrastructure needs, but responsive to the local context for sustained quality control (i.e., climate change projections, local capacities, etc.). For UNICEF, this means renewable energy solutions prioritize community ownership and strengthening local capacities for sustainability.

UNICEF's programming investment from 2019-2021 in the solarization of healthcare facilities and solar cold chain is approximately \$3 million/USD.

UNICEF has also been supporting the Ministry of Education, Science and Technology (MoEST) to improve access to Continuous Professional Development (CPD) for teachers through e-CPD program. For this, UNICEF installed ICT equipment including computers, printer, internet router, etc. at 20 Teacher Development Centres (TDCs) in 5 districts of the country. UNICEF is currently supporting the development of a moodle platform (offline and online) that will be accessed through the ICT equipment at the TDCs. Thus, in doing so UNICEF will support the digitization of the learning material and capacity building of about 3,000 teachers who will impact more than 18,000 students in the 5 districts of Malawi.

To support the e-CPD infrastructure at the 20 TDCs and ensure that the ICT equipment run uninterrupted, UNICEF installed solar systems to provide reliable, clean and free energy. Furthermore, the TDC staff have been trained on using the solar equipment and performing basic preventive maintenance.



By the end of 2020, UNICEF Malawi installed **429 solar direct drive (SDD) refrigerators in health care facilities**.* In 2021, UNICEF and its partners will install 260 units of cold chain equipment; **105 of which are powered by solar energy**. UNICEF estimates these SDD refrigerators have positively impacted more than **1 million mothers and children through improved essential health services**.

Also, by installing solar systems in **20 health facilities** with no electricity grid connection or inconsistent power, UNICEF estimates it will positively impact more than **300,000 mothers, and children**.

*with support from UNICEF's Supply Division



For children and mothers, reliable access to electricity sustains life and good health:

- ▶ Children, young people, and pregnant women can more easily and safely access critical health services at all times, including emergency medical services
- ▶ Children can get medications and vaccines requiring cold storage
- ▶ Mothers and pregnant women can access high quality maternal, newborn, and child healthcare services including hot water for delivery no matter the time of birth
- ▶ Children and young people can stay safe with access to clean water and sanitation
- ▶ Children, young people, and mothers benefit from better facility operations, such as digital connectivity and staff retention



Through the **20 solar systems at Teacher Development Centres** UNICEF aims to improve the learning programs for teachers and further improve educational service delivery.

Energy Donor Working Group

With a long-term goal to catalyse sustainable energy investment for children across the country, UNICEF Malawi is also playing an active role in advocating for child rights on energy through a national Energy Donor Working Group (EDWG). The EDWG is designed to strengthen, coordinate, and harmonize policy support, technical assistance, investments, and related interventions in the Malawi's energy sector. As an important development partner, UNICEF is working with organizations with similar social goals—such as USAID, the World Bank, GiZ, the European Union, and others—in data and evidence generation, policy analysis, and advocacy efforts.

UNICEF's efforts can range from advocating for its research on energy and infrastructure needs of community-based healthcare facilities to be included in nationwide energy plans to presenting the case for child-sensitive indicators in planning, budgeting, and activity implementation (i.e., indicators related to mortality rates for children under age five, the proportion of children fully immunized, and others).

UNICEF has also been promoting child rights for energy in the Malawi Renewable Energy Partnership Group (MREPG) since its inception in 2018. This technical working group is coordinated by GoM and include various stakeholders from the development partners, private sector associations, civil society organizations, and academic institutions.



Energy Donor Working Group Objective

Support the Government of Malawi to bring reliable, affordable, and clean power to at least **30 percent** of the Malawi population **by 2030**, including to social sectors critical to children.



The MREPG is mainly focused on off-grid electrification, which is the core part of UNICEF program support to rural healthcare and educational facilities.

Lessons Learned

Generate evidence to guide child-centred renewable energy investment

In developing renewable energy programmes that improve essential services for children and their families—especially those living in poverty—data and evidence generation helped UNICEF Malawi advocate for the feasibility, affordability, sustainability, and scalability of its programmes. For instance, UNICEF Malawi conducted an internal landscape review analysis of the current state of impacts due to climate change, environmental degradation, and unsustainable energy use on children in the country.¹⁵ This helped the organization determine key stakeholders and potential partners and prioritize programming and advocacy opportunities to advance child rights through sustainable energy investments across sectors.

The findings aided in UNICEF's efforts to provide a public evidence base for the technical, financial, and social aspects of renewable energy that could be integrated into inter-agency and government practices and policies. A continuing effort for UNICEF Malawi is in using the evidence for creating more child-centred indicators linking energy, child health, water and sanitation, and education into government actions and policies—especially on how the use of renewable energy for essential services can improve the health, WASH, and education outcomes for children in poverty.

Prioritize capacity-building in renewable energy investments

In UNICEF Malawi's research on the feasibility of using renewable energy to meet healthcare, WASH needs, it reviewed where previous solar projects had failed for long-term use. Key findings included:

- ▶ There is limited capacity within Malawi's health sector to manage the operations and maintenance contracts of solar equipment. For instance, UNICEF Malawi found that while solar service providers give one-year warranties, but there is little follow up.
- ▶ Within Malawi's health sector, there is limited capacity to negotiate long-term O&M contracts with service providers due to a lack of awareness on the value of O&M or the lack of resources to cover payments for O&M.
- ▶ For those tasked in communities with O&M, there is limited capacity in how to identify problematic issues, how to report faults for repair, and a minimal understanding in the supply chain that can result in repairs being too costly. Many also lacked funding for long-term upkeep.
- ▶ Within the sustainable energy sector, there is insufficient linkages at the technical level between the government health sector and the government energy sector.

As a response in programming, as UNICEF Malawi found, it is vital to include workshops and training manuals on basic solar skills in at the facility, community, and district level; develop performance standards; and to initiate government and implementing partner capacity-building for district-level technical support. In particular, the role of and engagement with private energy service providers is imperative for innovation in business models and to ensure long-term system sustainability. For increasing the lifespan of solar installations, it is also important to include capacity building of solar installation contracts with national and international companies to capitalize on their strong technical skills. In addition to benefiting health care facilities with solar-powered systems, a more skilled and knowledgeable technical team can also support other solar energy households, schools, and community structures.

Develop long-term sustainable energy partnerships

Important for sustainability is robust and long-term collaboration and commitment between the Ministry focused on energy and line Ministries—such as Ministries of Health, Water, and Education. This helps to ensure ongoing technical leadership for renewable energy and ownership from line Ministries, which can support efforts to prioritize and integrate sustainable energy solutions into national sectoral planning and policies. Also critical is creating long-term policy targets and financing instruments to catalyse private sector engagement.

Create an enabling environment for child-sensitive renewable energy policies

In many countries, the understanding of the scale and importance of child rights in nationwide energy policies and practices are in their infancy. National climate change and sustainable energy policies and plans tend to focus on the productive aspects of infrastructure, transport, etc. rather than on how those structures affect children and their families—especially those living in poverty and most vulnerable.

To address this, advocacy and inter-agency networking can help in providing evidence and best practices that link the outcomes for children from sustainable energy programmes to country policies and goals in health, education, water, climate, etc. (i.e., development strategies, national education policies, education policies, health, climate change strategic plans, and more). Doing so can help to increase child-sensitive indicators within national, high-level planning for more child-centred renewable energy solutions. Cost-benefit research can be especially influential in showing governments the long-term savings for the country investing in solar and other climate-resilient energy solutions.

Additionally, an enabling environment for decentralized renewable energy solutions requires a focus on long-term sustainability that can be managed by local, district, regional, and national government; and supported to scale with sufficient capacities, resources, and technical support. Unifying and mobilizing efforts towards this goal is necessary by UNICEF and all its UN, government, development financial institutions, private sector and civil society.

Conclusion

→ Studies show that decentralized renewable energy solutions for hard-to-reach social services—including WASH, healthcare, and education facilities—are critical to attain sustainable development goals on water for all; quality, universal healthcare; and education for all children in Malawi. However, the implementation is still in its infancy.

UNICEF Malawi and its partners are leading the way as they create policy linkages, generate data and evidence, and implement investments on sustainable energy that are already showing positive gains for children’s health at schools, healthcare facilities, and in the community.

Its cross-sectoral, social systems approach highlights the value of both technical and social solutions, sustained governmental and private-public partnerships, and attention on local capacities and community ownership. UNICEF Malawi’s attention on providing evidence for the cost-effectiveness, sustainability, and healthcare outcomes for children using renewable energy will continue to strengthen its potential as a sustainable solution in Malawi for more equitable quality healthcare for all children.



Key Resources

[Energy Needs Assessment of Malawi's Health Sector: Empowering Health Services](#)
[Malawi Growth Development Strategy \(MGDS III\)](#)
['Power for Health' Masterplan for Malawi](#)
[Scaling-Up Climate Resilient Sustainable Solar-Powered Systems for Institutions and Communities in Rural Malawi](#)
[UNICEF Malawi's new Country Programme 2019-2023](#)

Acknowledgements

This case study was developed in partnership with UNICEF Malawi. It was written by Dr. Tamara Plush; initiated & reviewed by Rakshya R Thapa, UNICEF Climate and Energy Specialist; and reviewed by Michele Paba, WASH Chief; Tedla Damte, Chief Health; Jaivardhan Singh, Electrical and Mechanical Engineer; Ghanashyam Sethy, Health Specialist; Jackson Ndayizeye, WASH Specialist; Trish Mary Mkutchwa; and Paolo Ciampagna, Designer.

Endnotes

- 1 <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=MW>.
 - 2 National Statistical Office of Malawi, population projections, www.nsomalawi.mw/index.php?option=com_content&view=article&id=135%3Aprojected-population-by-age-and-sex-for-malawi&catid=8&Itemid=3.
 - 3 Electricity Supply Corporation of Malawi Limited (ESCOM), 2016, www.escom.mw.
 - 4 <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=MW>.
 - 5 www.se4all-africa.org/seforall-in-africa/country-data/malawi.
 - 6 www.fao.org/faolex/results/details/en/c/LEX-FAOC177248.
 - 7 www.escom.mw/waterlevels-energysituation-malawi.php.
 - 8 <https://info.undp.org/docs/pdc/Documents/MWI/Malawi%20%27Power%20for%20Health%27%20Master%20Plan.pdf>.
 - 9 See pages 5, 18, and 63-74 in the 'Power for Health' Masterplan.
 - 10 www.unicef.org/malawi/reports/unicef-malawi-country-programme-document.
 - 11 Energy Needs Assessment of Malawi's Health Sector: Empowering Health Services (UNICEF, UNDP, Ministry of Health and Population, Department of Energy, the Electricity Supply Corporation of Malawi [ESCOM], and the Malawi Energy Regulatory Authority [MERA] 2018), www.unicef.org/malawi/reports/energy-needs-assessment-malawis-health-sector.
 - 12 Feasibility and costing study to establish the use of renewable energy to run national and sub-national cold rooms/cold chain system for the health sector in Malawi UNICEF 2019, www.unicef.org/malawi/reports/renewable-energy-run-national-and-sub-national-cold-rooms-cold-chain-system.
 - 13 According to the 2019 Joint Monitoring Programme data (JMP, UNICEF-WHO, 2019), 65.4 percent of the rural population in Malawi have access to at least a basic water supply service and 9.6 percent have access to a piped system, www.unicef.org/malawi/reports/scaling-climate-resilient-sustainable-solar-powered-systems-institutions-and-communities.
 - 14 www.unicef.org/malawi/reports/energy-needs-assessment-malawis-health-sector.
 - 15 UNICEF Malawi 2017 Climate Landscape for Children (CLAC).
-