

Solar Powered Water Systems in Humanitarian Context – Types and Configurations

Wednesday, 25 Nov at 11:00 am CET

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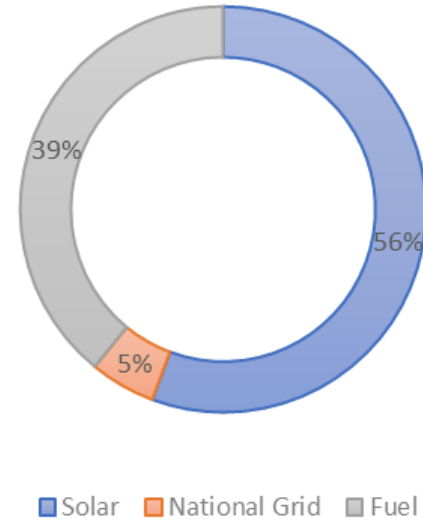


SCOPE

of water schemes:174
of Solar/Solar Hybrids: 164
of Grid/Fuel : 5
of Fuel:5

Daily Average Production September
2020: 13,939 m3

Power Source for Water Pumping in Refugee Settlements in Uganda



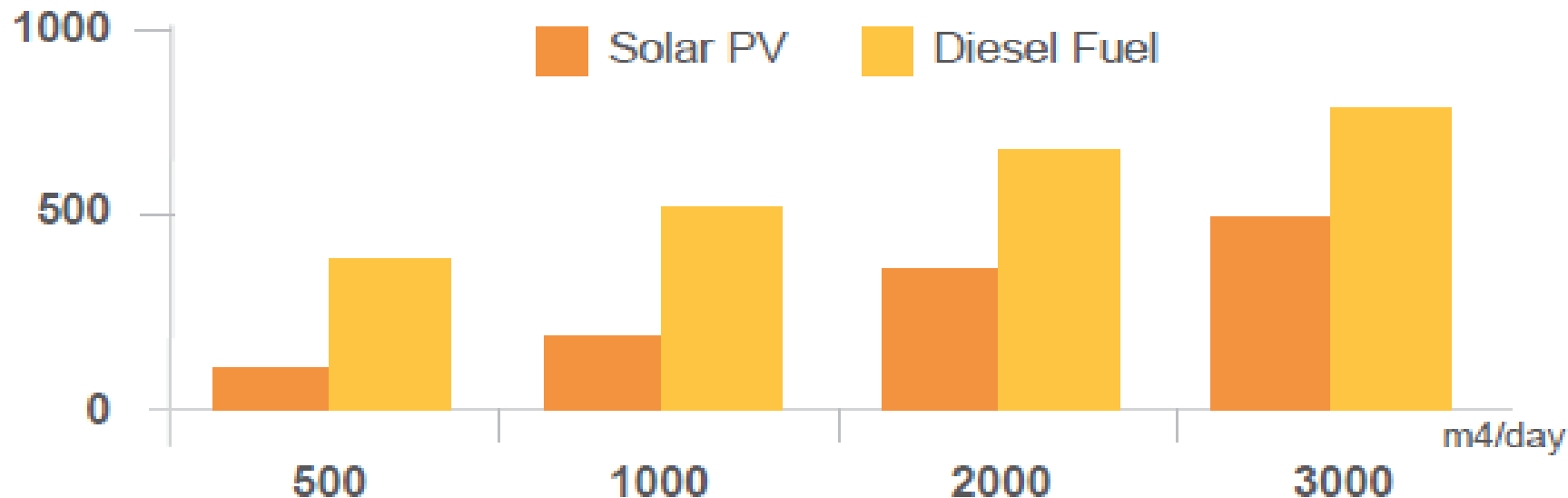
Key drivers to wider adoption

- Cost Analysis - LCCA
- Solar Pumping Market Place
- Environmental Considerations

Cost comparison between solar PV and diesel pumps

Lifetime Cost of Pump, by Size

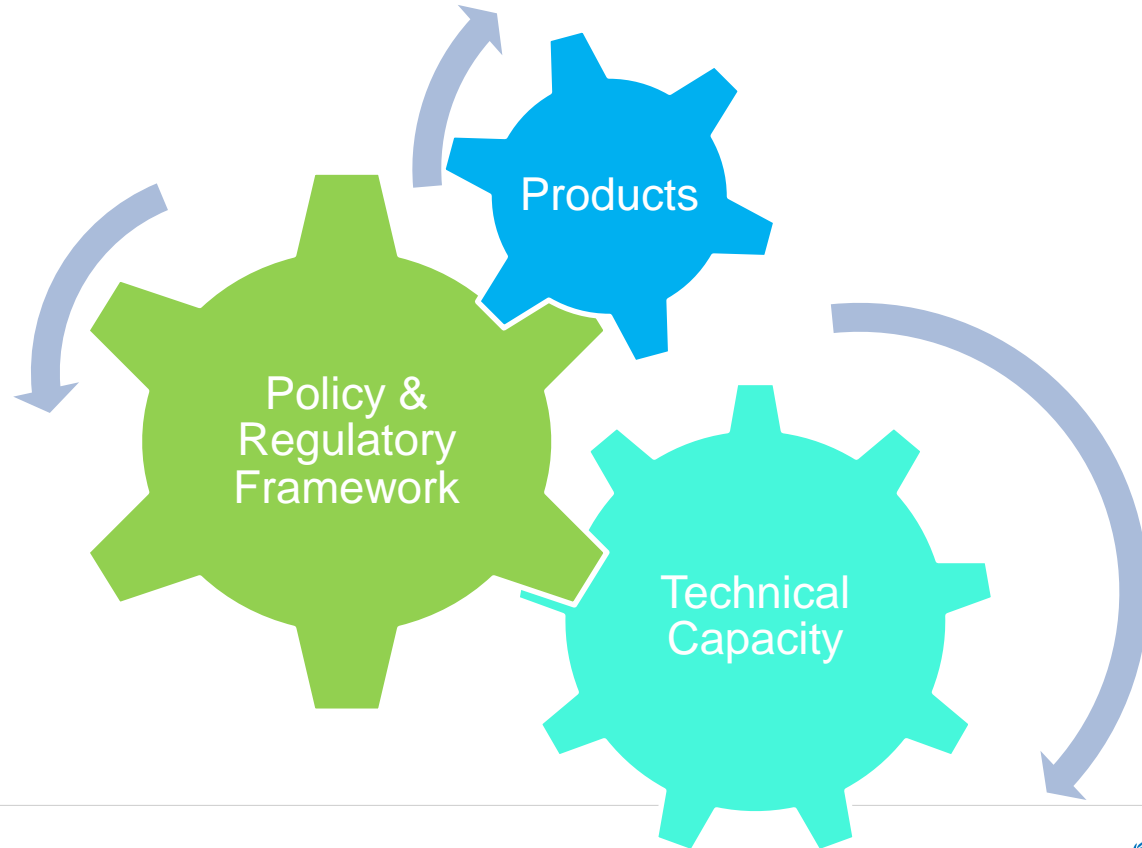
\$ Thousands



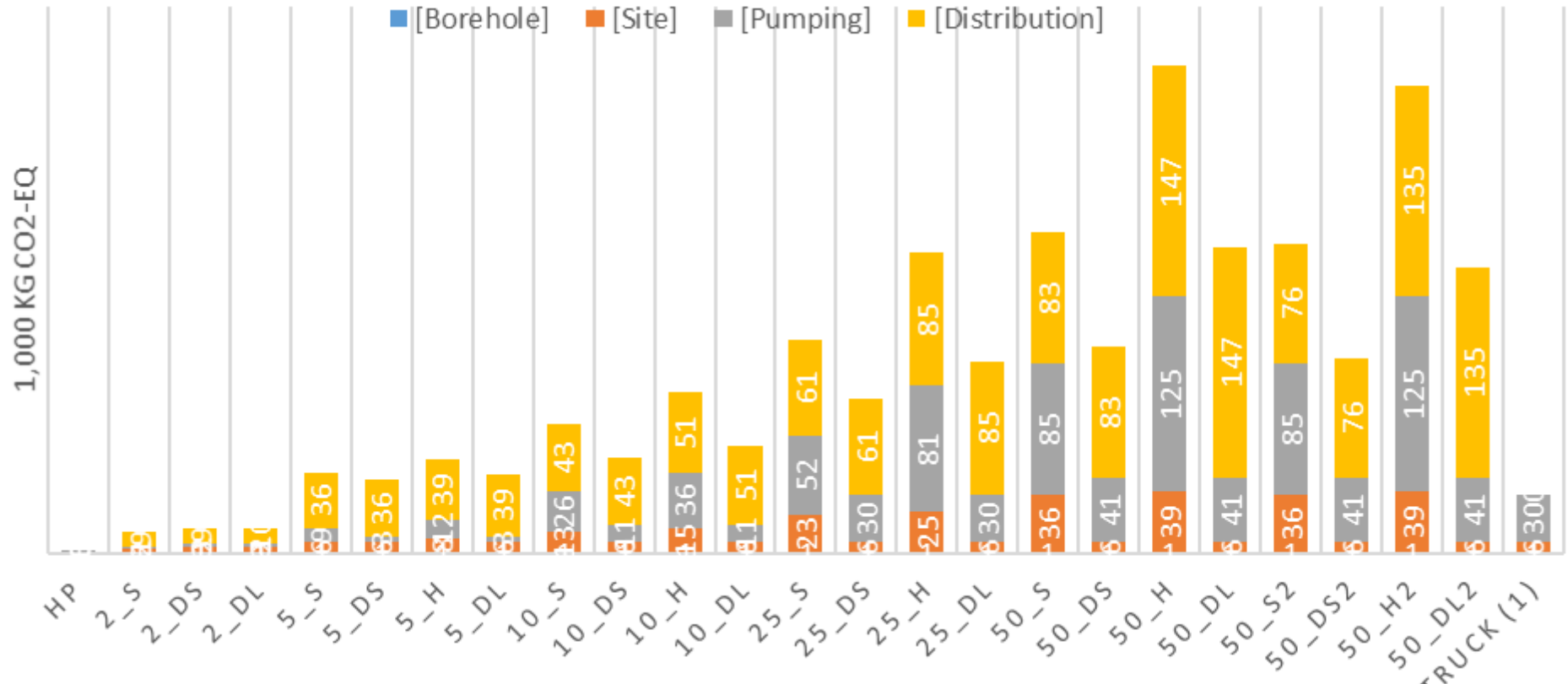
Source: <https://www.ace-taf.org/wp-content/uploads/2019/10/ACE-TAF-UGANDA-SOLAR-WATER-PUMPING-REPORT-SCREEN-1.pdf>

Column1	1	2	3	4	5	6	7	8	9
System Design Scenario	Gen Only (9,5h) (10k people)	Solar Only (10k people)	Solar-Gen (0h) Standby (10k people)	Solar-Gen (4h) Hybrid (10k people)	Solar Only (33k people)	Solar-Gen (0h) Standby (33k people)	Solar-Gen (4h) Hybrid (47k people)	Solar-Gen (13h) Hybrid (80k people)	Gen Only (23h) (80k people)
CapEx	\$ 186.000	\$ 224.000	\$ 261.000	\$ 234.000	\$ 615.000	\$ 669.000	\$ 812.000	\$ 1.061.000	\$ 828.000
O&M 1st Year	\$ 31.803	\$ 5.000	\$ 7.741	\$ 14.234	\$ 10.000	\$ 15.059	\$ 35.623	\$ 95.024	\$ 156.581
Total Initial	\$ 217.803	\$ 229.000	\$ 268.741	\$ 248.234	\$ 625.000	\$ 684.059	\$ 847.623	\$ 1.156.024	\$ 984.581
Total after 10 Years	\$ 567.828	\$ 284.031	\$ 353.934	\$ 404.889	\$ 735.061	\$ 849.805	\$ 1.239.690	\$ 2.201.866	\$ 2.707.923
People	10.000 People	10.000 People	10.000 People	10.000 People	33.000 People	33.000 People	47.000 People	80.000 People	80.000 People
\$\$/People Initial	22 \$\$/P	23 \$\$/P	27 \$\$/P	25 \$\$/P	19 \$\$/P	21 \$\$/P	18 \$\$/P	14 \$\$/P	12 \$\$/P
\$\$/People/Year	6 \$\$/P/Year	3 \$\$/P/Year	4 \$\$/P/Year	4 \$\$/P/Year	2,2 \$\$/P/Year	2,6 \$\$/P/Year	2,6 \$\$/P/Year	2,8 \$\$/P/Year	3,4 \$\$/P/Year
Cubic Meter / Day	150 m3/Day	150 m3/Day	150 m3/Day	150 m3/Day	495 m3/Day	495 m3/Day	705 m3/Day	1.200 m3/Day	1.200 m3/Day
Cubic Meter in 10 Years	547.500 m3	547.500 m3	547.500 m3	547.500 m3	1.806.750 m3	1.806.750 m3	2.573.250 m3	4.380.000 m3	4.380.000 m3
\$\$ / Cubic Meter	1,04 \$\$/m3	0,52 \$\$/m3	0,65 \$\$/m3	0,74 \$\$/m3	0,41 \$\$/m3	0,47 \$\$/m3	0,48 \$\$/m3	0,50 \$\$/m3	0,62 \$\$/m3
UGX / Cubic Meter	3.837 UGX/m3	1.919 UGX/m3	2.392 UGX/m3	2.736 UGX/m3	1.505 UGX/m3	1.740 UGX/m3	1.783 UGX/m3	1.860 UGX/m3	2.288 UGX/m3
UGX / 20 Liter	77 UGX/20L	38 UGX/20L	48 UGX/20L	55 UGX/20L	30 UGX/20L	35 UGX/20L	36 UGX/20L	37 UGX/20L	46 UGX/20L
O&M Percentage	67%	21%	26%	42%	16%	21%	34%	52%	69%

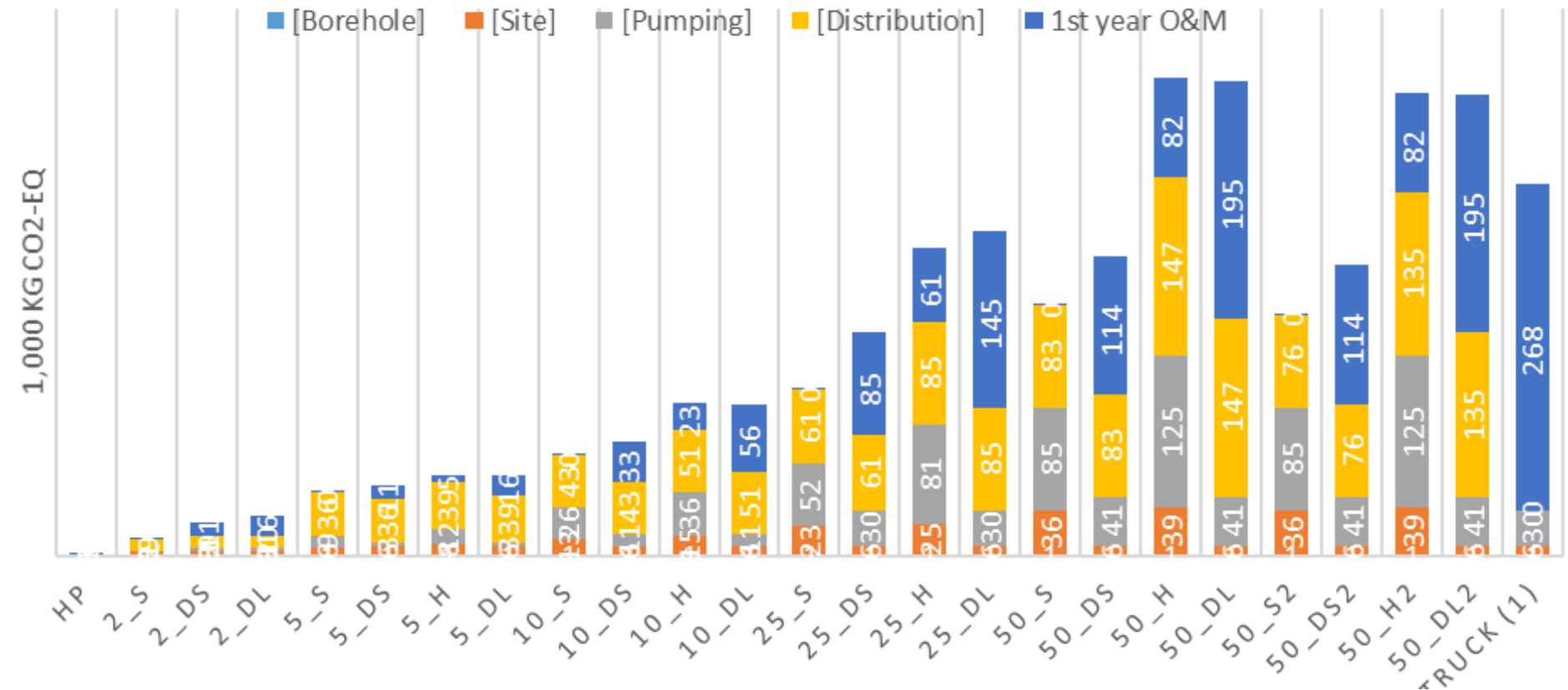
Solar Pumping Market Place



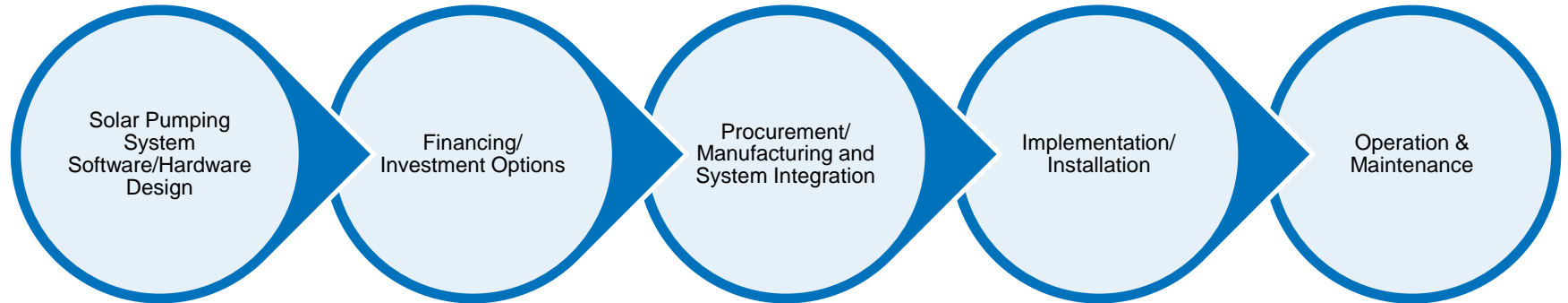
Environmental Consideration



Environmental Consideration



Solar Powered Pumping Scheme Chain in Humanitarian Setting



Performance

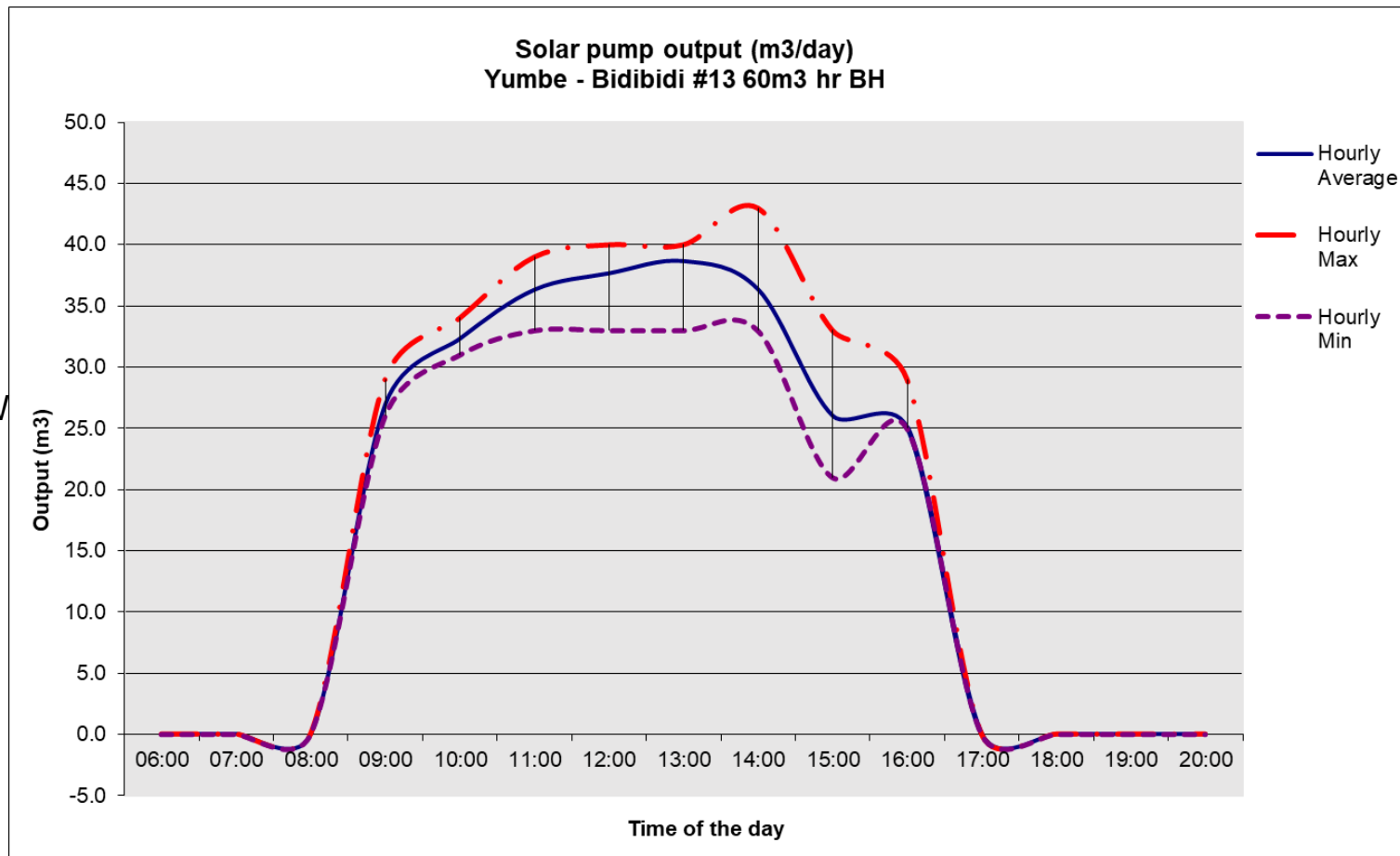
BH: 60m³/hr

Pump installed:
40m³/hr

Solar Array: 41.8 KW

Max Output: 266
m³/day

Avg Output:
259m³/day



Performance

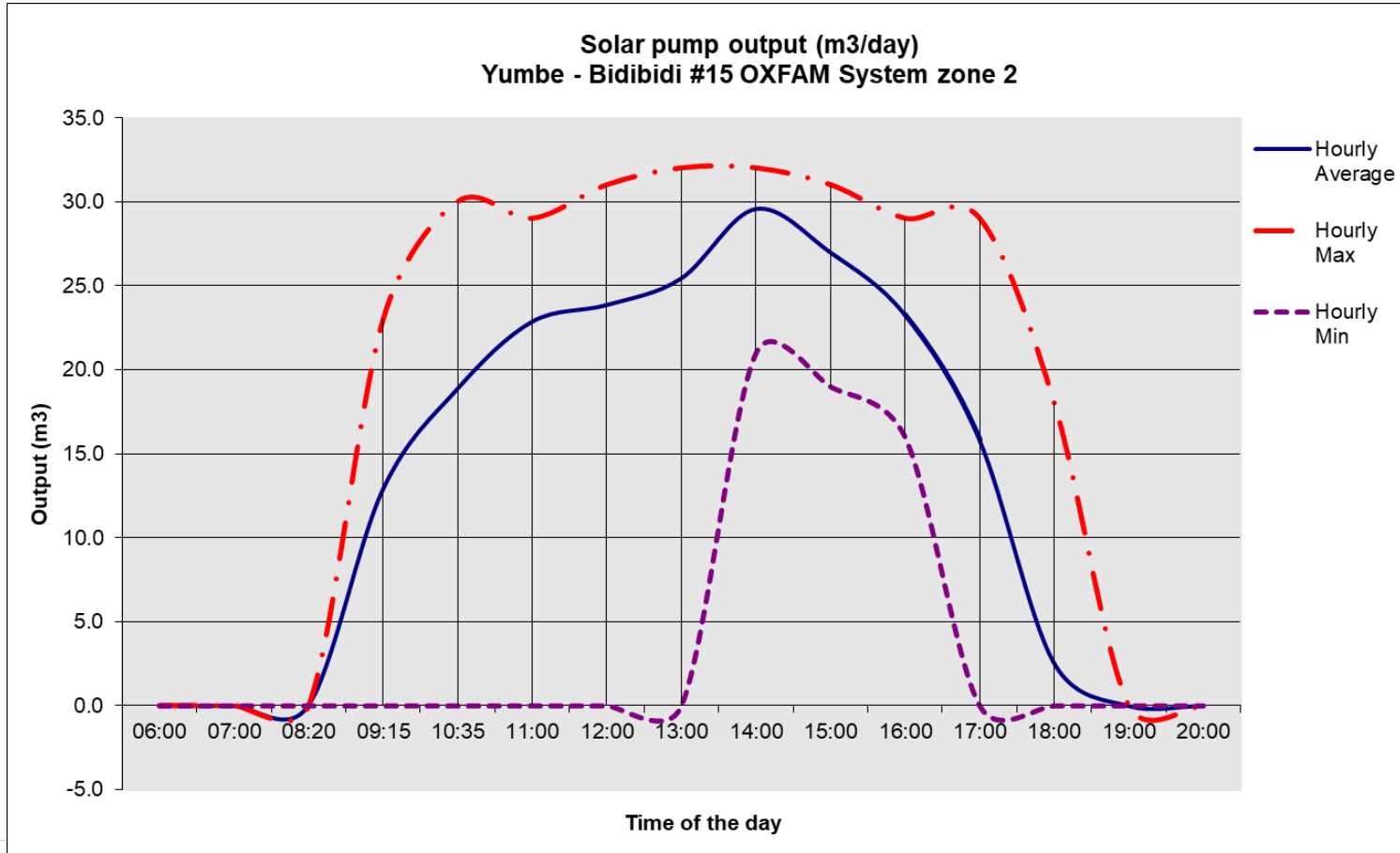
BH: 45m³/hr

Pump installed:
30m³/hr

Solar Array: 30KW

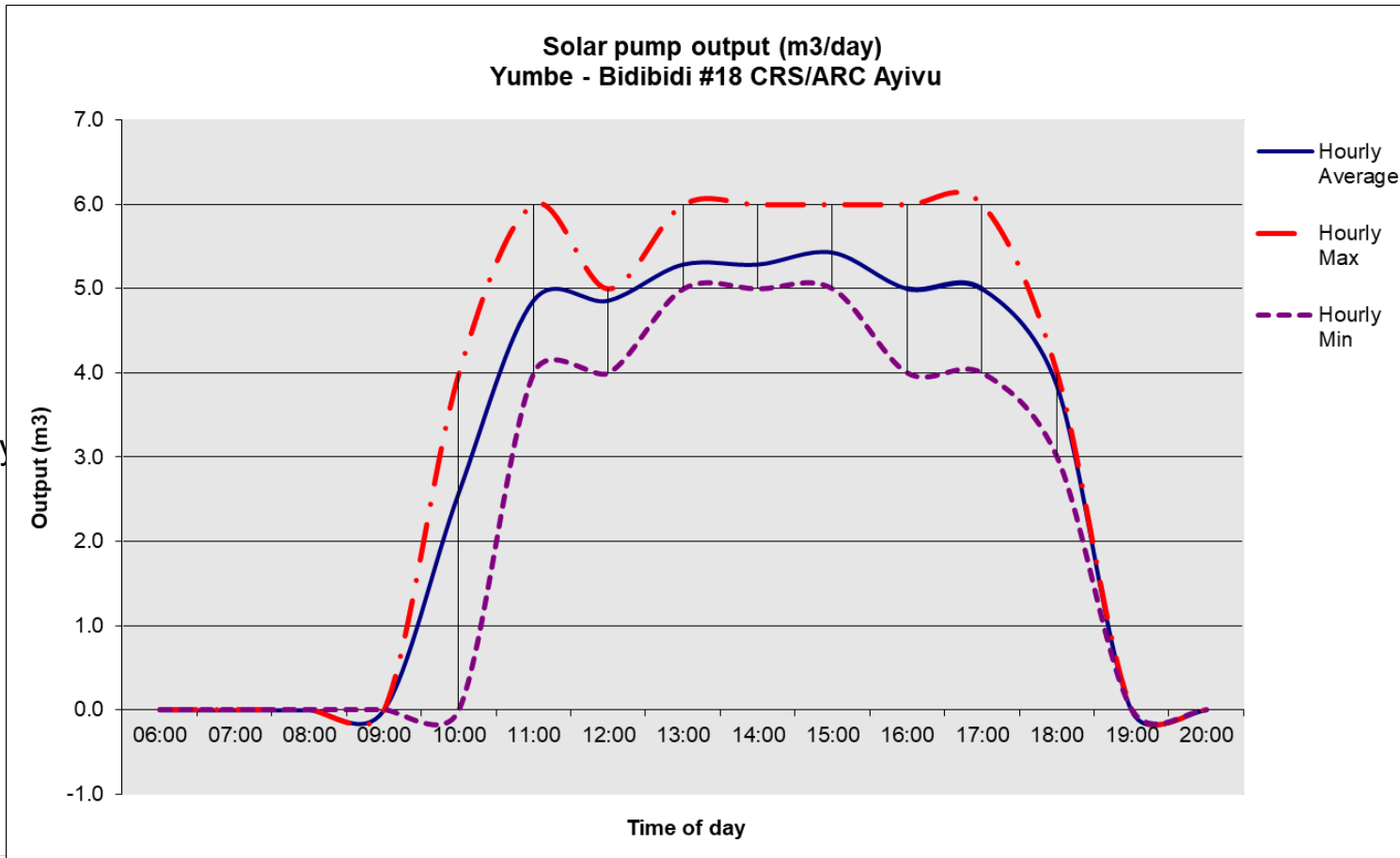
Max Output: 284
m³/day

Avg Output: 202
m³/day



Performance

Pump installed:
6.05m³/hr
Solar Array: 17.9KW
Max Output: 49m³/day
Min Output: 42.1
m³/day



Opportunities for Growth

Risk	Mitigation
Solar irradiation during the rainy seasons	Complement with rainwater harvesting and HH water treatment
Low technical Capacity to monitor performance effectively	Remote monitoring/IoT technologies
Over design/under-design: Inadequate data for optimized design	Agility and Optimization of systems based on analytics: Data collected...
Long Investment Payback Periods: Economics in rural areas	System Integration: drinking water pumping + Irrigation pumping+ Lighting+ Charging electronics+++ (leverage on CAPEX costs)

Join the conversation

