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SOLAR ENERGY FOR HEALTH

CHALLENGES AND OPPORTUNITIES
ASSESSMENT FINDINGS AND STRATEGY FOR ENERGY TRANSITION

Solar Energy for Health: Challenges and Opportunities
Assessment Findings and Strategy for Energy Transition

EXECUTIVE SUMMARY

The energy crisis affecting the Gaza Strip in recent years has had a significant impact on the delivery of a wide array of critical services, including in the health sector. Reliance on the electricity grid and diesel generators at rationed hours has created a dependency on fuel within the health system. In this context, renewable energy, particularly solar photovoltaic technology, has emerged as a suitable and reliable alternative source of power. Nevertheless, in light of the lack of a comprehensive assessment of the potential capacity for, and feasibility of, the solar electrification required as part of a successful energy transition, the WHO, UNDP and the Ministry of Health commissioned a team to assess the health system's potential for transitioning to renewable energy. The assessment was conducted over the October -2018May 2019 period.

As the assessment findings show, there is significant potential for the implementation and expansion of renewable energy systems and energy efficiency measures to strengthen the public health system in the Gaza Strip. The solar photovoltaic potential, when combined with effective energy efficiency measures, can considerably reduce the dependency on imported fuel and diesel generators, while also increasing the resilience of the health system through ensuring that services continue to operate without interruption. In light of the above, a transition towards a more sustainable energy infrastructure for the health system, based on full utilization of renewable energy, is advisable both in economic and technical terms.

The assessment primarily examined public health facilities managed by the Ministry of Health, as the latter provides the majority of health services in Gaza. A total of 15 hospitals and 59 Primary Health Care (PHC) facilities were assessed, of which 14 hospitals and 51 PHC facilities were identified as suitable sites for solar Photo Voltaic system integration. A solar Photo Voltaic capacity of 1.028 MWp is projected to be required for the solar PV transition of al PHC facilities (including EE measures), corresponding to an investment of US$ 4.315 million. An estimated solar PV capacity of 3.41 MWp is required for solar Photo Voltaic integration of the 15 hospitals under consideration, corresponding to an investment cost of US14$ million. The proportion of daily energy demand projected to be met by the proposed solar Photo Voltaic systems will vary across individual hospitals and PHCs and is primarily dependent on the availability of physical space for solar PV instalment. Overall, the introduction of solar PV systems, combined with additional energy efficiency measures, is expected to yield combined annual savings in electricity costs of US2.6$ Million, including US$ 2.1 million of savings for hospitals and US$ 514,000 for PHC facilities.

However, in order to build on the assessment findings, a comprehensive approach is required for coordinating project development and implementation efforts — an inclusive, transparent, and cooperative process, which engages all relevant stakeholders and underpinned by a full understanding of the opportunities.

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02 Planning and Implementation Strategy

In line with the assessment findings, as well as the coordination framework outlined above, the steps that follow fund mobilization, where multiple stakeholders are engaged in the same activity, can be prepared for implementation. A planning and implementation strategy is absolutely critical in leveraging the coordination framework and its outputs, as well as the proposed objectives of this report. This strategy would build upon the coordination framework, and follow the following three steps or phases:

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01 *Resource Mobilization and Allocation*

Coordination among donors, the health authorities, and the implementing entities enables an approach of project identification informed by the database developed in the assessment. The funding allocation can be geared towards the higher priority facilities and projects, taking into consideration the health impact, geographic distribution, and beneficiaries. Upon the allocation of funds, the project can formally progress to the next phase of engineering, which requires comprehensive technical planning and verification.

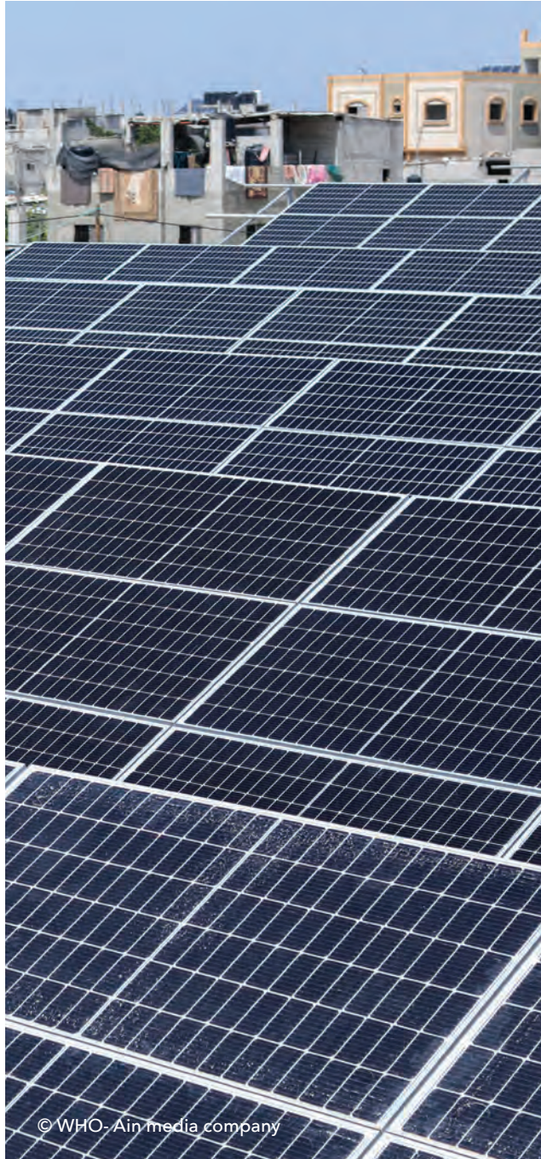
02 *Planning and Verification*

Upon the allocation of funding for a defined project(s), a planning process is required. The process would start by determining the available space resources with the facility management and health authorities, and compare it against the space recorded during the assessment for greater reliability. Furthermore, a validation process for the energy consumption and sources would be necessary to ensure optimal quantification, as this process would inform the design, engineering and feasibility understanding of each of the solar PV systems. An economic feasibility and assessment must also be undertaken for each facility upon the mobilization of resources.

After the verification of all relevant physical parameters, and quantified energy requirements, the sizing of the solar PV system, its classification and type according to the categorization mentioned in this report, are performed. The implementing entity may engage technical professionals or companies at this stage but must ensure all performed work is in conformity with the standards set by the technical level coordination team. All coordinating stakeholders can remain updated on progress within this stage through the tracking dashboard.

03 *Procurement and Installation*

The procurement and installation process should be based on the verified data produced by the technical planning process mentioned above. It is recommended that all stakeholders taking part in procurement and installation planning must use the same best-practice and standards for the equipment selection and installation processes, in order to ensure the highest quality of workmanship and engineering is achieved. Using a common knowledge resource as the standard for procurement and installation is highly recommended, and its development would be one of the main tasks set for the proposed collaborative coordination framework.



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In conclusion, it is recommended that the results of the assessment are taken into consideration for the mobilization of resources in order to introduce solar PV systems with the highest projected impact, with the goal being to deploy such systems wherever it is economically and technically feasible to do so.

Upon the allocation of funds for any facility or group of facilities, the process of engineering and implementation is recommended to take place in line with the guidelines that would harmonize the works of all entities engaged in the energy transition, for both hospitals and Primary Health Care centres.

Energy efficiency measures must be prioritized, as they are likely to yield considerable savings with minimal requirements compared to other investments. Furthermore, the emergency network deployment should be a key component of the solar electrification of any facility that receives funding.

The knowledge resources and standards that would inform the sizing, planning, and implementation of the project should be developed accordingly.
The electricity crisis in the Gaza Strip, and the fragility of public service provision of power, has multi-dimensional root causes, primarily related to the political and logistical constraints resulting from Israeli restrictions.

The proposed solar energy programmes will reduce diesel fuel consumption and dependency and increase the resilience of critical health facilities across the Gaza Strip, notably by ensuring continuity of service during fuel shortages or grid outages. However, even in cases of full utilization of solar energy in public health facilities, as proposed in this report, both diesel fuel and the electricity grid will continue to be necessary, core elements of the Gaza energy system. What solar energy can do, however, is increase the independence of the health sector as effectively as the physical constraints of space and climate allow. To ensure full energy resilience, a more comprehensive approach — one that considers all electrical infrastructure, including all generation and distribution components across the Gaza strip — will be necessary to successfully resolve this urgent problem at the scale required.

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01 Collaborative Coordination Framework (for harmonization)

A successful strategy for building upon the assessment findings requires concentrated efforts of cooperation and coordination among all stakeholders in the process, to maximise the scale and range of mobilized resources, and ensure they are deployed and used effectively and optimally.

General Level

A stakeholder coordination mechanism should be put in place to ensure resources are mobilized and allocated according to pre-defined priorities. The latter must also be updated in a dynamic, continuous way through a shared public platform that tracks the progress of the Gazan health system's solar energy transition. A dynamic online dashboard was developed as part of this report; and offers a summary of its findings, as well as of the potential solar PV systems, according to defined classifications and design approaches. The dashboard is designed to serve the cooperation and coordination process, to help stakeholders identify the progress-status for various facilities, and to allocate resources where an un-met priority is identified. Stakeholders potentially include local authorities who can help shape and decide priorities, together with all relevant multi-lateral agencies, donors, NGOs, and other entities. Such stakeholder engagement can take place in the form of a working group, coordination mechanism, or a cooperation platform that provides the space, with defined roles to achieve the required functions.

Technical Level

Coordination and cooperation is necessary to ensure the technical planning and implementation of solar electrification projects within the proposed framework are conducted in a coherent and harmonized manner by all relevant stakeholders and according to the highest technical standards, while taking the specificities of the local context and needs into consideration. Stakeholders are likely to include technical specialists and officers from relevant entities, who can contribute accordingly towards achieving the overall objectives set by the stakeholder cooperation framework.

Moderating and leading the group at both levels (general and technical) requires the consent of all stakeholders engaged in the process and must take place within clearly defined terms of reference.

Required Functions

At both aforementioned levels, the following functions are required to ensure effective project planning and implementation within the scope of solar electrification for health facilities proposed in this report:

Tracking of Project Progress:
The tracking of the project status can facilitate the prioritization and resource allocation dimensions of the project. The tracking dashboard can be used by stakeholders to visualize the funding status and unmet needs on a system-by-system and facility-by-facility basis. This can help prevent duplication of efforts, inadequate resource allocation, and offer clear visibility of each intervention's health impact, economic savings, and other key aspects.

Development of Knowledge-Resources:
The identification, development and adoption of relevant knowledge resources is essential for the effective planning and implementation of the proposed projects. Such resources can streamline the design and engineering of solar PV systems, provide guidance and standards for their planning and installation, achieve consistency of systems across all health facilities in the Gaza Strip. Such a strategy by extension would contribute to streamlining operation and maintenance functions post-installation, and would contribute to operational sustainability, excellence, and longevity. A list of resources is provided in Annex 6.