

Item No.	Description	Unit	Qty	Rate	Total \$ c
	NSSA REHABILITATION CENTRE, BULAWAYO				
	BILL NO. 2: PHYSIOTHERAPY 10KW PHOTOVOLTAIC SOLAR POWER SYSTEM				
	<u>Drawing No. XXXX</u>				
	<u>Hybrid Solar AC Coupled System Installation</u>				
	Supply, install, connect and test the following components of the photovoltaic grid tied power installations as shown on the drawings and as described in the specifications.				
	Supply, install, connect and operate PV-Solar power system for the building c/w PV cells, 48V 100Ah Lithium-ion battery, inverters, necessary electrical cables to connect solar cells together and to the DB's, to have a complete operational system according to the specification and approval.				
	Price to include all materials needed to connect from modules to inverter and have complete photovoltaic power system.				
	DC to AC inverter <i>(with parallel capability and lithium ion battery compatible)</i>				
2/1	10kW output three phase input three phase output DC to AC inverter SMA Sunny Tripower 10000TL or equivalent	No.	1		
	Monocrystalline Solar Panel/Solar Module				
2/2	Supply, install, connect and operate 510Watt monocrystalline Solar Modules, with minimum 16% high module conversion efficiency, high PID resistant, mismatch losses must be reduced to 2%, suitable for extreme wind (3800pascal) and harsh environment like desert condition, with all necessary electrical cables to connect solar cells together and to the inverters to have a complete operational circuit, conduits, cable trays, earthing system and complete with IP68 rated Main Junction Box (Fuses switch disconnectors, diodes and others) according to the specification and engineer's instruction and approval. Price to include all materials needed to connect from modules to inverter. All will be as per drawings or according to the engineer's specification and approval c/w all brackets and mounting accessories suitable for the above mounting brackets. The contractor should provide manufacturer's product warrantee for each solar panel for a period not less than 10 years, as Suntech STP 510 or approved equal.	No.	20		
	Module Mounting Structure				
	Supply and install module mounting structure for roof complete with aluminium anodized for supports, plates & screws, profiles for steel skeleton including bracing and double hot galvanized angles, rails, clips, etc.				
2/3	10 panel mounting structure	No.	2		
	48V/100Ah Lithium Ion Battery Bank				
2/4	Supply and installation of 48V 100Ah Lithium-ion battery	No.	6		
	Data Logging and Monitoring System				

2/5	Supply and installation of Data logging and monitoring System connecting all Grid Tie Systems to monitor daily power generation and consumption and the monthly report of generation. Eg SMA Energy Meter (E Meter 20) or approved	Item	1		
	20KA DC SPD DC surge protector Supply, install, connect and operate 20KA DC SPD DC surge protector for grid connected system. The Surge protector unit shall be suitable for indoor and outdoor installations. The surge protector system shall include all necessary electrical cables, conduits and trays and all other materials and workmanship needed to the system according to the drawings and engineer's instruction and approval and have a complete job ready. 100A 600VDC DC disconnect	No.	1		
2/6	AC Disconnect between Inverter and AC Distribution Boards to protect against utility faults and internally 40A three phase fused disconnect Box	No.	1		
	Solar PV Array Combiner to protect Solar modules, power tracking and blocking diodes.				
2/7	2 string combiner box	No.	2		
	Cabling between inverter output , inverter AC disconnect and AC distribution Boards				
2/8	10mm ² , 4c XLPE/LSF/SWA/LSF + 16mm ² BCEW	m	40		
2/9	16mm ² twin core 1000VDC flexible Solar Cabling	m	95		
2/10	10mm ² twin core 1000VDC flexible Solar Cabling	m	40		
2/11	GSM Modem connected to Programmable Logic controller	No.	1		
2/12	Programmable Logic Controller to receive Data Inputs from Inverter Outputs for remote monitoring and control. Shall be expandable. ABB PLC AC500 or approved equivalent	No.	1		
2/13	Data Cabling between Inverter outputs and PLC using RS485 cabling	m	115		
	Testing and Commissioning				
2/14	Allow for Testing and Commissioning the entire 10kWp Hybrid Solar AC Coupled System installations to the satisfaction of the Engineer and Employer	Item	1		
	Record Documentation				
2/15	Allow for the provision of 3No. Sets of well tabulated Operation and Maintenance (O&M) Manuals and As Built Drawings including CDs all enclosed in durable files	Item	1		
	Client Training				
2/16	Allow for comprehensive training to Client End User on all facets of the installation	Item	1		
	Spares				
2/17	Allow for the provision of spares, special tools, etc to the client	Item	1		
	Defects Liability Period				

2/18	Allow for attendance to Defects and Maintenance after Practical Completion for a period of 12 months.	Item	12		
<u>CONTINGENCIES</u>					
2/19	Allow a contingency which is to be expended wholly or partly or deducted at the discretion of the Consulting Engineer.	Item	1	2,900.00	2,900.00
<u>PROVISIONAL SUMS</u>					
	Allow a provisional sum which is to be expended wholly or partly or deducted at the discretion of the Consulting Engineer.				
2/20	Allow for the modifications to DB-Physiotherapy	Item	1	500.00	500.00
TOTAL BILL NO. 2: PHYSIOTHERAPY 10KW PHOTOVOLTAIC SOLAR POWER SYSTEM TO FINAL SUMMARY					

Item No.	Description	Unit	Qty	Rate	Total \$ c
	NSSA REHABILITATION CENTRE, BULAWAYO BILL NO. 3: LAUNDRY 3KW PHOTOVOLTAIC SOLAR POWER SYSTEM <u>Drawing No. XXXX</u>				
	<u>Hybrid Solar AC Coupled System Installation</u> Supply, install, connect and test the following components of the photovoltaic grid tied power installations as shown on the drawings and as described in the specifications. Supply, install, connect and operate PV-Solar power system for the building c/w PV cells, 48V 100Ah Lithium-ion battery, inverters, necessary electrical cables to connect solar cells together and to the DB's, to have a complete operational system according to the specification and approval. Price to include all materials needed to connect from modules to inverter and have complete photovoltaic power system.				
3/1	DC to AC inverter (<i>with parallel capability and lithium ion battery compatible</i>) 3kW output single phase input single phase output DC to AC inverter SMA Sunny Tripower 3000TL or equivalent	No.	1		
3/2	Monocrystalline Solar Panel/Solar Module Supply, install, connect and operate 510Watt monocrystalline Solar Modules, with minimum 16% high module conversion efficiency, high PID resistant, mismatch losses must be reduced to 2%, suitable for extreme wind (3800pascal) and harsh environment like desert condition, with all necessary electrical cables to connect solar cells together and to the inverters to have a complete operational circuit, conduits, cable trays, earthing system and complete with IP68 rated Main Junction Box (Fuses switch disconnectors, diodes and others) according to the specification and engineer's instruction and approval. Price to include all materials needed to connect from modules to inverter. All will be as per drawings or according to the engineer's specification and approval c/w all brackets and mounting accessories suitable for the above mounting brackets. The contractor should provide manufacturer's product warrantee for each solar panel for a period not less than 10 years, as Suntech STP 510 or approved equal.	No.	6		
3/3	Module Mounting Structure Supply and install module mounting structure for roof complete with aluminium anodized for supports, plates & screws, profiles for steel skeleton including bracing and double hot galvanized angles, rails, clips, etc. 10 panel mounting structure	No.	1		
3/4	48V/100Ah Lithium Ion Battery Bank Supply and installation of 48V 100Ah Lithium-ion battery	No.	1		
	20KA DC SPD DC surge protector				

3/5	Supply, install, connect and operate 20KA DC SPD DC surge protector for grid connected system. The Surge protector unit shall be suitable for indoor and outdoor installations. The surge protector system shall include all necessary electrical cables, conduits and trays and all other materials and workmanship needed to the system according to the drawings and engineer's instruction and approval and have a complete job ready. 100A 600VDC DC disconnect	No.	1		
3/6	AC Disconnect between Inverter and AC Distribution Boards to protect against utility faults and internally 40A three phase fused disconnect Box	No.	1		
	Solar PV Array Combiner to protect Solar modules, power tracking and blocking diodes.				
3/7	2 string combiner box	No.	1		
	Cabling between inverter output , inverter AC disconnect and AC distribution Boards				
3/8	10mm ² , 4c XLPE/LSF/SWA/LSF + 16mm ² BCEW	m	30		
3/9	10mm ² twin core 1000VDC flexible Solar Cabling	m	30		
	Testing and Commissioning				
3/10	Allow for Testing and Commissioning the entire 3kWp Hybrid Solar AC Coupled System installations to the satisfaction of the Engineer and Employer	Item	1		
	Record Documentation				
3/11	Allow for the provision of 3No. Sets of well tabulated Operation and Maintenance (O&M) Manuals and As Built Drawings including CDs all enclosed in durable files	Item	1		
	Client Training				
3/12	Allow for comprehensive training to Client End User on all facets of the installation	Item	1		
	Defects Liability Period				
3/13	Allow for attendance to Defects and Maintenance after Practical Completion for a period of 12 months.	Item	12		
	CONTINGENCIES				
3/14	Allow a contingency which is to be expended wholly or partly or deducted at the discretion of the Consulting Engineer.	Item	1	810.00	810.00
	PROVISIONAL SUMS				
3/15	Allow a provisional sum which is to be expended wholly or partly or deducted at the discretion of the Consulting Engineer.				
3/16	Allow for the modifications to DB-Laundry	Item	1	150.00	150.00
	TOTAL BILL NO. 3: LAUNDRY 3KW PHOTOVOLTAIC SOLAR POWER SYSTEM TO FINAL SUMMARY				

Item No.	Description	Unit	Qty	Rate	Total \$ c
	NSSA REHABILITATION CENTRE, BULAWAYO BILL NO. 4: KITCHEN 15KW PHOTOVOLTAIC SOLAR POWER SYSTEM <u>Drawing No. XXXX</u> <u>Hybrid Solar AC Coupled System Installation</u> Supply, install, connect and test the following components of the photovoltaic grid tied power installations as shown on the drawings and as described in the specifications. Supply, install, connect and operate PV-Solar power system for the building c/w PV cells, 48V 100Ah Lithium-ion battery, inverters, necessary electrical cables to connect solar cells together and to the DB's, to have a complete operational system according to the specification and approval. Price to include all materials needed to connect from modules to inverter and have complete photovoltaic power system. DC to AC inverter (<i>with parallel capability and lithium ion battery compatible</i>) 4/1 15kW output three phase input three phase output DC to AC inverter SMA Sunny Tripower 15000TL or equivalent Monocrystalline Solar Panel/Solar Module 4/2 Supply, install, connect and operate 510Watt monocrystalline Solar Modules, with minimum 16% high module conversion efficiency, high PID resistant, mismatch losses must be reduced to 2%, suitable for extreme wind (3800pascal) and harsh environment like desert condition, with all necessary electrical cables to connect solar cells together and to the inverters to have a complete operational circuit, conduits, cable trays, earthing system and complete with IP68 rated Main Junction Box (Fuses switch disconnectors, diodes and others) according to the specification and engineer's instruction and approval. Price to include all materials needed to connect from modules to inverter. All will be as per drawings or according to the engineer's specification and approval c/w all brackets and mounting accessories suitable for the above mounting brackets. The contractor should provide manufacturer's product warrantee for each solar panel for a period not less than 10 years, as Suntech STP 510 or approved equal. Module Mounting Structure Supply and install module mounting structure for roof complete with aluminium anodized for supports, plates & screws, profiles for steel skeleton including bracing and double hot galvanized angles, rails, clips, etc. 4/3 10 panel mounting structure 48V/100Ah Lithium Ion Battery Bank 4/4 Supply and installation of 48V 100Ah Lithium-ion battery Data Logging and Monitoring System	No.	1		
		No.	30		
		No.	3		
		No.	9		

4/5	Supply and installation of Data logging and monitoring System connecting all Grid Tie Systems to monitor daily power generation and consumption and the monthly report of generation. Eg SMA Energy Meter (E Meter 20) or approved	Item	1		
	20KA DC SPD DC surge protector Supply, install, connect and operate 20KA DC SPD DC surge protector for grid connected system. The Surge protector unit shall be suitable for indoor and outdoor installations. The surge protector system shall include all necessary electrical cables, conduits and trays and all other materials and workmanship needed to the system according to the drawings and engineer's instruction and approval and have a complete job ready. 100A 600VDC DC disconnect	No.	1		
4/6	AC Disconnect between Inverter and AC Distribution Boards to protect against utility faults and internally 40A three phase fused disconnect Box	No.	1		
	Solar PV Array Combiner to protect Solar modules, power tracking and blocking diodes.				
4/7	2 string combiner box	No.	2		
	Cabling between inverter output , inverter AC disconnect and AC distribution Boards				
4/8	10mm ² , 4c XLPE/LSF/SWA/LSF + 16mm ² BCEW	m	40		
4/9	16mm ² twin core 1000VDC flexible Solar Cabling	m	95		
4/10	10mm ² twin core 1000VDC flexible Solar Cabling	m	40		
4/11	GSM Modem connected to Programmable Logic controller	No.	1		
4/12	Programmable Logic Controller to receive Data Inputs from Inverter Outputs for remote monitoring and control. Shall be expandable. ABB PLC AC500 or approved equivalent	No.	1		
4/13	Data Cabling between Inverter outputs and PLC using RS485 cabling	m	195		
	Testing and Commissioning				
4/14	Allow for Testing and Commissioning the entire 15kWp Hybrid Solar AC Coupled System installations to the satisfaction of the Engineer and Employer	Item	1		
	Record Documentation				
4/15	Allow for the provision of 3No. Sets of well tabulated Operation and Maintenance (O&M) Manuals and As Built Drawings including CDs all enclosed in durable files	Item	1		
	Client Training				
4/16	Allow for comprehensive training to Client End User on all facets of the installation	Item	1		
	Spares				
4/17	Allow for the provision of spares, special tools, etc to the client	Item	1		
	Defects Liability Period				

4/18	Allow for attendance to Defects and Maintenance after Practical Completion for a period of 12 months.	Item	12		
<u>CONTINGENCIES</u>					
4/19	Allow a contingency which is to be expended wholly or partly or deducted at the discretion of the Consulting Engineer.	Item	1	4,000.00	4,000.00
<u>PROVISIONAL SUMS</u>					
	Allow a provisional sum which is to be expended wholly or partly or deducted at the discretion of the Consulting Engineer.				
4/20	Allow for the modifications to DB-Kitchen	Item	1	750.00	750.00
TOTAL BILL NO. 4: KITCHEN 15KW PHOTOVOLTAIC SOLAR POWER SYSTEM TO FINAL SUMMARY					