	Appointment of an Electrical Contractor for the Supply, Install, Test and Commission including maintenance of Solar systems at listed Stations in the EC region.	

Bill of Quantities

EC Region Roof top installation

KZN	Size of Installation	Single/ Three Phase	Roof Type
Berlin Station	20 KWp	3 Phase	Tiles

BERLIN STATION

BILL OF QUANTITIES FOR SOLAR PV INSTALLATION AND BATTERY BACK UP AT BERLIN STATION

A: PRELIMINARY AND GENERAL					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	All Insurances is to be honored by the contractor for work being conducted on site. The contractor remains liable for any material should it be stolen. Ownership of material to only transfer on handover of solar PV plant	sum	100%		
	The Contractor is providing PRASA PM with a HELIO SCOPE analysis for all identified sites in the region				
	Executive documents - As builds, Layouts, SLDS', AC and DC connection. Engineering: preliminary design, bill of quantities, drawings, allow to produce "as installed" drawings. The contractor is to return a fully marked up set of as-built drawings to Prasa Project manager.				
	Health & Safety: OSH Act + Construction Act compliance. The contractor shall allow for Compliance with the OHS Act, including the Construction Safety Regulations of the OHS Act, as the electrical contractor shall be the responsible person for the duration of the contract period.				
	Lightning Protection risk assessment and survey				
	SUB TOTAL: P&G				

B: MECHANICAL MOUNTING STRUCTURE					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	Supply and install aluminum mounting rack - Rails, end clamps, end clamps, screws. The Contractor designs, procures and constructs the most efficient means for non-Penetrative Mounting Structure for PV modules that stems from structural analysis. The mounting structure is of roof mounted, fixed type. The structure withstands all possible static, dynamic, and seasonal loads at site condition. All PV mounting structures are off-the-shelf products as much as possible. Either case studies or reference sites should accompany this offer. The proposed mounting structures (product) have proven track record and the product have been installed in PV projects for more than 100 KW capacity. The mounting structures are designed for optimum PV module orientations. The row-to-row distance is selected to minimize the shading losses. The mounting structure is designed for minimum 25 years of operation and the Contractor provides minimum 5 years as warranty on material/product. The Contractor provides the mounting structure solutions which is efficient, cost effective and reliable. The design reduces installation time and material waste.	sum	100%		
2	To minimize the risk of lightning induced surges damaging PV equipment and causing potential hazard to humans, the system shall be properly grounded. Install Air terminal to provide the shortest possible path for the lightning induced surges to reach the earth, the module frames and the array support structure shall be directly connected to the grounding electrodes or earth mats. All grounding electrodes or earth mats must be linked for equi-potential. This connection shall be made using 16 mm2 bare copper wire as a grounding conductor. Earth resistance values to be less than 10-Ohms.	Sum	1		
	SUB TOTAL: MOUNTING RACK				

C: CONNECT TO GRID					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	Provisions to be made for the connection to the local Eskom or Municipal network- paperwork and approval process are to be adhered to and submitted to PRASA PM	sum	100%	ZAR 10,000.00	ZAR 10,000.00
	SUB TOTAL				ZAR 10,000.00

D: REMOTE MONITORING FOR SOLAR PLANT					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	Supply and install a comprehensive remote monitoring solution for solar plant management and performance both regionally and at PRASA HO. The contractor is to confirm design solutions and options prior to any installation with the client. This will entail both computer hardware and screens.	each	2		
	SUB TOTAL				

E: OPERATION MAINTENANCE AND REPAIRS					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	The Contractor is responsible for the all-inclusive operations and maintenance (preventive, corrective and spare parts replacement) of the SOLAR PLANT for 24 months. This submission must be accompanied by a maintenance plan and schedule. Added predictive rand value for the possible replacement of parts can be included.	months	24	2% of proposal	
2	The Contractor is responsible for the all-inclusive operations and maintenance (preventive, corrective and spare parts replacement) of the BATTERY PACK for 24 months. This submission must be accompanied by a maintenance plan and schedule. Added predictive rand value for the possible replacement of parts can be included.	months	24	2% of proposal	
	SUB TOTAL				

F: DIESEL GENERATORS COMPATABILITY					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	The contractor is to make provision in the design for electrical connectivity should PRASA endevour to connect a generator to the station to ensure safe workings of the generator as well as to protect the solar PV installation.	Sum	100%		
	SUB TOTAL				

G: TECHNICAL AND OPERATIONAL TRAINING					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	The Contractor is responsible for the training of Identified PRASA employees during operation and maintenance of the PV Plant. PRASA requires 2 of its employees to be trained on operations and maintenance of the PV Plant. It is anticipated that PRASA's trained staff will be utilized during the Construction operation and maintenance period. The Contractor proposes the training plan and content of the training during the first two months of operation. All training must include both on-site and a formal class attendance with accreditation from a reputable institution.	each	2	R 10 000.00	R 20 000.00
	SUB TOTAL				

H: PHOTO VOLTAIC INSTALLATION					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	Supply and install PV Modules - refer to spec in tender document, mono - crystalline type. All PV modules supplied for the Plant are of the same type and brand (550Wp or 555Wp or 560WP is the preferred size and from a Tier 1 and GRADE A manufacturers ranked via BNEF tiering system (Bloomberg's New Energy and Finance). Bidders MUST provide relevant data specifications of panels being proposed.	Wp	50		
2	Supply and install 20 KW hybrid, HV inverter – refer to above spec. The Contractor provides to the Project Manager all type test and serial test results performed by the respective inverter manufacturer/supplier for the inverters to be delivered for the Project. The tests include all certificates according to valid IEC and South African Grid Code standard as described below. **Charge Controller (MPPT) - Maximum Power Point Tracker type (MPPT**) with a rated capacity of **11KW** @ 48V, Lithium compatible, complete with communication port, Parallel capable (for black start) (**11000Wp** connected), MPPT Range voltage 80-450 VDC, MPPT Input Current 2x 18A, Minimum compliance Standards: Safety EN/IEC 62109-1, UL 1741, CSA C22.2	kVA	1		
3	Supply and install electrical cable infrastructure for PV installation as per following, Circuit breaker / Pull Fuse - 250A 48V DC between inverter and battery bus bar (linked pair) or Unit Circuit Breaker equivalent, 35mm2 red and black cable - Multi strand pure copper cable from battery bank to inverter bus bar. 10mm2 Red and black Cable - Multi strand pure copper cable from Charge Controller to PV Sub Array UV resistant, PV combiner boxes – IP 54 PV box input complete , up to 1000 VDC circuit breaker and surge protection devices (SPD) 2 in - 2 out. Output DB CW/ Circuit Breaker / Change Over DB - 60A AC/DB complete with residual current and SPD, Change Over and isolation	sum	100%		
4	Supply and install Lightning Protection	sum	100%		
5	Supply - As built drawings, commissioning sheets, COC, PAT, FAT	sum	100%		
6	Supply and install Auxiliary equipment	sum	100%		
7	Supply and install Earthing system	sum	100%		
8	Supply and install Consumables	sum	100%		
9	Supply all relevant and up to date electrical Certificate of compliance for this installation	sum	100%		
	SUB TOTAL				

I: Testing, Commissioning and Handover					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	The Contractor and the Project Manager will confirm the commissioning tests required during the project execution. Supply, delivery complete with installation, commissioning and testing of the power plant, including making good of works to civil structures as and where applicable as well as lightning rods for the power plant. Certificate of Compliance (CoC), PV Green Card Certifications required. Safety Equipment (Harness, Hard Hat, High Visibility Vest, etc.) to be used on site. All cables need to be in Conduit and or trunking / Cable trays when entering or exiting building. All electrical equipment must be properly labelled AC and DC IP65 Enclosure will be used for electrical components At installation Lithium Fire extinguishers will be placed for battery's All penetration of building shall be sealed. BSI compliant Lithium Fire Extinguisher (9l) 2 per site	Complete	1		
	SUB TOTAL				

J: Battery Pack					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	Supply, install, test and commission Battery backup into 19 inch black 32 U, 600 mm X 1000 mm depth, cabinet with shelves and 80mm castors – refer to above spec, Lithium Batteries - Rated Capacity 116Ah C Rating - 1C, DOD 100% Weight 42KG, Dimensions 442mm x 495mm x 178mm, Design Life +/- 15 Years, Advanced BMS - current limiting function Cycle Life +/- 6000 Cycles @ 50% DOD, Above 3000 Cycles @ 100% DOD, Certification CE, UN38.33, CBT31484-2015, GBT31485-2015, GBT31486-2015	Each	2 hours		
	SUB TOTAL				

K: Painting of Roof					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	Supply and Paint roof prior to installation of Solar panels. Spec to be provided	Sum	100%	R 30 000.00	R 30 000.00
	SUB TOTAL				

L: Provisional Sum					
	Description	**Unit**	**Quantity**	**Rate**	**Amount**
1	The contractor is to allow 10% contingency amounts of the tendered amount and must form part of the final Total. All works conducted under this item must be required to obtain prior approval from the PRASA Project manager before any commencement of work. This amount is for the purpose and not limited to unforeseen circumstances that may arise during the course of the installation. Therefore, all works must be measured accordingly and forwarded to PRASA.	sum	10%		
	SUB TOTAL				

Summary of pricing					
Section	**Description**	**Unit**	**Quantity**	**Rate**	**Amount**
A	PRELIMINARIES & GENERAL				
B	MECHANICAL MOUNTING STRUCTURE				
C	CONNECT TO GRID			R 10 000.00	R 10 000.00
D	REMOTE MONITORING FOR SOLAR PLANT				
E	OPERATION MAINTENANCE AND REPAIRS				
F	DIESEL GENERATORS COMPATABILITY				
G	TECHNICAL AND OPERATIONAL TRAINING			R 10 000.00	R 20 000.00
H	PHOTO VOLTAIC INSTALLATION				
I	TESTING, COMMISSIONING AND HANDOVER				
J	BATTERY PACK				
K	PAINTING OF ROOF			R 30 000.00	R 30 000.00
L	PROVISIONAL SUM	10%			
	SUBTOTAL Excluding VAT				
	VAT @ 15%				
	Total				

Summary of Pricing		
No	**Stations**	**Price**
1	Belin Station	
	SUBTOTAL Excluding VAT	
	Please ensure that double VAT is not charged - VAT @ 15%	
	Total	