

Ref: PAL 10 - 00096619

19 August 2018

**Subject: Final Report - Renewable Energy for All, Gaza Strip**

Dear Mr Al Rawni,

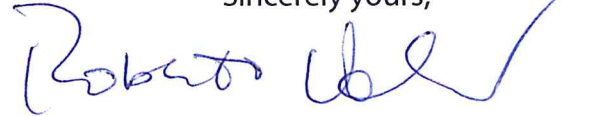
Reference is made to the contribution agreement between Islamic Relief Canada and UNDP's Programme of Assistance to the Palestinian People for the "Renewable Energy for All – Gaza Strip" project effective 11 October 2015.

I am pleased to submit herewith the Narrative and Financial Final Report.

The report summarizes the progress of the project as of 30 June 2018 and provides an overview of the achievements, challenges, lessons learned, financial status and way forward.

I thank Islamic Relief Canada for its contributions to UNDP and look forward to strengthening our partnership in support of the Palestinian People.

Sincerely yours,



Roberto Valent  
Special Representative of the  
Administrator



Mr Ziad Al Rawni  
Chief Executive Officer  
Islamic Relief Canada  
Canada

## Final REPORT

### United Nations Development Programme Programme of Assistance to the Palestinian People

#### Renewable Energy for All – Gaza Strip

October 2015 – June 2018

Reporting Period	October 2015 – June 2018
Donor	Islamic Relief Canada (IRC)
Country	Occupied Palestinian territory
Project Title	Renewable Energy for All – Gaza Strip PAL (10 - 00096619)
Project ID (Atlas Award ID) Outputs (Atlas Project ID and Description)	Project ID: PAL 10-00091323 Output (Atlas ID): PAL 10 - 00096619 Renewable Energy for All project provides renewable source of energy to three hospitals in the Gaza Strip, as a sustainable solution to the current energy crisis
Implementing Partner(s)	Ministry of Health and Palestinian Energy and Natural Resources Authority - PENRA
Project Start Date	03 May 2016
Project End Date	30 June 2018
Work Plan Budget	USD 571,914.00
Total resources required	USD 571,914.00
Revenue received	Donor (IRC): USD 571,914.00
Unfunded budget	0
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## I. Executive summary

The health sector in the Gaza Strip is experiencing a chronic energy crisis since 2006, and particularly after the 2014 summer hostilities on Gaza which led to vast destruction of social and public infrastructure, including hospitals and health facilities. The “Renewable Energy for All in the Gaza Strip” project provides emergency support to the health sector in the Gaza Strip, particularly in addressing the urgent need of the health sector to a continuous source of energy in order to maintain and improve health services delivery to the residents of the Gaza Strip. Thus, the project will be minimizing the electricity gap through the provision of a renewable energy source in three hospitals in the northern and southern areas of the Gaza Strip.

Funded by Islamic Relief Canada, this initiative is providing a renewable source of energy as a sustainable solution to the current energy crisis. Solar photovoltaic (PV) systems offer a cost-effective and environmentally friendly solution. UNDP technical team has worked in close cooperation with the concerned national stakeholders, namely, the Ministry of Health (MOH) and the Palestinian Energy and Natural Resources Authority (PENRA) as the regulator of the energy sector. The intervention is in line with the National Policy Agenda 2017-2022 and the PENRA plans on mainstreaming renewable energy as a sustainable source of energy in the State of Palestine.

The targeted hospitals are the Indonesian Hospital in Beit Lahia, Al-Aqsa Hospital in Deir El-Balah and Beit Hanoun Hospital, all of which offer multiple health services to around 416,424 people. The installation of the solar system in the Indonesian Hospital in Beit Lahia (30 KW), Al-Aqsa Hospital in Deir El-Balah (50 KW) and Beit Hanoun Hospital (30 KW) has contributed to sustaining the provision of basic health services in the targeted hospitals.

## II. Background

Gaza has been affected by a chronic electricity deficit for over a decade, which has severely disrupted the delivery of healthcare services. As a result, public hospitals have been forced to rely on generators to maintain the provision of these critical services, which are operated through UN assisted emergency fuel.

The electricity deficit stands at 75% of 450 MW, which is the current demand for the Gaza Strip, and is expected to increase in the near future. The current deficit is translated to 16-hours of daily cuts of electricity, depending on the availability of fuel. This pattern may still get worse due to faults in the electricity distribution networks or to loss of feeding lines, during escalations.

As the electricity supplied from Egypt and Israel is fixed at 22 MW and 120 MW<sup>1</sup>, respectively, the only way to improve supply and to reduce deficit is by increasing the weekly amount of industrial fuel to Gaza's power plant to 3.5 million litres. This should increase the output of the power plant to from 80 MW to 120 MW.

The recurrent mass demonstrations at the fence between Gaza and Israel that started on 30 March 2018 is resulting in a dramatic influx of trauma cases that require complex medical interventions. The total shut down of the Gaza Power Plant from April onwards, and the regular malfunction of energy lines from Egypt has resulted in a major increase in the use of electricity at hospitals, and a concurrent increased demand for emergency fuel or alternative sources of power. The costs of providing the emergency fuel have also grown, as a result of the decreased availability of electricity from the grid and the increased number of trauma cases arriving to hospitals requiring complex surgeries and other life-saving care services. According to OCHA, emergency fuel reserves are now predicted to become exhausted by early August 2018 as no financial contributions towards fuel replenishment have been pledged.

In light of these conditions, the availability of a renewable source of energy is crucial for the continuity of the provision of life-saving health care services. According to a World Bank Report<sup>2</sup>, failure to invest in Gaza's power sector would make an already dire situation worse. Gaza is unable to meet 50 percent of its demand today. If no further power options are developed, the extent of unserved energy would escalate to 63 percent of demand by 2030. To avert this outcome, Gaza needs to develop additional power supply options. According to the Palestinian Energy and Environment Research Centre, the utilization of renewable energy is one of the strongest alternatives in the State of Palestine due to the absence of fossil fuel resources and several years of occupation.

Different research studies constituted empirical evidence on the prospects of using photovoltaic solar systems as a potential solution for the energy crisis in the Palestinian state. The State of Palestine has a high solar energy potential. It has about 3,000 sunshine hours per year and high annual average of solar radiation to 5.4 kWh/m<sup>2</sup>/day on horizontal surface. The lowest solar radiation is in December as it amounts to 2.63 kWh/m<sup>2</sup>/day while this reaches 8.4 kWh/m<sup>2</sup>/day in June<sup>3</sup>. These figures are encouraging indicators for the utilization of solar energy in different applications such as water heating, water pumping and electrification.

On the other hand, the health sector has been severely affected during the 2014 hostilities on Gaza. Damages to medical facilities and personnel, along with shortages of medicine, equipment and power supplies, caused the near collapse of the health sector, as a number of

<sup>1</sup> It is worth to highlight that due to recent political tension, the electricity supply from the Israeli lines has dropped into 80 MW.

<sup>2</sup> World Bank Group, et al. "Securing Energy for Development in the West Bank and Gaza, Summary Report", November 2017.

<sup>3</sup> "Renewable Energy in the Middle East" by the NATO Science for Peace and Security Programme.

health facilities were directly hit. During the hostilities, nearly half of all health facilities were unable to provide services due to damage or danger, leaving functioning facilities overwhelmed by increased demand and inadequate resources. The targeted hospitals have sustained partial damages, which reduced access to health care services. These hospitals serve around 350,000 people in the targeted communities.

### III. Achievements Review:

Indicated output	Activities	Schedule Status						Activities status	Achievements
		2016		2017					
		Q3	Q4	Q1	Q2	Q3	Q4		
<b>Output 1: Installation of 50 KW Solar System at Al-Aqsa Hospital in Deir El-Balah</b>	Design and capacity development of Palestinian Energy and Natural Resource Authority (PENRA)	X						Completed	Needs Assessment was carried out jointly by UNDP, MoH and PENRA to decide on the targeted departments as well as to measure the power needs and consumption of these units in the hospitals.  The targeted units include an Operations Theatre, Cardiac Unit, Intensive Care, Nursery unit, Dialysis Unit and Reception.  The assessment indicated the need for a lab for examining the solar system equipment and materials to PENRA. The lab equipment was supplied and installed.
	Construction of room on top of hospital for solar system		X					Completed	The construction of a battery room for the solar system at the top of the hospital roof was completed.
	Supply and installation			X	X	X		Completed	All the PV solar components were

	of solar system								supplied and installed in hospital's rooftop where all PV panels, batteries, inverters and cables were installed.  Currently, the solar system is operational and supplying the targeted health units with an alternative source of energy.
<b>Output 2: Installation of 30 KW Solar System at Indonesian Hospital in Beit Lahia</b>	Design and needs assessment	X						Completed	Needs Assessment was carried out jointly by UNDP, MoH and PENRA to decide on the targeted departments as well as to measure the power needs and consumption of these units in the hospitals.  Targeted units include an Operations Theatre, Cardiac Unit, Intensive Care, and Reception.
	Construction of room on top of hospital for solar system		X					Completed	The construction of a battery room for the solar system at the top of the hospital roof was completed.
	Supply and installation of solar system			X	X	X		Completed	All the PV solar components were supplied and installed on hospital's rooftop, where all PV panels, batteries, inverters and cables were installed.  Currently, the solar system is operational and supplying the

									targeted health units with an alternative source of energy.
<b>Output 3: Installation of 30 KW Solar System at Beit Hanoun Hospital in Beit Hanoun</b>  <b>This new output was added due to savings in budget</b>	Design and needs assessment			X				Completed	Needs Assessment was carried out jointly by UNDP, MoH and PENRA to decide on the targeted departments as well as to measure the power needs and consumption of these units in the hospitals.  Targeted units include Operations Theatre, Labs, and Reception.
	Construction of room on top of hospital for solar system				X			Completed	The construction of a battery room for the solar system at the top of the hospital roof was completed.
	Supply and installation of solar system				X			Completed	All the PV solar components were supplied and installed on the hospital's rooftop where all PV panels, batteries, inverters and cables were installed.  Currently, the solar system is operational and supplying the targeted health units with an alternative source of energy.



## IV. Lessons Learned

- 1) The PV solar system has proven to be an effective alternative to providing solar energy that should be widely mainstreamed in public and social infrastructure. UNDP is adopting this strategy through the integration of PV solar systems in its development programming.
- 2) Solar energy has contributed to the reduction of reliance on back-up generators at the targeted hospitals which would potentially decrease the costs of fuel needed to operate these generators.
- 3) The estimated cost of the project showed significant decrease in prices after completing the tendering process. Following donor's approval, the surplus was utilized based on MoH priorities by targeting an additional hospital.
- 4) Entry of solar panels and equipment entailed prolonged procedures and restrictions. UNDP uses its access and coordination mechanism to facilitate the entry of such materials.

## V. Conclusions and Way Forward

In light of the protracted energy crisis in the Gaza Strip, the project has had a substantial impact on the operation of vital health units by improving the availability of energy through a renewable source of power. The following are the main conclusions of this project:

1. The supplied solar systems via this project have benefited vital units, guarantying the provision of life-saving services at the targeted hospitals and the minimum operation in worst scenarios.
2. The operation of the targeted units relied extensively on the power provided by solar systems during day time, while partially (for 4-6 hours) during night time, which was supplemented through small-scale generators.
3. The provision of a solar system at these hospitals has considerably reduced the consumption of fuel supplied to public hospitals, which would enhance independence from UN assisted emergency fuel.

As part of UNDP's strategy to mainstream renewable energy in public hospitals, new funds from OFID will further strengthen and expand the capacity of the current solar systems at public hospitals. It has become evident that photovoltaic solar systems can afford a cost-effective and environmentally friendly solution, especially the cost of the diesel-fired Gaza Power Plant is already very expensive compared to alternatives and this cost is projected to rise along with the international oil price.



In conclusion, this project is of crucial importance to ensure efficient operation of the Palestinian health sector facilities and sustainability of the health services delivery. The project remains highly relevant within phasing out of the humanitarian aid to supply fuel for critical services. Finally, similar interventions are considered a need under the prevailing Gaza context.

## VI. Financial Status

<b>Budget Main Items (According to Proposal)</b>	<b>A. Original budget USD</b>	<b>B. Disbursement USD</b>	<b>C. Balance USD (A-B)</b>	<b>D. Rate of Disbursement (%) (B/A*100)</b>
1. Lighting of two health hospital by using PV solar cells.	471,250.00	471,250.00	0	100%
2. Total project implementation unit (PIU)	58,300.00	58,300.00	0	100%
Sub -Total	529,550.00	529,550.00	0	100%
GMS (8%)	42,364.00	42,364.00	0	100%
Grand Total	571,914.00	571,914.00	0	100%

## VII. Annex I : Photo Gallery

### The Indonesian Hospital in Beit Lahia, North of Gaza



Figure 1: The Indonesian Hospital in Beit Lahia



Figure 2: The Indonesian Hospital in Beit Lahia



*Figure 3: ICU at Indonesian Hospital*



*Figure 4: ICU at Indonesian Hospital*



*Figure 5: Construction of the Batteries Room on the top of the Indonesian Hospital*



*Figure 6: Construction of the Batteries Room on the top of the Indonesian Hospital*



*Figure 7: Supplied batteries in the Batteries Room at Indonesian Hospital*

### **The Al-Aqsa Hospital in Deir El Balah, Middle Area of Gaza Strip**



*Figure 8: Solar Panels on the top of Al Aqsa Hospital in Deir El Balah*



*Figure 9: ICU powered by Solar Energy - Al Aqsa Hospital*



*Figure 10: Nursery Unit powered by Solar Energy - Al Aqsa Hospital*





*Figure 11: Nursery Unit powered by Solar Energy - Al Aqsa Hospital*



*Figure 12: Emergency / Orthopaedic Unit powered by Solar Energy - Al Aqsa Hospital*



Figure 13: ICU powered by Solar Energy - Al Aqsa Hospital



Figure 14: Dialysis Unit powered by Solar Energy - Al Aqsa Hospital



Figure 15: Testing the installation of Solar System in Al Aqsa Hospital



Figure 16: Solar Panels on the top of Al Aqsa Hospital

## Beit Hanoun Hospital, North of Gaza Strip



*Figure 17: Solar Panels installed on the top of Beit Hanoun Hospital*



*Figure 18: Operations theatre in Beit Hanoun Hospital*



*Figure 19: Reception and Emergency section at Beit Hanoun Hospital*



*Figure 20: Labs at Beit Hanoun Hospital*



Figure 21: Labs at Beit Hanoun Hospital



Figure 22: Guidance given to Hospital Administrator on the Operation of the Solar System at Beit Hanoun Hospital



*Figure 23: Checking the Steel Structure of the Solar Panels in Beit Hanoun Hospital*



*Figure 24: Solar System equipment entered into Gaza stored at UNDP's warehouse*