



**Solar for Health (S4H) innovative financing feasibility study
in Liberia, Malawi, Namibia, Zambia, and Zimbabwe**

UNDP PRC/ZWE/RFP/0008/7/8/2019

The UNDP Solar for Health programme

More than 70% of healthcare facilities in Sub-Saharan Africa (SSA) lack reliable access to electricity, with one quarter of facilities not having access to electricity at all. Unreliable power affects lighting for emergency night-time care (e.g., births), refrigeration (e.g., vaccines), use of medical technology (e.g., sterilisation), and communication (e.g., contacting emergency care personnel). Energy poverty is a critical obstacle to the realisation of universal access to quality healthcare, putting lives at risk every day. Due to this lack of reliable electricity from the grid, many healthcare facilities in Sub-Saharan Africa (SSA) rely on CO₂-emitting diesel generators to meet their energy needs. Nitrous oxides from the diesel generators account for 15% of all nitrous oxides emitted in the region.

With the mandate to bridge the humanitarian-development nexus through the implementation of the Sustainable Development Goals (SDGs), the UNDP launched a global Solar for Health (S4H) programme to address the gap in universal health coverage (SDG#3) and access to efficient modern energy (SDG#7). By providing health facilities with reliable solar photovoltaic (PV) energy systems, the programme aims to improve the quality of health service delivery, while reducing greenhouse gas emissions (SDG#13) of the health sector and contributing to the achievement of the Nationally Determined Contributions (NDCs) set out in the Paris Agreement. Solar PV systems ensure access to a reliable and clean source of energy for improved health products and services. In addition, the programme aims to boost the development of local solar energy markets (e.g., manufacturers, engineers, implementers, service providers), as well as strengthen the local regulatory framework and institutional capability (e.g., tax incentives for renewables). As a result, the programme builds the foundations necessary for a cross-sector and nationwide transition towards low-carbon energy in targeted countries.

The programme's objective is to provide modern solar energy services in over 18,000 health facilities in 22 developing countries in Africa, the Arab States, Central Asia and the Pacific. In 2017, a pilot funded by donors – such as the Global Fund and Innovation Norway – was successfully launched, providing solar energy with a total installed capacity of 7.7 MWp to more than 650 health facilities in Zimbabwe, Zambia, Libya, Namibia, Sudan and South Sudan.

Feasibility study objectives and methodology

Given encouraging preliminary results from the pilot and the ambitions of the programme, UNDP saw an opportunity to mobilise private sector support to deploy and scale-up S4H across the 22 countries in scope. Within that framework, UNDP mandated KOIS and Differ to assess the feasibility of an innovative financing mechanism that could best leverage private capital through innovative financial instruments. The objective of the feasibility study was to design a sustainable financing mechanism to accelerate the S4H programme in the prioritised countries, as well as to provide UNDP and the local governments with sufficient information to make a decision on further financing and implementation of the proposed S4H financing model. Five countries in SSA were selected for this study, including Namibia, Liberia, Malawi, Zimbabwe, and Zambia.

In 2019, KOIS and Differ undertook this 8-month study, comprised of three main phases:

1. **Demand-side analysis:** Given the importance of a thorough understanding of the financed projects and the local context in which they operate, the study started with an analysis of the macroeconomic environment, health sector structure, regulatory environment, and local energy market of the five target countries. Building upon preliminary desk research, the project team conducted interviews with more than 100 key stakeholders, such as government officials, regulators, healthcare facilities, energy service providers (ESPs), donors, and other relevant stakeholders in the five target countries. The interviews were conducted in person during country visits in Malawi, Namibia, Liberia and Zambia, and remotely with stakeholders in Zimbabwe due to COVID-19 pandemic related travel restrictions. Based on that analysis, the study identified the main barriers hindering a market approach to energy access for healthcare facilities, which need to be addressed by the S4H programme financing solution.
2. **Supply-side analysis:** Building upon the understanding of the local context and existing innovative financing instruments for energy access in health, several S4H financing models were identified as potential solutions for scale-up of the S4H programme. Interviews with over 30 potential investors and financiers, including private investors, international and

development financial institutions (IFIs and DFIs), local commercial banks, foundations and impact investment funds, helped identify their main requirements and constraints for structuring a hypothetical S4H financing facility, as well as test their appetite to support such facility.

3. **Design of the S4H financing structure:** Based on the demand- and supply-side analysis, a scalable S4H financing model was designed in a way to address the main challenges identified by both groups of stakeholders. It is to be noted that during this phase, considerations related to the long-term operational and financial sustainability of the proposed structure were paramount, and as such, the model incorporates sustainability of the solar installations, as well as disposal at the end of their lifetime. The design phase has been a collaborative and iterative process involving the most relevant stakeholders within and outside UNDP, to co-create an actionable solution and obtain preliminary commitments for its future implementation.

Solar for Health financing model

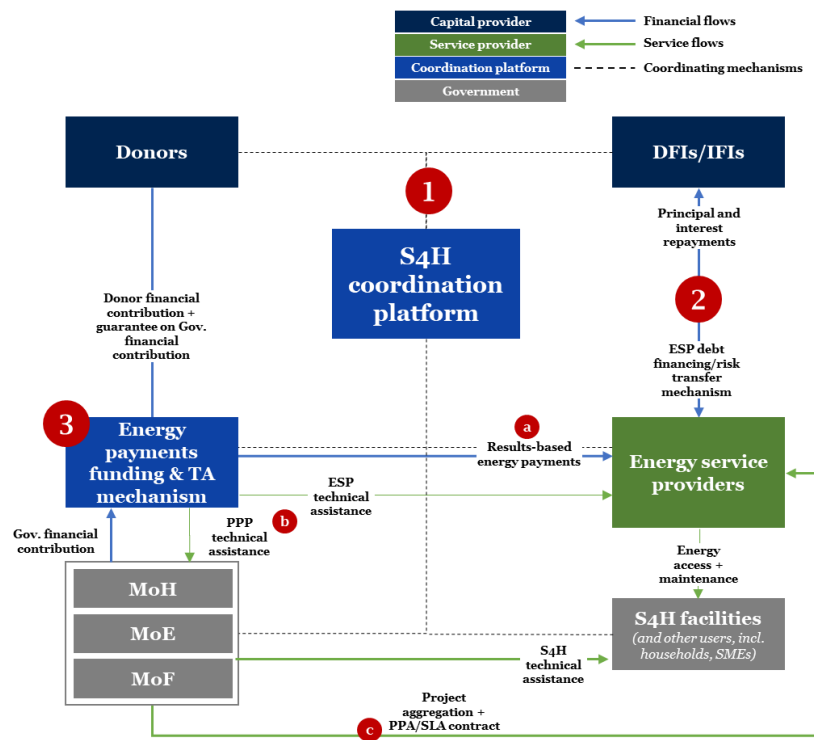
Scaling up off-grid solar energy solutions for healthcare will require both increasing demand-side potential and supply-side project bankability. The main determinants of off-grid energy demand in the context of S4H in SSA are (i) healthcare facility type, (ii) population/economic activity density and (iii) distance from the national grid. The target S4H healthcare facilities can be segmented along these dimensions to assess their attractiveness to local ESPs:

- Small size rural facilities located far from the grid are the most deprived when it comes to energy access and they also serve more vulnerable and poor population. Due to their limited size and difficulty of access, they represent an unattractive market for ESPs without subsidies or pooling of a larger number of facilities.
- Medium-/larger-size off-grid facilities provide healthcare services to a larger patient bases in urban/peri-urban areas and can represent an attractive market potential for local ESPs, provided the ability to pay of these facilities is strengthened.
- On-grid facilities are usually located in larger cities and could benefit from solar installations when the grid is unreliable or costly. They are highly attractive to ESPs given their larger demand, their higher ability to pay and their central location.

When selecting from the defined S4H market segments, several trade-offs have to be made. Larger and more centrally located healthcare facilities stand out as potential quick wins due to the relative ease of S4H implementation, whereas smaller and more remote healthcare facilities typically serve more vulnerable populations will lower energy access rates, and their inclusion in S4H might yield more overall impact. Another trade-off must be decided between providing more healthcare facilities with a minimum viable energy access, as opposed to fewer facilities benefitting from full access.

Once the S4H market defined, a significant number of challenges need to be addressed on both demand and supply side to implement the programme across geographies at scale. These include notably (i) low ability to pay of healthcare facilities, (ii) lack of access to capital for ESPs, (iii) frequently lacking focus on sustainability of deployed solar installations, as well as (iv) low availability of off-grid solutions, especially in rural areas.

In consultation with key stakeholders, the S4H coordination platform financing model has been designed with the aim to address the specific challenges identified. The model is scalable across geographies with features that can be tailored to local specificities.



1. **S4H coordination platform role:** The S4H coordination platform will harmonise stakeholders' interventions (e.g., UN agencies, donors, DFIs/IFIs, private sector and government entities) across the countries in scope to electrify health facilities, and combine efforts to achieve efficiency and sustainability, as well as to link energy and health sectors. One of the objectives is to address the lack of coordination between the different stakeholders that currently hinder the sustainability of donor-funded installations and negates their cost effectiveness. UNDP, through its facilitation role and via its country offices locally, will supervise and support the entire investment process from procurement through the investment monitoring to ensure proper quality standards and successful implementation of the programme. It should be noted that this coordination platform is not meant as a financing channel, but as a mechanism to ensure that all relevant ecosystem actors are coordinating and complementing respective efforts in a holistic set of interventions.
2. **ESP access to financing from DFIs/IFIs:** In order to address the limited investment attractiveness and low access to affordable financing in the sector, the S4H coordination platform will aggregate a number of projects to create investable portfolios of relevant ticket sizes and risk-return profiles to attract DFI financing. The proposed structure envisages a public-private partnership (PPP) that will incorporate DFIs' investment considerations to help streamline the investment process for both DFIs and local ESPs, and ensure linkages between the tendering process and investor capital mobilisation. A set of features will further mitigate the investment risks and facilitate ESPs' access to affordable capital, for instance, (i) the PPP between the ESP and the local government will secure regular cash flows to service the debt repayment obligation of the ESP, (ii) donor contributions to the leasing payment will support the ability to pay of the local government, and (iii) guarantees or contingent grants will additionally address any remaining credit risk on the local government.
3. **Energy payment funding and technical assistance mechanisms:** These mechanisms were designed to ensure the long-term financial and operational sustainability to the S4H programme in the selected countries thanks to three key components:
 - a. Capacity-building of ESPs, government stakeholders, and S4H facilities will strengthen (i) PPP procurement/tendering, energy assessments, project development, and contractual/regulatory frameworks; and (ii) local ESP market development;

- b. A power purchase agreement (PPA) will set out the contractual and financial obligations between DFIs, MoH, and the local ESP. The PPA/leasing framework between governments and local ESPs will ensure: (i) long-term sustainability of energy service; (ii) stable revenue streams for ESPs and market development; and (iii) reduced upfront capital expenditure costs for the government. The PPP contract might additionally price in disposal costs as part of the local ESP's long-term sustainability obligations; and
- c. Result-based payments as part of a service level agreement (SLA) in the PPA coupled with the distribution of the payments over the contract duration will align financial incentives of the payers and the ESP and support the long-term financial, operational, and environmental sustainability of the installation.

Validation workshops and implementation roadmap

In Q3 2020, five virtual national validation workshops coordinated by the project team in cooperation with the UNDP regional and country offices were held to disseminate the results of the feasibility study and collect feedback from stakeholders potentially involved in the mechanism. Government representatives from the respective energy and health ministries, as well as other relevant stakeholders (including local ESPs, financiers and sector experts) participated in the workshop. The proposed financing model was validated, with UNDP further coordinating formal expressions of interests from the local ministries to move to the implementation phase of the S4H programme. The following next steps are required to launch the implementation process as defined below:

1. Draft and execute a Letter of Interest for the Green Climate Fund (GCF): as a concrete outcome of the country consultative workshops, UNDP is to coordinate with relevant government ministries in each country to execute a Letter of Interest supporting a proposal request for funding from the GCF and its Project Preparation Facility (PPF);
2. Develop memorandums of understanding between local government and UNDP Country Offices: UNDP Country Offices will establish a working group to formalise partnership with relevant local stakeholders (including relevant ministries and development agencies) setting out guiding principles for engagement on S4H innovative financing programme;
3. Define S4H programme scope: UNDP together with the local ministries of health will conduct a comprehensive ecosystem analysis/action plan, energy needs assessment, project selection and prioritisation, and budget sizing across the portfolio of healthcare facilities;
4. Engage with donors, DFIs, and other capital providers: UNDP, relevant government officials, and UNDP financial transaction advisor will engage with donors and investors to mobilise early interest and/or commitments for the S4H programme; and
5. Design and structure the S4H coordination platform financing model: based on the initial design of the PPP model in this feasibility study and local government operational design requirements, UNDP and its financial transaction advisor will develop a financial model and investment term sheet to fundraise with donors, DFIs, and other investors. The full design and launch of an S4H innovative financing facility is expected to take 1-1.5 years in each country.

