



Scale Up of Off Grid Solar PV Water Pumping: Case study of Bidi Bidi Refugee Settlement, Uganda.

Context.

Bidi Bidi Refugee Settlement is situated in North West Uganda. It covers an area of approximately 250 square kilometers, hosting around 270,000 South Sudanese refugees as of late 2017, making it the largest settlement of its kind in the world.

Since 2016, IOM, together with OXFAM and NRC, has been implementing the ECHO-funded Global Solar and Water Initiative [GLOSWI]. Part of the project objective was to assist WASH stakeholders to improve cost efficiency and sustainability of water schemes through adoption of solar photovoltaic solutions.

First Visit to Bidi Bidi.

The GLOSWI team visited Bidi Bidi in January 2017, only a few months after the opening of the settlement. At that time only 1 NGO had hybridized [solar + generator] 3 water schemes in Bidi Bidi. Support on site was given to 4 other NGOs in solar technical design and engineering, and procurement related to 14 boreholes that were running on diesel generators. Cost benefit analysis performed for those boreholes showed a Return on Investment of only 1.2 years; these analysis were later used to lobby donors at national and regional levels.

Finally, a 3-day Solar Pumping training was run in Kampala, involving 17 organizations [NGOs, UN agencies and government] participating in the current refugee response. Design tools were explained and shared together with other made-for-purpose documents and checklists.

Additional support was provided during 2017 through a technical helpline.

Second Visit to Bidi Bidi.

The GLOSWI team returned to Bidi Bidi in January 2018. The water supply options for the Bidi Bidi refugee settlement included by then:

Water Supplied Through Motorized Boreholes.

- 131 hand pumps, supplying 30% of water,
- 19 mechanized boreholes supplying 44%
- Water trucking for the remaining 26%.

All the existing mechanized boreholes were assessed finding that out of 20 water schemes, 19 had been partially or totally solarized [7 solar stand alone, 13 solar-generator hybrid].

Some enablers made possible this quick scale up of solar schemes:

- Combined coordinated efforts of 8 NGOs, 7 donor agencies, UNICEF and UNHCR.

- On-site and on-line continued technical support by GLOSWI team to field engineers.

- Presence of knowledgeable private sector companies at national level with high quality SWP solutions.

- Evidence built around cost-effectiveness of solar leading to funding decisions based on cost over time vs capital cost.

Conclusion

In camp contexts in Northern Uganda, solar pumping can be considered from as early stage in time as possible [no need to wait for long years], especially whenever they are able to meet a significant amount of the water demand. Unless population figures are prone to sudden increases or behavior of the aquifer is largely unknown, stand-alone solar systems should be favored over hybrid (solar + back-up power source) due to higher cost saving and easier Operation & Maintenance.



BIDI BIDI REFUGEE SETTLEMENT

Land area: 250 sq. km

Population: 272,206

Date: July 2017

Price of solar PV Panel/w: 0.9 US\$

Diesel price: 1.0 US\$

Solar PV power installed: >235kWp

Pumping Technology	Cost of water pumping (USD/ m3)
Solar-PV	0.082
Diesel	0.237

Produced by:

Funded by:



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Pumping Technology	Total water supplied (m ³ /d)	Number of schemes	Pumping hours per day	Average cost saved by Solarizing (%)**	Average Solar Return on Investment (years)
Stand alone Solar PV	231	7	59	69%	1.0
Hybrid	Solar PV side	769	13	57%	1.3
	Generator side	610	13		

*Hand pumps and water trucking also in operations in Bidi Bidi / ** % cost saved when compared to cost for running same schemes with a stand-alone diesel generator