Eskom	Strategy	Engineering

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Compiled by	Functional Responsibility	Authorised by
.....	pp.	.....
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Engineering Design Work Lead: Arnot Power Station	**Arnot Project Engineering Manager (Acting)**	**Arnot Engineering Manager**
Date: 2025/12/12	Date: 2025/12/12	Date: 12-12-2025

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TABLES

1. INTRODUCTION

Eskom Holdings SOC Ltd desires to engage the services of an Engineering, Procurement and Construction (EPC) Contractor to undertake, on a lump-sum basis under a NEC ECC contract, all studies, permitting, design, engineering, procurement, manufacturing, deliveries to Site, execution, erection, commissioning, testing, completion, operation and maintenance (O&M) until Taking Over, making good defects and warranty cover during the Defects Liability Period, and other works necessary to construct a solar photovoltaic (PV) power Plant, the access road, the Site facilities and any additional infrastructure at Arnot Power Station.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document contains the Tender Technical Evaluation Strategy and associated documents relating to a commercial enquiry for the design, manufacture, testing, supply, delivery, off-loading, construction, commissioning, development of user documentation, training, operating and maintenance of a Solar PV facility at Arnot Power Station.

The Tender Technical Evaluation Strategy will define the following technical evaluation criteria:

- Mandatory Evaluation Criteria
- Qualitative Evaluation Criteria
- Tender Returnable Technical Schedules
- TET Member Responsibilities
- Foreseen Acceptable / Unacceptable Qualifications

2.1.1 Purpose

The purpose of this tender technical evaluation strategy is to define the Mandatory Evaluation Criteria, Qualitative Evaluation Criteria, Tender Returnable Technical Schedules, TET Member Responsibilities, and Foreseen Acceptable / Unacceptable Qualifications for the Arnot Solar PV Plant tender technical evaluation. The technical evaluation strategy serves as the basis for the tender technical evaluation process.

2.1.2 Applicability

The technical evaluation criteria stated in this document shall apply to all parties who submit a Tender Bid for the Project described herein and the TET members responsible for the tender technical evaluation.

It must be noted that the Tender Technical Evaluation Strategy Report, with the team members names and authorisation signatures, will not be included in the enquiry as a document, but only the content thereof.

2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] 240-168966153: Generation Tender Technical Evaluation Procedure

[2] 240-48929482: Tender Technical Evaluation Procedure

[3] 375-172742 Arnot Solar PV Facility Employer's Requirements

[4] 32-1033: Eskom Procurement and Supply Chain Management Policy

[5] 32-1034: Eskom Procurement and Supply Chain Management Procedure

2.2.2 Informative

[6] 240-53114190: Internal Audit Procedure

[7] ISO 9001 Quality Management Systems

[8] 240-141007195 Electronic Signature Usage Policy

[9] 240-156280553 Procedure for signing documentation electronically using the Eskom Electronic Signing System

2.3 DEFINITIONS

Definition	Description
Tender	A tender refers to an open or closed competitive request for quotations/prices against a clearly defined scope/specification.
(Tender's) Bid	The documentation submitted by a Bidder for consideration for the tender process concerning the Project at Arnot Power Station.
Bidder	A third party who submits a Bid in response to the tender issued for the Project at Arnot Power Station.
Contract	The NEC ECC Contract governing the engineering, procurement and construction work required for the Project.
Contractor	The primary Contractor who will be responsible for the entire Project Works, including all studies, permitting, design, engineering, procurement, manufacturing, deliveries to Site, execution, erection, commissioning, testing, completion, O&M until Taking Over, making good defects and warranty cover during the Defects Liability Period, and other works necessary to construct a solar PV power plant at Arnot Power Station.
Defects Liability Period	A fixed period of time after the Taking Over Date (usually a twenty-four (24) month period) in which the Contractor shall remedy any outstanding defects and work required for the Project, and during which the Project is monitored to ensure it meets certain performance related thresholds as per the Contract.
Employer	Eskom Holdings SOC Ltd
Plant	All component and parts forming part of the Arnot solar PV power plant which are necessary for the generation of electricity.
Project	The Plant and all access roads, site facilities and additional infrastructure located on Site.
Taking Over	The date on which the Project Works are determined to be complete in terms of the Contract (except for minor defects and outstanding work) and are taken over by the Employer.
Technical Evaluation Team	A team of individuals appointed by the Employer who are responsible for the review and evaluation of the Bids received in terms of the established technical evaluation criteria.
Site	The physical demarcated location on which the solar PV power plant is to be built.
Tender	A tender refers to an open or closed competitive request for quotations/prices against a clearly defined scope/specification.
Works	All studies, permitting, design, engineering, procurement, manufacturing, deliveries to Site, execution, erection, commissioning, testing, completion, O&M until Taking

Definition	Description
	Over, making good defects and warranty cover during the Defects Liability Period, and other works necessary to construct a solar PV power plant at Arnot Power Station.

2.3.1 Classification

Controlled Disclosure: Controlled Disclosure to external parties (either enforced by law, or discretionary).

2.4 ABBREVIATIONS

Abbreviation	Description
AC	Alternating Current
AIS	Air Insulated Switchgear
C&I	Control and Instrumentation
CMS	Control and Monitoring System
CV	Curriculum Vitae
DC	Direct Current
ECSA	Engineering Council of South Africa
EDWL	Engineering Design Work Lead
EPC	Engineering, Procurement and Construction
EYA	Energy Yield Analysis
GIS	Gas Insulated Switchgear
HMI	Human Machine Interface
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning (
LV	Low Voltage
MEC	Maximum Export Capacity
MV	Medium Voltage
NLEPDS	Non-Lethal Energized Perimeter Detection System
O&M	Operation and Maintenance
OEM	Original Equipment Manufacturer
OHL	Overhead line
POC	Point of Connection
PR	Performance Ratio
PV	Photovoltaic
RMU	Ring Main Unit
SACPCMP	South African Council for the Project and Construction Management Professionals
SCADA	Supervisory, Control and Data Acquisition
SLD	Single Line Diagram

Abbreviation	Description
TET	Tender Evaluation Team

2.5 ROLES AND RESPONSIBILITIES

In accordance with [1] 240-168966153: Generation Tender Technical Evaluation Procedure.

2.6 PROCESS FOR MONITORING

N/A

2.7 RELATED/SUPPORTING DOCUMENTS

AEEP 0128 Appendix C: Tender Returnable Technical Schedule

3. TENDER TECHNCIAL EVALUATION STRATEGY

3.1 TECHNICAL EVALUATION THRESHOLD

The minimum weighted final score (threshold) required for a tender to be considered from a technical perspective is 70%.

3.2 TET MEMBERS

Table 3-1: TET Members

TET number	TET Member Name	Designation
TET 1	Johannes Senoamadi	Arnot Electrical LDE
TET 2	Cameron Govender	Arnot Electrical EDWL
TET 3	Viren Heera	PEPM Renewables– for Solar PV system
TET 4	Onkgopotse Leeuw	Arnot C&I LDE
TET 5	Vernon Erasmus	Arnot EDWL
TET 6	Yvonne Mazibuko	Renewable Energy Snr Engineer
TET 7	Bhekisigcino Mlangeni	Renewable Energy Snr Engineer
TET 8	Mkhululi Ncube	Arnot Mechanical LDE
TET 9	Tebatso Menziwa	Arnot Civil LDE
TET 10	Elisha Maharaj/Moses Tshikomba	Project Manager
TET 11	Kanya Kutu	Contracts Manager

3.3 MANDATORY TECHNICAL EVALUATION CRITERIA

Mandatory Evaluation Criteria (gatekeepers) are ‘must meet’ criteria. These criteria are assessed on a Yes/No basis as to whether the criteria are met. An assessment of ‘No’ against any criterion shall technically disqualify the tender and shall not be further evaluated against Qualitative Criteria.

Refer to Appendix A for the defined Mandatory Criteria.

The Mandatory Criteria will be evaluated based on the information provided in accordance with **Error! Reference source not found.**, which describes the specific tender returnable and technical schedules that the Bidder should complete and return during the Tender phase.

3.4 QUALITATIVE TECHNICAL EVALUATION CRITERIA

Tenders that have met all the Mandatory Evaluation Criteria will be evaluated against the Qualitative Evaluation Criteria. Qualitative Evaluation Criteria are weighted evaluation criteria used to identify the highest technically ranked tender.

The minimum weighted final score (threshold) required for a tender to be considered “Functionally Acceptable” from a technical perspective is 70%.

Refer to Appendix B for the defined Qualitative Criteria.

The Qualitative Criteria will be evaluated based on the information provided in accordance with AEEP 0128, Appendix C: Tender Returnable Technical Schedules, which describes the specific tender returnable and technical schedules that the Bidder should complete and return during the Tender phase.

3.5 TET MEMBER RESPONSIBILITIES

The TET members allocated to review/evaluate each Mandatory and Qualitative criterion is indicated in Table 3-2.

Refer to Table 3-1 for identification of the TET members.

Refer to Appendix A, Table 1-1 for the Mandatory Criteria.

Refer to Appendix B, Table 1-2 for the Qualitative Criteria.

Table 3-2: TET Member Responsibilities

Mandatory Criteria Number	TET 1	TET 2	TET 3	TET 4	TET 5	TET 6	TET 7	TET 8	TET 9	TET 10	TET 11
1					X					X	X
2					X					X	X
3					X					X	X
Qualitative Criteria Number	TET 1	TET 2	TET 3	TET 4	TET 5	TET 6	TET 7	TET 8	TET 9	TET 10	TET 11
1					X	X	X			X	X
2	X	X	X	X	X	X		X	X		
3	X	X				X	X				
4		X		X							
5					X				X		
6					X			X			
7	X	X		X	X			X	X	X	X
8	X	X					X				

3.6 FORESEEN ACCEPTABLE / UNACCEPTABLE QUALIFICATIONS

3.6.1 Risks

Table 3-3: Acceptable Technical Risks

Risk	Description
	None

Table 3-4: Unacceptable Technical Risks

Risk	Description
1	Tier 1 Solar PV Modules not offered.

3.6.2 Exceptions / Conditions

Table 3-5: Acceptable Technical Exceptions / Conditions

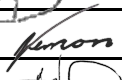
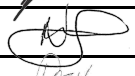
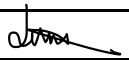
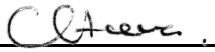
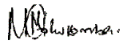
Risk	Description
1	Not providing technical details deemed intellectual propriety.
2	Deviations issued with explanations or motivated alternative solutions.

Table 3-6: Unacceptable Technical Exceptions / Conditions

Risk	Description
1	Bidder’s proposal does not cover entire scope of works.
2	Contractor or Subcontractor not registered with the specified professional bodies.

4. AUTHORISATION

This document has been seen and accepted by:

Name	Designation	Signature
Cameron Govender	Arnot Electrical EDWL	
Johannes Senoamadi	Arnot Electrical LDE	
Onkgopotse Leeuw	Arnot C&I LDE	
Vernon Erasmus	Arnot EDWL	
Yvonne Mazibuko	Renewable Energy Snr Engineer	
Bhekisigcino Mlangeni	Renewable Energy Snr Engineer	
Grace Olukune	Renewable Energy Snr Engineering Manager	
Mkhululi Ncube	Arnot Mechanical LDE	
Viren Heera	PEPM Renewables– for Solar PV system	
Tebatso Menziwa	Arnot Civil LDE	
Moses Tshikomba	Project Manager	
Kanya Kutu	Contracts Manager	

5. REVISIONS

Date	Rev.	Compiler	Remarks
12 Dec. 25	2	VM Erasmus	Changes to Grid Connection Works Criteria and changes to TET 6 and 7 responsibilities in Table 3 2: TET Member Responsibilities.
02 Dec. 25	1	VM Erasmus	First issue

6. DEVELOPMENT TEAM

The following people were involved in the development of this document:

- Cameron Govender
- Johannes Senoamadi
- Onkgopotse Leeuw
- Mkhululi Ncube
- Tebatso Menziwa

7. ACKNOWLEDGEMENTS

Lethabo Solar PV Plant team who's documented formed the basis for this document.

APPENDIX A: MANDATORY TECHNICAL EVALUATION CRITERIA

1. MANDATORY TECHNICAL EVALUATION CRITERIA

Mandatory Evaluation Criteria (gatekeepers) are 'must meet' criteria. These criteria are assessed on a Yes/No basis as to whether the criteria are met. An assessment of 'No' against any criterion shall technically disqualify the tender and shall not be further evaluated against Qualitative Criteria.

The Mandatory Criteria is defined in Table 1-1.

The Mandatory Criteria will be evaluated based on the information provided in accordance with AEEP 0128, Appendix C: Tender Returnable Technical Schedules, which describes the specific tender returnable and technical schedules that the Bidder must return during the Tender phase.

Table 1-1: Mandatory Technical Evaluation Criteria

	Mandatory Technical Criteria Description	**Reference to Technical Specification / Tender Returnable**	**Motivation for use of Criteria**
1.	Engineering, Procurement, and Construction EPC capability Successful execution of ≥ 20 MWp DC cumulative capacity completed commercial ground-mounted, grid-connected, front-of-meter Solar PV projects within the last seven (7) years, as the principal EPC contractor, with at least one project ≥ 10 MWp DC) to align with the scale and technical requirements of the Arnot PV plant. Submit Tender Returnable with supporting documents to proof criterion No.1	**Tender Returnable**: The Bidder must provide proof of completed and operational solar PV project(s) in the form of a signed contract, completion certificate or a take-over certificate with references from solar PV plant Owner(s) / Developer(s)	The Bidder must exhibit the requisite capability and previous experience to provide assurance that the required works can be successfully executed.
2.	O&M capability Successfully performed Operations and Maintenance (O&M) duties for at least two	**Tender Returnable**: The Bidder must provide proof of EPC Contract(s) or O&M Contract(s) accordingly.	The Bidder must exhibit the requisite capability and previous experience to provide assurance that the required O&M can be successfully performed.

	(2) years 1 for at least two (2) ground mounted PV plant which was ≥ 12MWac. Submit Tender Returnable with supporting documents to proof criterion No.2	Where the O&M duties are subcontracted, a signed letter of intent between the two parties shall be submitted.	
3.	Required footprint & capacity The Arnot PV Plant shall be designed within a footprint not exceeding 22.5 ha. The AC capacity of the Solar PV plant shall be minimum capacity of 11.1 MWac and maximum export power evacuation of 17.2MWac and the minimum DC capacity shall be ≥12.8 MWp. The DC/AC ratio shall not be less than 1.15 Submit Tender Returnable with supporting documents to proof criterion No.3	**Tender Returnable**: The Bidder shall provide an Energy Yield Assessment report to confirm the above requirements are met.	The Project Maximum Export Capacity (MEC) is 17.2 MWac (measured at the PoC). Hence, the Solar PV plant AC capacity shall at least be ≥11.1 MWac. The DC capacity should be oversized in relation to the AC capacity (DC/AC ratio greater than 1), thereby allowing for greater energy harvest when the solar production is below the inverter's rating. A DC/AC ratio of at least 1.15 will be required.

APPENDIX B: QUALITATIVE TECHNICAL EVALUATION CRITERIA

1. QUALITATIVE TECHNICAL EVALUATION CRITERIA

Tenders that have met all the Mandatory Evaluation Criteria will be evaluated against the Qualitative Evaluation Criteria. Qualitative Evaluation Criteria are weighted evaluation criteria used to identify the highest technically ranked tender.

The minimum weighted final score (threshold) required for a tender to be considered “Functionally Acceptable” from a technical perspective is 70%.

The scoring of qualitative criteria will be based on the degree of achievement of the tender to meet the technical requirements. A score will be allocated as per Table 1-1, for each technical qualitative criterion.

Table 1-1: Scoring Guide for Qualitative Technical Evaluation Criteria

Score	Percentage	Description
5	100	Compliant • Meet technical requirement(s) AND • No foreseen technical risk(s) in meeting technical requirements
4	80	Compliant with associated qualifications • Meet technical requirement(s) with • Acceptable technical risk(s) AND/OR • Acceptable exceptions AND/OR • Acceptable conditions
2	40	Non-compliant • Does not meet technical requirement(s) AND/OR • Unacceptable technical risk(s) AND/OR • Unacceptable exceptions AND/OR • Unacceptable conditions
0	0	Totally deficient or non-responsive
Note: The scoring table does not allow for scoring of 1 and 3 as per procedure 240-168966153.		

The highest technically ranked tender will be based on the final scoring comparisons. The tender with the highest score will be recommended from a technical perspective, provided the minimum threshold is met or exceeded.

The Qualitative Criteria is defined in Table 1-2. During the tender evaluations, Table 1-1 will be used as a guide to score each criterion defined in Table 1-2. The Qualitative Criteria will be evaluated based on the information provided in accordance with **Error! Reference source not found.**, which describes the specific tender returnable and technical schedules that the Bidder should complete and return during the Tender phase.

Table 1-2: Qualitative Technical Evaluation Criteria

Qualitative Technical Criteria Description		Reference to Technical Specification / Tender Returnable	Scoring Criteria	Criteria Weighting (%)	Criteria Sub Weighting (%)
1	**General**			10%	100%
1.1	Level 3 complete Project programme/Schedule with ALL activities for Arnot PV plant. Schedule indicates all the durations aligned with the activities listed in the detailed method statement.	**Tender Returnable:** Project program (schedule)	5 – Level 3 schedule with all relevant activities and realistic timelines 4 – Level 3 schedule with some activities and realistic timelines 2 – Schedule submitted but lacking details and activities OR unrealistic timelines 0 – Schedule is not at level 3, lacking activities and realistic timelines		40%
1.2	The Bidder shall provide a detailed training plan for electrical plant (incl. C&I) and equipment and a 24-month Operations and Maintenance (O&M) specification for electrical systems.	**Tender Returnable:** Training plan and prelim O&M manual	5 – Comprehensive and fully compliant submission: Detailed training programme covering all major electrical equipment (inverters, transformers, MV switchgear, protection & control systems, SCADA/CMS, DBs and cables), including schedule, training		40%

			outcomes, certification and trainer qualifications. Full 24-month O&M specification submitted and aligned with Technical Specification. No omissions.4 – Good submission with minor gaps: Training plan submitted but lacking minor detail (e.g., schedule or certification). 24-month O&M specification submitted but with limited depth. Overall, technically compliant without major risk.2 – Partially compliant submission: Training plan submitted at high level only and missing electrical equipment coverage. O&M specification incomplete or generic. Requires clarification.0 – Non-compliant or not submitted: No training plan – submitted, no 24-month O&M specification submitted. Submission does not demonstrate ability to support operational readiness.		

1.3	Equipment Warranty: The Bidder provides warranty for the equipment offered. PV modules come with a 12-year product warranty against manufacturing defects and a 25-year linear power performance guarantee. Mounting structures include a 10-year warranty for steel components and 20 years for corrosion protection. Tracker motors and gears, if applicable, are covered for 5 years, while communication and control systems have a 2-year warranty. Inverters, MV transformers, MV switchgear, HV transformers, and HV switchgear each carry a 5-year warranty. Civil works are protected by a latent defect warranty for 10 years.	**Tender Returnable**: Warrantees Refer to Appendix C for evaluation.	As per Table 1.1		20%
2	**Solar PV Plant Configuration and Performance Criteria**			30%	100%
2.1	PV system design: The Bidder provides a preliminary PV system design in accordance with the indicated requirements, including: • Solar PV System Design parameters • High level plant layout drawing including PV array layout • Technical datasheet for PV modules, Mounting Structures / Trackers, Inverters, and MV/LV Transformers.	**Tender Returnable**: Preliminary design Refer to Appendix C for evaluation.	As per Table 1.1		35%

2.2	Plant Annual Performance Ratio (PR) guarantee The Bidder provides a guarantee for the PR for each year of the 2-year Defects Liability Period until Final Acceptance is reached, including monthly breakdown of Guaranteed Performance Ratio for the first year and the corresponding estimated long-term solar irradiation on module plane.	**Tender Returnable:** Guarantee Refer to Appendix C for evaluation.	5 – Performance Ratio ≥82% 4 – Performance Ratio ≥ 80% & < 82% 2 – Performance Ratio ≥ 78% & < 80% 0 – Performance Ratio < 78%		45%
2.3	Plant Annual Guaranteed Technical Availability The Bidder provides a guarantee for the Plant's Availability for each year of the 2-year Defects Liability Period until Final Acceptance is reached.	**Tender Returnable:** Guarantee Refer to Appendix C for evaluation.	5 – Technical Availability ≥ 99% 4 – Technical Availability ≥ 97% & < 99% 2 – Technical Availability ≥ 95% & < 97% 0 – Technical Availability < 95%		20%
3	**Electrical**			10%	100%

3.1	The Bidder submits a valid ECSA Certificate or equivalent international acknowledgement for the Electrical Engineer/Technologist including CV with minimum of 5 years' work experience on the design, testing and commissioning of related electrical as specified on the Works Information.	**Tender Returnable**: CV and ECSA or equivalent international certificate	5 – Valid ECSA Certificate and CV submitted with more than 5 years' work experience for similar electrical scope of work. 4 – Valid ECSA Certificate or equivalent international acknowledgement and CV submitted with less than 5 years' work experience for similar or not similar electrical scope of work. 2 – Invalid/No ECSA Certificate or equivalent international acknowledgement and CV submitted with less than 5 years' work experience for similar or not similar electrical scope of work. 0 – No submission		15%

3.2	The Bidder submits a technical report confirming full compliance or any deviations if applicable for the electrical design, installation, commissioning, and handover requirements specified in the electrical scope.The technical report shall be in the form of a narrative and supportive documentation shall include the following as a minimum: • Compliance to electrical standards and requirements for PV Modules. • Compliance to electrical standards and requirements for Inverters. • Compliance to electrical standards and requirements for AC and DC cables. • Compliance to electrical standards and requirements for Ring Main Units (RMUs).Compliance to electrical standards and requirements for Medium and Low Voltage Switchgear • Compliance to electrical standards and requirements for HV/MV Power Transformers, MV/LV Transformers, and MV/MV or LV/LV Transformers. • Compliance to electrical standards and requirements for 400/230VAC and DC Distribution Boards • Compliance to electrical standards and requirements for Essential Power Systems (Batteries and Battery Chargers, Uninterruptable Power Supplies and Diesel Generators) • Compliance to electrical standards and requirements for Earthing System and Lighting Protection. • Compliance to electrical standards and requirements for Protection and Control. Compliance to electrical standards and requirements for Grid Code.	**Tender Returnable:** Technical confirmation report.	5 – Comprehensive narrative provided which explicitly details the Bidder's technical report confirming full compliance to the electrical Works for all listed items without deviations. 4 – Narrative technical report contains ambiguity and deviations for not more than 3 items with acceptable risk, exceptions, and conditions. 2 – Narrative technical report where 3 or more than 3 items are incomplete, unclear and non-compliant with unacceptable risk, exceptions and conditions. 0 – No documentation provided		50%

3.3	The Bidder shall provide the following information:Typical Type Test Certificates and/or Technical Datasheets for Medium Voltage (MV) Switchgear, which may be either Gas-Insulated Switchgear (GIS) or Air-Insulated Switchgear (AIS).Typical Type Test Certificates and/or Technical Datasheets for Medium Voltage (MV) Power Transformers.	**Tender Returnable**: Declaration in the form of a report	5 – Two (x2) Type test certificates or datasheets and schedule provided without any deviations. 4 – Two (x2) Type test certificates or datasheets and schedule provided with acceptable risk, exceptions, and conditions. 2 – One (1) Type test certificate or datasheet not submitted, or schedule submitted with unacceptable risk, exceptions and conditions specified in any of the schedules submitted. 0 – No documentation		15%
3.4	The Bidder submits the following: • High level Conceptual Electrical Reticulation or Single Line Drawing (SLD) for the required scope of work. • Power system study report previously done by the Contractor for similar scope of work.	**Tender Returnable**: Line diagram and study report	5 – Conceptual Electrical Reticulation or SLD submitted including power system study. 4 – Conceptual Electrical Reticulation or SLD submitted excluding power system study. 0 – No documentation provided		20%
4	**Control and Monitoring System (CMS) Criteria**			10%	100%

4.1	Bidders key personnel experience – C&I works. The Bidder provides detailed CVs of the key personnel, where the C&I works Designer exhibits the required qualifications and experience. The detailed design in terms of this Contract is to be executed by a qualified Professional Engineer or Professional Technologist who is a member of ECSA or equivalent international acknowledgement.	**Reference**: Specific roles and responsibilities in past C&I works projects. 1. A detailed project history table listing relevant projects, the designer's role, project value, duration, and key C&I scope elements. 2. Total years of relevant C&I design experience explicitly stated. Proof of Professional Registration: 1. An ECSA Privy link that shows a copy of the valid ECSA registration certificate (showing Pr.Eng or Pr.Tech status) or 2. Equivalent, verifiable proof of international engineering licensure/registration from a recognized body (e.g., P.E., C.Eng., P.Eng.)	5 - Registered, with more than 5 year's relevant experience for resource 4 - Registered, with 5 years' relevant experience for resource 2 - Registered, between 3 to 4 years relevant experience for resource 0 - Registered with less than 3 years' relevant experience for resource or resource is not registered or no submission made		10%

4.2	System Architecture & Redundancy Philosophy - The Bidder shall demonstrate a robust, fault-tolerant design philosophy. This includes comprehensive redundancy concepts for core SCADA networks (dual-ring, self-healing), servers (hot-standby clustering), data loggers/PLCs, and uninterruptible power supplies (UPS with autonomy >12 hours). The design must ensure no single point of failure leads to loss of monitoring or control.	**Returnable**: 1. Redundancy & Availability Philosophy Document detailing design for networks, servers, power, and field controllers. 2. System Architecture Diagrams showing redundant paths, failover mechanisms, and UPS autonomy calculations. 3. Project Reference Table & Evidence (as per 4.3 & 4.4) proving implementation of similar redundant architectures on ≥2 operational plants ≥10MWac.	5 – Philosophy document is detailed, covers all systems. Diagrams clearly show no single points of failure. Strong evidence from ≥3 reference plants. 4 – Philosophy covers key systems. Diagrams show good redundancy. Evidence from 2 reference plants. 2 – Philosophy is generic or incomplete. Redundancy concepts are weak or not evidenced. Limited reference proof. 0 – No coherent philosophy, diagrams missing, or no relevant reference projects.		15%

4.3	Software Architecture, Data Management & Analytics - The Bidder shall specify the operational paradigm (on-premise vs. cloud), data archiving strategy, and capabilities for advanced analytics. The system must be primarily on-premise for core control, with secure cloud capabilities permitted only for specific, approved functions (e.g., remote diagnostics, performance dashboards). Detailed specifications for data historian resolution (1-min for 3 years min.), capacity, location (on-site primary, secure off-site backup), and tools for predictive analytics/AI-driven optimization are required.	**Returnable**: 1. Software & Data Management Plan - Defining on-premise/cloud split, historian specs (resolution, retention, capacity), backup/restore procedures, and description of any AI/predictive maintenance tools. 2. Evidence of Implementation: Screenshots or reports from existing plants demonstrating data historian functionality and analytical tools.	5 – Plan mandates on-premise control with clear, secure cloud use cases. Historian specs exceed requirements. Includes demonstrable AI/analytics tools with proven benefits. 4 –Plan is clear and compliant. Historian meets all requirements. Basic analytics are mentioned. 2 – Plan unclear on cloud use. Historian specs are basic or undersized. No meaningful analytics. 0 – Plan advocates unacceptable cloud-based control, or no plan submitted.		15%

4.4	The Bidder shall provide a detailed cybersecurity design compliant with IEC 62443/ISO 27001 principles and specific Employer OT cyber standards. This includes network segmentation (IT/OT DMZ), next-generation firewalls, Intrusion Detection/Prevention Systems (IDS/IPS), application whitelisting, Multi-Factor Authentication (MFA) for all remote access, rigorous user/password management, and proven backup/restore procedures for system configuration and data.	**Returnable**: 1. Cybersecurity Design Report covering architecture (segmentation, DMZ), specified hardware/software (Firewalls, IDS/IPS), user access controls (MFA, role-based), and backup/restore protocols. 2. Secure Remote Access Procedure for third-party OEM support, detailing controlled, auditable, and time-limited access methods.	5 – Report is exhaustive, aligns with best practices, specifies modern tools (NG Firewalls, MFA), and includes robust third-party access controls. 4 – Report covers all major areas adequately and meets core security requirements. 2 – Report is generic, lacks detail on key areas (e.g., segmentation, MFA), or proposes weak security measures. 0 – No substantive cybersecurity plan, or plan contains critical vulnerabilities.		15%

4.5	The Bidder shall define all external interfaces, specifying protocols (e.g., IEC 61850, OPC UA, Modbus TCP, DNP3) and the integration philosophy for hardwired vs. networked signals. Furthermore, the design must fully integrate or interface with key supporting systems: HVAC, Fire Detection System (FDS), CCTV, Access Control, and Public Announcement (PA). The control room location and operating regime (local/remote) must be defined.	**Returnable**: 1. Interface Control Document & Diagram (High-level and detailed) listing all system interfaces, protocols, and integration method. 2. Supporting Systems Integration Plan describing interface with HVAC, FDS, CCTV, Access Control, and PA (e.g., FDS alarm to SCADA, CCTV feed to control room). 3. Control Room & Operating Philosophy stating location and defining local vs. remote monitoring/control capabilities.	5 – Documents show mature use of modern protocols (IEC 61850, OPC UA). Clear, bidirectional integration plans for all supporting systems. Operating philosophy is comprehensive. 4 – All interfaces and supporting systems are addressed with standard protocols. Operating philosophy is defined. 2 – Interfaces or support systems are missing, unclear, or rely on outdated/inappropriate protocols. Philosophy is vague. 0 – Major gaps in interface definition or no consideration for supporting systems.		15%

4.6	The Bidder shall demonstrate a rigorous approach to field installation quality and a design adaptable to future technologies. This includes their proposed philosophy for cable management (type, rating, segregation), PV array earthing/equipotential bonding, and lightning protection integration. The proposal must also confirm the CMS design's compatibility for future integration with systems such as robotic panel cleaning.	**Returnable**: 1. Field Installation Quality Philosophy: A document outlining the Bidder's standards and methodologies for C&I cable installation, earthing, junction box mounting, and testing during construction. 2. Proposed C&I Testing Framework: A high-level description of the planned testing stages (FAT, SAT, commissioning), key objectives for each, and the approach to developing detailed ITPs & QCPs post-contract award. 3. Statement on Automated Maintenance Compatibility: Confirmation that the SCADA/CMS architecture will include provisions (e.g., spare I/O, communication protocols, power points) to facilitate future integration with automated maintenance systems.	5 – Quality philosophy is detailed, references best practices and specific standards. Testing framework is clear, staged, and robust. Future-proofing for automation is explicit and well-considered. 4 – Philosophy is adequate and addresses key areas. Testing framework is defined. Future compatibility is acknowledged. 2 – Philosophy is vague or copied from generic manuals. Testing framework is poorly defined. Little to no consideration for future integration. 0 – Lacks a coherent quality philosophy, no defined testing approach, or design is closed to future.		15%

4.7	The Bidder shall provide proven experience via project references and a detailed compliance matrix, demonstrating adherence to all functional and technical requirements for the CMS/SCADA system.	**Returnable**: 1. Project Reference Table & Evidence for SCADA hardware and software (as previously defined). 2. Detailed Compliance Matrix against the Employer's CMS Requirements, with justification for any deviations.	5 – Strong evidence from ≥3 relevant plants. Compliance matrix shows 100% compliance with robust justification. 4 – Evidence from 2 plants. Compliance matrix shows compliance with minor, justified deviations. 2 –Weak evidence. Matrix shows significant gaps or unjustified deviations. 0 – No Track Record / Non-Compliant.		15%
5	**Civil**			10%	**100%**
5.1	Copy of the CV of a Construction Manager that will be responsible for the Civil Scope. The Professional Engineer must have a minimum 15 years' experience in civil and structural works relating to renewable technology. This manager will be responsible for the Assessments, and Design.	**Reference**: Works Information **Returnable**: CV	5 – if the manager meets the required years and type of experience 4 – If the person has more than 10 but less than 15-years' experience. 0 – If the person has less than 5 years' experience.		40%
5.2	Previous similar work Tenderer's or tenderer's subcontracting relevant experience in the construction of similar civil engineering works (Steel Structures, Masonry/brick wall construction, concrete works). A list of at least three (3) verifiable references demonstrating previous similar works. Copies of completion certificates for each reference shall have the following:	**Returnable:** Completion certificates/ completion letters/ reference letters – signed by the client	5 = 3 or more signed testimonial letters or copies of completion certificates for previous similar works has been submitted. 4 = 2 signed testimonial letters or copies of completion certificates for		30%

	• Project name • Principal contractor • Client • Description of work performed (size of structures to be indicated) • Project cost (only for scope performed) • Project start and end date • Name, designation and contact number of reference person		previous similar works has been submitted. 2 = 1 signed testimonial letter or a copy of completion certificate for previous similar works has been submitted 0 = No proof previous similar work submitted as requested, submitted proof of similar works are not verifiable (no client contact details).		
5.3	Technical proposal detailing the work methodology, which complies to the full scope and describes how the scope will be executed (both design and construction phases of the project). Technical proposal must demonstrate understanding of the scope and include the following as a minimum: • Proposed plant, equipment and tools • Methodology for the proposed works • Foreseen risks and concerns • Health and safety requirements • Quality management requirements • Required temporary works (if any)	**Reference**: Works Information **Returnable:** Method Statement	5 – proposal is detailed and meets all the requirements with no technical deficiencies 4 – proposal is high level and meets the requirements with no technical deficiencies 2 - proposal is lacking details and has technical deficiencies 0 – proposal does not meet requirements or not submitted		30%
6	**Balance of Plant Criteria**			10%	**100%**

6.1	**Fire protection**The Bidder shall submit a Fire Protection Services design philosophy, covering aspects such as the fire protection/detection assessment, system and component description, system sizing approach, system design and construction codes, and system process (diagram).	**Returnable:** Fire protection design philosophy	5 - The Bidder submits a comprehensive and detailed Fire Protection Design Philosophy covering all required elements (assessment, component description, sizing, codes, diagrams). Submission clearly demonstrates understanding of the site risks. 4 - The Bidder submits a Fire Protection Design Philosophy that covers most of the required elements, but some sections lack detail (e.g., missing sizing approach, incomplete process diagram, limited description of detection system). 2 - The Bidder submits a Fire Protection Design Philosophy that doesn't cover much of the required elements, lacks technical depth, or is generic. 0 - No submission is made, OR the information provided is not relevant to the required fire protection scope.		20%

6.2	**Water supply and reticulation** The Bidder shall submit a water supply and reticulation design philosophy, covering aspects such as the water system, treatment of water for cleaning modules and monitoring mechanisms.	**Returnable:** Water supply and reticulation design philosophy	5- The Bidder submits a complete and detailed Water Supply & Reticulation Design Philosophy, covering all required elements (water system, treatment, monitoring, standards, diagrams). Submission is project-specific and demonstrates a clear understanding of PV module cleaning requirements. 4 - Acceptable. The submission covers most of the required elements, but some areas lack detail. 2 - The submission doesn't have the required elements, is generic, or lacks substantive technical detail. 0 - No submission is provided OR the information submitted is irrelevant or does not address the required water reticulation scope.		20%
6.5	**Heating, Ventilation and Air Conditioning (HVAC)** The Bidder shall submit a design philosophy for the HVAC system.	**Returnable:** HVAC system design philosophy	5 - Excellent. The Bidder provides a comprehensive and detailed HVAC Design Philosophy covering all required elements: system description, design basis, standards, control philosophy, and process/schematic		20%

			diagrams. Submission is project-specific and demonstrates clear understanding of HVAC requirements for electrical and control environments. 4 - Acceptable The Bidder provides an HVAC Design Philosophy that covers most of the required elements, but one or more areas lack sufficient detail 2 - The submission covers less than the required elements, is generic, lacks technical depth, or does not demonstrate an understanding of HVAC requirements for PV plant supporting infrastructure. 0 - Non-Compliant. No submission is made OR the submission is irrelevant and does not address the required HVAC design philosophy.		
6.6	Meteorological equipment and instrumentation scheduleThe Bidder shall submit datasheets for the Meteorological station and the pyranometer.	**Returnable:** Meteorological station datasheets	5 - Excellent. The Bidder submits complete and detailed datasheets for both the meteorological station and pyranometer, covering all required technical parameters and standards. 4 - Acceptable. The Bidder provides datasheets for both instruments, but one or more required		20%

			parameters are missing. 2 - The submission includes incomplete or generic datasheets, fails to meet some requirements. 0 - Non-Compliant. No datasheets are submitted, OR the datasheets provided do not pertain to meteorological equipment and pyranometers as required.		
6.7	Mechanical Engineer(s) (Professional Registered Engineer) with over 5 years' experience in Fire protection Systems, HVAC design and Water supply and reticulation design.	**Returnable:** CVs and Qualifications	5 - Professionally Registered Mechanical Engineer (Pr Eng) with 5 years or more experience in Fire Protection Systems design, HVAC design, and Water Supply & Reticulation design. 0 - Candidate has less than 5 years relevant experience or is not a Pr Eng.		20%
7	**Operations and Maintenance Criteria**			10%	**100%**
7.1	Operations and Maintenance (O&M) Bidders key personnel experience – O&M Manager during O&M period. The Bidder provides detailed CVs of the key personnel, where the Site O&M Manager exhibits the required qualifications and experience.	**Returnable:** CVs	5 – More than 3 years relevant experience 4 – Three years relevant experience 2 – Less than 3 years relevant experience 0 – No submission		25%

7.2	O&M training Experience Bidders key personnel experience – Trainers for O&M. The Bidder provides detailed CVs of the key personnel.	**Returnable:** CVs	5 – More than 3 years relevant experience 4 – Three years relevant experience 2 – Less than 3 years relevant experience 0 – No submission		25%
7.3	O&M training Plan The Bidder submits a preliminary Training Plan. The plan shall describe the timing, type, and level of detail for the various training interventions, including O&M, Inverter, SCADA, CMS, etc.	**Returnable:** CVs	As per Table 1.1		25%
7.4	Spare parts Letter confirming Bidder acceptance of spare parts minimum requirements as well as highlighting any proposed deviations.	**Returnable:** Letter	As per Table 1.1		25%
8	**Grid Connection Works Criteria**			**10%**	**100%**
8.1	Consulting Engineer must submit a valid ECSA or internationally equivalent certificate for the Electrical Engineer/Technologist, including the CV with a minimum of 5 years Grid connection work experience on Substations, Control Plant and HV lives. The Bidder submits a signed letter of intent between the Consulting Engineer and EPC contractor.	**Returnable**: Letter of intent, ECSA certificate and CV	5 – Letter of intent submitted together with ECSA certificate and CV that covers the required experience. 0 – None responsive		30%
8.2	Approved Eskom HV SubcontractorSigned letter of intent between HV Subcontractor and EPC Bidder to be provided.	**Returnable:** Letter	5 – Letter submitted and HV Subcontractor on Eskom's approved list of HV Subcontractors0 - HV Subcontractor not on Eskom's approved list of		30%

			HV Subcontractors or no submission made		
8.3	Overhead Line (OHL) and Switching Station: The Bidder submits documented traceable evidence of experience in successfully executing the scope of work similar or more than the following scope of work: • Establishment and commissioning of a fully functional a 22 kV (or higher voltage) Switching Station or Substation with 2 or more feeder bays. • Construction of an overhead power line at a voltage of 22 kV or higher voltage not less than 3 km.	**Returnable:** Documented traceable evidence of experience.	5 – Successfully completed more than 5 projects with similar or more scope of work. 4 – Successfully completed 3 or 4 projects with similar or more scope of work. 2 - Successfully completed less than 3 projects with similar or more scope of work. 0 – No experience in similar projects		40%

APPENDIX C: TENDER RETURNABLE TECHNICAL SCHEDULES

1. GENERAL

a. This document provides the specific technical requirements and schedules for the Bidder to complete and return during the Tender phase. The returnables are for the installation of ground-mounted PV system at Arnot Power Station in the Mpumalanga Province of South Africa.
b. The Bidder completes this document with the clear understating and information presented in Functional Specification for Solar Photovoltaic (PV) Plant at Arnot Power Station – AEEP 0127. The Bidder is free to deliver information in a free form outside the given tables, wherever this seems to be suitable. However, the Bidder shall abide by the topics and the numbering of the schedules and completely provide the requested information together with the respective schedule.
c. The column “Tendered” shall be filled in by the Bidder for all items. The given information and specification shall be part of the agreement and binding for all delivery and services.
d. The technical data sheets shall be supplemented by additional descriptions, explanations, drawings, and all other information necessary for a clear understanding of its application to enable the Employer to undertake the necessary assessment, evaluation, and verification of the technical and performance features of the Tender.
e. The Bidder ensures that wherever the information is required in respect to multiple units, the Bidder provides the required information on a unit-by-unit basis.
f. The Bidder provides all figures in this returnable to no more than two decimal places, unless required in specific section/s.

2. EXPERIENCE AND ELIGIBILITY

2.1 EPC CONTRACTOR EXPERIENCE

Table 3 General information about EPC Bidder

No.	Item	Details
1	Name of EPC Bidder	
2	Home office address	
3	Regional office address	
4	Telephone / email address	
5	Name, Position and Title of contact person	
6	Legal form	
7	Area of main business	
8	No. of staff in main business	Engineers: Others:
9	Number of Solar PV power projects successfully completed	

Table 4 Specific EPC PV Project Experience

Item No.	Description	Unit	Required	Response from Bidder
1	**Experience**			

1.1	Number of PV projects designed, constructed, and commissioned by EPC Bidder	Number	Successful execution of at least one (1) completed commercial ground mounted PV project within the last seven (7) years	
1.2	Capacity of Solar PV projects previously designed, constructed and commissioned by the EPC Bidder as principal EPC Contractor	Mwac	At least one (1) project shall be ≥ 20 MWac	
2	**Project Details from experience presented above**			
2.1	Name of Solar PV plant	-	To be provided by Bidder	
2.2	Location of Solar PV plant	-	To be provided by Bidder	
2.3	Name of Solar PV plant Owner(s) / Developer(s)	-	To be provided by Bidder	
2.4	Contact details of Solar PV plant Owner(s) / Developer(s)	-	To be provided by Bidder	
2.5	Type of PV module technology	-	To be provided by Bidder	
2.6	Type of PV mounting (fixed-tilt, tracking etc.)	-	To be provided by Bidder	
2.7	Installation capacity	MWac	≥ 10	
2.8	Duration of construction	Months	To be provided by Bidder	
2.9	Commercial operation date	-	To be provided by Bidder	
2.1	Photographs if possible	-	To be provided by Bidder	
2.11	Proof verifying completed Solar PV plant in the form of contract, test on completion certificate, or take over certificate, with references from solar PV plant Owner(s) / Developer(s)	-	To be provided by Bidder	

2.2 O&M CONTRACTOR EXPERIENCE

a. The EPC Contractor will perform the role of O&M Contractor during the O&M period, defined as the first two (2) years of plant operations and maintenance during the Defects Liability Period. The EPC Contractor must have successfully performed, or subcontracted, the Operations and Maintenance (O&M) duties for at least two (2) years for at least one (1) commercial ground mounted PV plant with an installed capacity ≥ 20 MWac.

b. The required operations and maintenance experience must be presented as indicated in Table 2-3 and Table 2-4.

c. If the EPC Contractor is subcontracting the work for operations and maintenance of the Project for the O&M period, then the required Subcontractor's general information must be included as indicated in Table 2-3, and the Subcontractor's operations and maintenance experience must be presented as indicated in Table 2-4. Furthermore, a signed letter of intent between the two parties shall be submitted during the tender stage.

Table 5 General information about O&M Service Provider

No.	Item	Details	
1	Name of O&M Service Provider		
2	Home office address		
3	Regional office address		
4	Telephone / email address		
5	Name, Position and Title of contact person		
6	Legal form		
7	Area of main business		
8	No. of staff in main business	Engineers:	Others:
9	Number of Solar PV power projects successfully operated and maintained		
10	Signed letter of intent between O&M Service Provider and EPC Bidder (if subcontracting O&M service)	To be provided by Bidder	

Table 6 Specific O&M PV Project Experience

Item No.	Description	Unit	Required	Response from Bidder
1	**Experience**			
1.1	Number of PV projects designed, constructed, and commissioned by EPC Bidder	Number	Successful execution of at least one (1) completed commercial ground mounted PV project within the last seven (7) years	
1.2	Capacity of Solar PV projects previously designed, constructed and commissioned by the EPC Bidder as principal EPC Contractor	Mwac	At least one (1) project shall be ≥ 20 MWac	
2	**Project Details from experience presented above**			

2.1	Name of Solar PV plant	-	To be provided by Bidder	
2.2	Location of Solar PV plant	-	To be provided by Bidder	
2.3	Name of Solar PV plant Owner(s) / Developer(s)	-	To be provided by Bidder	
2.4	Contact details of Solar PV plant Owner(s) / Developer(s)	-	To be provided by Bidder	
2.5	Type of PV module technology	-	To be provided by Bidder	
2.6	Type of PV mounting (fixed-tilt, tracking)	-	To be provided by Bidder	
2.7	Installation capacity	MWac	≥ 20	
2.8	Duration of construction	Months	To be provided by Bidder	
2.9	Commercial operation date	-	To be provided by Bidder	
2.1	Photographs if possible	-	To be provided by Bidder	
2.11	Proof verifying completed Solar PV plant in the form of contract, test on completion certificate, or take over certificate, with references from solar PV plant Owner(s) / Developer(s)	-	To be provided by Bidder	

3. PROJECT IMPLEMENTATION SCHEDULE

The Bidder shall provide a Level II project implementation schedule, showing all the Project activities to be performed, including activities that will be subcontracted. The entire Project scope of work shall be represented.

4. KEY PERSONNEL

a. The Bidder shall ensure that suitably qualified personnel are included in design, construction, commissioning, operation, and maintenance of the Project. The minimum requirements of key personnel for the Project are presented in Table 4-.

b. The Bidder shall provide a detailed organogram for the entire project, including the design, construction, commissioning, operation, and maintenance phases. The organogram shall indicate the key personnel for the project.

c. The Bidder shall provide the detailed CV of each key personnel responsible for the works mentioned in Table 4-.and indicated on the detailed organogram.

d. If any replacement is required during the design, construction, commissioning, operation, and maintenance of the Project, the Bidder shall ensure that the replacement has equivalent or higher experience and qualifications than the one being replaced.

Table 7 Experience of Key Personnel

Item No.	Description	Unit	Required	Response from Bidder
1	**Designer**			
1.1	Solar PV system	Years	≥ 5	
1.2	Electrical works	Years	≥ 5	
1.3	C&I works	Years	≥ 5	
1.4	Civil / Structural works	Years	≥ 5	
1.5	Structural works	Years	≥ 5	
2	**Managers**			
2.1	Site Manager during construction	Years	≥ 5	
2.2	Site Manager during operation and maintenance	Years	≥ 3	
2.3	Project Manager	Years	≥ 3	
2.4	Commissioning Manager	Years	≥ 5	
2.5	Quality Manager	Years	≥ 5	
2.6	Health, Safety, and the Environment (HSE) Manager	Years	≥ 5	
3	**Trainers – Design, Construction, Commissioning, and O&M**			
3.1	Training Coordinator	Years	≥ 3	
4	**Detailed CV of all personnel mentioned above**	-	To be provided by Bidder	
5	**Organogram for the entire project, including the design, construction, commissioning, operation, and maintenance phases**	-	To be provided by Bidder	

5. EQUIPMENT WARRANTY

a. The Bidder provides equipment warranty according to minimum requirement set in Table 8 Equipment Warranty below.

b. In addition (and without prejudice) to the defects liability, the Bidder releases warranty on equipment (including not limited to strategic part warranty). No equipment warranty shall limit another warranty or otherwise.

c. The Bidder transfers the ownership of all manufacturer equipment warranties to the Employer during the Substantial Completion of the Project.

Table 8 Equipment Warranty

Equipment		Minimum Warranty Period in Years	Warranty Period in Years provided by Bidder
PV Modules	Product Warranty against Manufacturing defects	12	
	Linear Power Performance	25	
Mounting structures	Steel structure components	10	
	Corrosion	20	
	Tracker motors and gear (if applicable)	5	
	Communication and Control system (if applicable)	2	

Inverters	5	
MV Transformers	5	
MV Switchgear (Primary and Secondary distribution)	5	
HV Transformers	5	
HV Switchgear	5	
Civil Works (latent defect warranty)	10	

6. SOLAR PV PLANT CONFIGURATION AND PERFORMANCE CRITERIA

a. The Bidder ensures the Solar PV system design is performed according to all relevant standards, permits, licenses, best industry practice, and according to the site conditions.

b. The Bidder designs a PV Plant with AC capacity ≥ 75MW, complying with the requirements indicated below.

Table 9 Solar PV System Design

Item No.	Description	Unit	Required	Response from Bidder
1	**Basic Design Conditions**			
1.1	Design lifetime of the plant	Years	≥ 25	
1.2	Ambient Temperature	° C	-5 to 55	
1.3	Complying with site environmental conditions	Yes/No	Yes	
1.4	Complying with Environmental Permit and Water Use license permit	Yes/No	Yes	
2	**PV Capacity**			
2.1	Nominal AC capacity	MWac	≥ 10	
2.2	DC capacity	MWp	≥ 86.25	
2.3	Ratio of DC to AC capacity	-	≥ 1.15	
3	**Major Components – General Information**			
3.1	Total number of PV modules offered for the project	-	To be provided by Bidder	
3.2	Total number of inverters offered for the project	-	To be provided by Bidder	
3.3	Total number of Inverter Stations offered for the project (if applicable)	-	To be provided by Bidder	
3.4	Total number of MV/LV inverter transformers offered for the project	-	To be provided by Bidder	
4	**PV Module – Inverter Configuration**			
4.1	Number of PV modules per string	-	To be provided by Bidder	
4.2	String voltage (Vmpp) at maximum operating module temperature (at 85°C module temperature)	V	≥ 110% of minimum MPP input voltage of respective inverter	

4.3	String voltage (Vmpp) at minimum operating module temperature (at 0° C module temperature)	V	Below the maximum MPP input voltage of respective inverter	
4.4	String voltage (Voc) at minimum module temperature (at 0° C module temperature)	V	Below the maximum input voltage of respective inverter	
5	**Supportive Information**			
5.1	PV Array Layout	Yes/No	Yes	
5.2	String Voltage calculation	Yes/No	Yes	
5.3	Technical datasheet of PV module	Yes/No	Yes	
5.4	Technical datasheet of PV module mounting structure / tracker	Yes/No	Yes	
5.5	Technical datasheet of inverter	Yes/No	Yes	
5.6	Technical datasheet of Inverter Stations	Yes/No	Yes	
5.7	Technical datasheet of MV/LV inverter transformer	Yes/No	Yes	

7. GUARANTEE ON PERFORMANCE AND AVAILABILITY

a. The Bidder provides guarantee on the:
   i. Plant Performance Ratio (PR), and
   ii. Plant Availability

b. These Performance Guaranteed Values will be verified during the Provisional Acceptance Certificate (PAC) Test (PAT) and Final Acceptance Certificate (FAC) Tests.

c. The actual Performance Ratio (PR) shall be evaluated at 99% plant availability. The actual Plant Availability shall be evaluated separately.

d. The Bidder is required to provide Performance Guaranteed Values as indicated in Table 7-1.

Table 10 Plant Performance Guarantees

Year	Parameter	Minimum required by Employer	Guaranteed by Bidder
1	Guaranteed annual average Performance Ratio for year 1 of operation - Tests After Date of Completion (Year 1)	78%	
	Guaranteed annual average Plant Availability for year 1 of operation - Tests After Date of Completion (Year 1)	95%	
2	Guaranteed annual average Performance Ratio for year 2 of operation - Tests After Date of Completion (Year 2)	78%	
	Guaranteed annual average Plant Availability for year 2 of operation - Tests After Date of Completion (Year 2)	95%	

e. With regards to the “Guaranteed annual average Performance Ratio for year 1 of operation - Tests After Date of Completion (Year 1)” provided in Table 7-1, the

Bidder is required to provide a monthly breakdown of this year 1 Performance Ratio (PR) guarantee, along with estimation of solar irradiation on module plane, in a tabular format as shown in Table 7-2.

f. The Performance Ratio (PR) guaranteed for the Tests After Date of Completion (Year 1) will be the corresponding monthly average PR (shown in Table 7-2) during which the test is performed. If the test duration covers period of two consecutive months, then the guaranteed PR during the Tests After Date of Completion (Year 1) is calculated based on weighted average PR of the two respective months.

Table 11 Monthly breakdown of Guaranteed Performance Ratio for first year

Month	Breakdown of first year annual guaranteed PR (%)	Estimated Solar Irradiation on Module Plane (kWh/m2)
January		
Month	**Breakdown of first year annual guaranteed PR (%)**	**Estimated Solar Irradiation on Module Plane (kWh/m2)**
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual Average		

g. The Bidder provides the following supportive information and documents (indicated in Table 7-3) which shall verify the guaranteed level of Performance Ratio (PR).

Table 12 Plant Performance Estimation

Item No.	Description	Unit	Required	Response from Bidder
1	**Documents and Diagrams**			
1.1	Energy yield assessment report	Yes/No	Yes	
1.2	Bidder confirms that the TMY datasets, provided as part of the RfP documentation package, were used for the Energy Yield Assessment Report in 1.1 (P50, P90, and P99 for year 1, 10year, and 25-year return periods)	Yes/No	Yes	
1.3	PV Module tilt angle (for fixed-tilt)	°	10 – 25 degrees	

1.4	Row to row distance	m	To be provided by Bidder	
2	**Losses Estimation**			
2.1	Near shading losses	%	≤ 2.5	
2.2	Reflection (IAM) losses	%	To be provided by Bidder	
2.3	Soiling losses	%	To be provided by Bidder	
2.4	Losses due to irradiance level	%	To be provided by Bidder	
2.5	Losses due to temperature	%	To be provided by Bidder	
2.6	Mismatch losses	%	To be provided by Bidder	
2.7	Module quality losses	%	To be provided by Bidder	
2.8	DC cabling losses	%	To be provided by Bidder	
2.9	AC cabling losses	%	To be provided by Bidder	
2.1	Losses in inverter	%	To be provided by Bidder	
2.11	Technical availability	%	To be provided by Bidder	
2.12	MV/LV Transformer losses	%	To be provided by Bidder	
2.13	Self-consumption losses	%	To be provided by Bidder	
2.14	Power evacuation losses	%	To be provided by Bidder	
2.15	Annual module degradation	%	To be provided by Bidder	
2.16	Others (specify)	%	To be provided by Bidder	

8. ELECTRICAL SYSTEM

8.1 ELECTRICAL SYSTEM CRITERIA

Table 13 Electrical Single Line Diagram and Reports

Item No.	Description	Unit	Required	Response from Bidder
1	**Full Compliance to Electrical Requirements**			
1.1	The Bidder submits a technical report or methodology confirming full compliance or any deviations if applicable for the electrical design, installation, commissioning, and handover requirements specified in the electrical scope.	-	To be provided by Bidder	
2	**Type Test Certificates and/or Datasheets**			
2.1	Submission of typical Type test certificate and/or datasheet for Primary and Secondary MV Switchgear (GIS or AIS)	-	To be provided by Bidder	
2.2	Typical Type Test certificate and/or datasheet for HV/MV Power Transformer.	-	To be provided by Bidder	
3	**Plant Electrical Single Line Diagram**			
3.1	Submission of a high level Conceptual Electrical reticulation or Single Line Drawing containing the following as a minimum: - PV Modules - DC and AC Cabling - Combiner boxes - Inverter stations - Primary and secondary Switchgear - HV/MV Transformers - Power protection and surge devices - Overhead line - Indication of Point of Connection (POC)	-	To be provided by Bidder	
4	**Power System Study**			
4.1	Submission of Power System Study report previously done by the Contractor for similar scope of work	-	To be provided by Bidder	

9. TECHNICAL SCHEDULES

9.1 PV MODULES

Table 14 PV Modules Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Product information**			
1.1	PV Module manufacturer	Name	To be provided by Bidder	

1.2	Proof / supporting documentation that the offered PV module manufacturer is on the BNEF PV Module Tier 1 list	-	To be provided by Bidder	
1.3	Module Type	-	To be provided by Bidder	
2	**Technical Characteristics**			
2.1	PV Module/Cell technology	-	To be provided by Bidder	
2.2	String maximum Voltage	VDC	1500	
2.3	Positive Power Tolerance	W	0 to +5 (or 0 to +3%)	
2.4	Module efficiency	%	≥ 20%	
2.5	Operating temperature	°C	between -40 °C and 85 °C	
2.6	Static mechanical load	Pa	≥ 2400	
2.7	Increased distributed mechanical load on the front glass surface	Pa	≥ 5400	
2.8	Temperature coefficient	%/°C	≥ -0.37	
2.9	Light induced degradation loss	%	≤ 2	
2.10	Nominal Module Operating Temperature (NMOT) lower than or equal to	°C	≤ 45 °C ±2 °C (NMOT @800 W/m2, 20 °C, AM 1.5, Wind speed 1 m/s)	
3	**Product Performance Guarantee**			
3.1	Power output guaranteed during the first year of operation	%	Minimum: 98%	
3.2	Linear power degradation coefficient from year 2 to year 25	%/year	Maximum degradation of -0.55%/year	
3.3	Guaranteed output of the nominal power after 10 years	%	Minimum 90%	
3.4	Guaranteed output of the nominal power after 25 years	%	Minimum 80%	
4	**Minimum Certificates and Standards**			
4.1	As per Section 9.5 of the Employer's Requirements [375-172742], indicating required minimum certificates and standards.	Yes/No	Yes	
5	**Track Record**			
5.1	Manufacturer Production track record	year	≥ 5	
5.2	Minimum annual production capacity	MWp	≥ 500	
5.3	Capacity installed	MWp	≥ 1,000	
5.4	Module type in operation in at least three (3) commercial plants of similar size (10 MWac) that have been in successful operation for at least one (1) year.	Yes/No	Yes	
5.4.1	Location of each Project	-	To be provided by Bidder	

5.4.2	Capacity of each Project	MWp	To be provided by Bidder	
5.4.3	Commercial operation date of each project	-	To be provided by Bidder	
6	**Supportive Documents**			
6.1	Module Datasheet	-	To be provided by Bidder	
6.2	Brief description of the cleaning strategy instruction (from module manufacturer)	-	To be provided by Bidder	
6.3	A letter of confirmation certifying that module manufacturer track record is as per 5.1, 5.2, and 5.3 of this table.	-	To be provided by Bidder	
7	**Additional Information – To be listed by the Bidder**			
7.1	To be defined by the Bidder	-	To be provided by Bidder	

9.1.1 Inverters

Table 15 Inverter Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Product information**			
1.1	Inverter manufacturer	Name	To be provided by Bidder	
1.2	Inverter Type	-	To be provided by Bidder	
2	**Track Record**			
2.1	Manufacturer Production track record	year	≥ 5	
2.2	Minimum annual production capacity	MW		
2.3	Minimum capacity installed	MW		
2.4	Inverter type or series in operation in at least three (3) commercial plants totalling 20 MWac or higher nominal power (not demonstration projects), for at least twelve (12) months and have recorded a technical availability of at least 99% for twelve (12) consecutive months of operation.	Yes/No	Yes	
2.4.1	Location of each Project	-	To be provided by Bidder	
2.4.2	Capacity of each Project	MW	To be provided by Bidder	
2.4.3	Commercial operation date of each project	-	To be provided by Bidder	

2.5	Inverter type or series in operation in similar ambient conditions (up to ≥ 50°C)	months	≥ 12	
3	**Inverter Characteristics**			
3.1	Inverter technology/type	-	Central/String	
3.2	Inverter rated capacity per unit	MVA	To be provided by Bidder	
3.3	Nominal AC output Voltage	V	To be provided by Bidder	
3.4	Maximum conversion efficiency	%	≥ 98	
3.5	European efficiency	%	≥ 98	
3.6	Operating ambient temperature range	°C	-5 … +50	
3.7	Cooling method/mechanism	-	To be provided by Bidder. (The inverter cooling method shall be designed for installation and operating site conditions to ensure the inverter functions within its operating ambient temperature range)	
3.8	Inverter Maximum DC voltage	V	1,500	
3.9	Connection phases	-	Three-Phase	
3.10.	Frequency	Hz	50	
3.11	Total harmonic distortion, Power Factor, Anti-islanding protection	-	According to South African Grid code compliance: Grid connection code for Renewable Power Plants (RPPs) connected to the electricity Transmission system (TS) or the Distribution system (DS) in South Africa	
3.12	Protection type IP rating	IP	Indoor ≥ IP54, Outdoor ≥ IP65	

3.13	Controllability of inverter output per remote control / energy management system, if possible.	Yes/No	Yes: Dynamic adjustable	
3.14	Earthing concept/philosophy	Yes/No	Yes Earthing according to installation requirements of PV module and inverter manufacturer.	
3.15	Input Failure detection	Yes/No	Yes	
3.16	Frequency protection	Yes/No	Yes	
3.17	DC overvoltage protection	Yes/No	Yes	
3.18	Surge protection	Yes/No	Yes	
4	**Minimum required standards**			
4.1	As per Section 9.11 of the Employer's Requirements [375-172742] indicating required minimum certificates and standards.	Yes/No	Yes	
5	**Monitoring system requirements**			
5.1	Continuous data logging to the CMS system for the defined technical plant performance parameters including events and status.	Yes/No	Yes	
5.2	Connection interface to CMS	Yes/No	Yes	
6	**Product Warranty Extension**			
6.1	The Bidder shall indicate if the inverter manufacturer has an option for extension of product warranty. If yes, maximum duration of the warranty shall be indicated	years	To be provided by Bidder	
7	**Supportive Documents**			
7.1	Inverter datasheet	-	To be provided by Bidder	
7.2	A letter of confirmation certifying that inverter manufacturer track record is as per 2.1, 2.2, and 2.3 of this table.	-	To be provided by Bidder	
8	**Additional Information – To be listed by the Bidder**			
8.1	To be defined by the Bidder	-		

9.1.2 Inverter Station

Table 16 Inverter Station Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Product information**			
1.1	Inverter Station manufacturer	Name	To be provided by Bidder	
2	**Track Record**			
2.1	Have been used in Projects of 20 MW in capacity or more.	Yes/No	Yes	

2.2	Location of project	-	To be provided by Bidder	
2.3	Capacity of project	-	To be provided by Bidder	
2.4	Commercial operation date	-	To be provided by Bidder	
3	**Inverter Station Characteristics**			
3.1	For central inverter; shall at minimum house inverters and associated protection and control equipment and LV/LV auxiliary transformer.	Yes/No	Yes	
3.2	Ventilation system type	-	To be provided by Bidder	
3.3	Degree of Protection (SANS 60529)	IP	≥ IP65	
3.4	Designed/protected to withstand outdoor conditions for at least 25 years	Yes/No	Yes	
3.5	Corrosion resistance	Yes/No	Yes	
4	**Product Warranty**			
4.1	Product warranty	Year	≥ 5	
5	**Supportive Documents**			
5.1	Inverter Power Station datasheet	-	To be provided by Bidder	
6	**Additional Information – To be listed by the Bidder**			
6.1	To be defined by the Bidder	-		

9.1.3 MV/LV Inverter transformer

Table 17 MV/LV Inverter transformer Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Product information**			
1.1	MV/LV Inverter transformer manufacturer	Name	To be provided by Bidder	
2	**Transformer Characteristics**			
2.1	Transformer Type	-	To be provided by Bidder	
2.2	Rated Capacity	MVA	To be provided by Bidder	
2.3	Nominal Voltage (Low voltage side)	V	To be provided by Bidder	
2.4	Nominal Voltage (Medium voltage side)	kV	To be provided by Bidder	
2.5	Rated Frequency	Hz	50	
2.6	Tap-Changer Type	-	off-load	

2.7	Tap-changer - number of steps	No.	5	
2.8	Tap-changer –Ratio of each step	%	-5% to 5%	
2.9	Type of protection	-	To be provided by Bidder	
2.10.	Transformer insulating medium	Type	Biodegradable oil or Dry-type	
2.11	Transformer Cooling method	-	To be provided by Bidder	
2.12	IP Rating	IP	≥ IP55 for outdoor ≥IP4X for indoor	
2.13	No-load losses	W	To be provided by Bidder	
2.14	Load losses	W	To be provided by Bidder	
2.15	Climatic class (dry-type transformer only)	-	C2	
2.16	Environmental class (dry-type transformer only)	-	E2	
2.17	Fire class (dry-type transformer only)	-	F1	
2.18	Insulation Class (dry-type transformer only)	-	F	
3	**Minimum required standards (to be proven by respective Certificate or Conformity Declaration)**			
3.1	As per Section 12.7 of the Employer's Requirements [375-172742], indicating required minimum certificates and standards	Yes/No	Yes	
4	**Monitoring system requirements**			
4.1	Continuous data logging to the CMS system for the defined transformer performance parameters including events and status.	Yes/No	Yes	
4.2	Connection interface to CMS system using protocols.	Yes/No	Yes	
5	**Supportive Documents**			
5.1	Transformer Datasheet	-	To be provided by Bidder	
6	**Additional Information – To be listed by the Bidder**			
6.1	To be defined by the Bidder	-	To be provided by Bidder	

9.1.4 MV/LV Auxiliary transformer

Table 18 MV/LV Auxiliary transformer Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Product information**			
1.1	MV/LV Aux transformer manufacturer	Name	To be provided by Bidder	
2	**Transformer Characteristics**			

2.1	Transformer Type	-	To be provided by Bidder	
2.2	Rated Capacity	MVA	To be provided by Bidder	
2.3	Nominal Voltage (Low voltage side)	V	To be provided by Bidder	
2.4	Nominal Voltage (Medium voltage side)	kV	To be provided by Bidder	
2.5	Rated Frequency	Hz	50	
2.6	Tap-Changer Type	-	off-load	
2.7	Tap-changer - number of steps	No.	5	
2.8	Tap-changer –Ratio of each step	%	-5% to 5%	
2.9	Type of protection	-	To be provided by Bidder	
2.10.	Transformer insulating medium	Type	Biodegradable oil or Dry-type	
2.11	Transformer Cooling method	-	To be provided by Bidder	
2.12	IP Rating	IP	≥ IP55 for outdoor ≥IP4X for indoor	
2.13	No-load losses	W	To be provided by Bidder	No-load losses
2.14	Load losses	W	To be provided by Bidder	Load losses
2.15	Climatic class (dry-type transformer only)	-	C2	
2.16	Environmental class (dry-type transformer only)	-	E2	
2.17	Fire class (dry-type transformer only)	-	F1	
2.18	Insulation Class (dry-type transformer only)	-	F	
3	**Minimum required standards (to be proven by respective Certificate or Conformity Declaration)**			
3.1	As per Section 12.7 of the Employer's Requirements [375-172742], indicating required minimum certificates and standards	Yes/No	Yes	
4	**Monitoring system requirements**			
4.1	Continuous data logging to the CMS system for the defined transformer performance parameters including events and status.	Yes/No	Yes	
4.2	Connection interface to CMS system using protocols.	Yes/No	Yes	
5	**Supportive Documents**			
5.1	Transformer Datasheet	-	To be provided by Bidder	

6	**Additional Information – To be listed by the Bidder**			
6.1	To be defined by the Bidder	-	To be provided by Bidder	

9.1.5 MV Primary Switchgear

Table 19 MV Primary Switchgear Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Product information**			
1.1	Switchgear manufacturer	Name	To be provided by Bidder	
1.2	Type/Model	Type	To be provided by Bidder	
2	**Ratings**			
2.1	Nominal voltage	kVrms	33kV	
2.2	Rated voltage	kVrms	To be provided by Bidder	
2.3	System frequency	Hz	50	
3	**Design**			
3.1	Indoor/Outdoor application	-	Indoor	
3.2	Insulating medium	-	AIS	
3.3	Type	Withdrawable or - Fixed patten	Withdrawable	
3.4	Interrupting technology	-	Vacuum	
4	**Supportive Documentation**			
4.1	Switchgear datasheet/Catalogue	-	To be provided by Bidder	
5	**Minimum required standards**			
5.1	As per Section 12.9 of the Employer's Requirements [375-172742], indicating required minimum standards	Yes/No	Yes	
6	**Additional Information – To be listed by the Bidder**			
6.1	To be defined by the Bidder	-		

9.1.6 Grid Code Compliance

Table 20 Grid Code Compliance

Item No.	Description	Unit	Required	Response from Bidder
1	**Minimum Plant Technical Grid Code Requirements for category C Plant**			

1.1	Voltage range as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
1.2	Frequency as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
1.3	Voltage ride through as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
1.4	Power Quality as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
1.5	Power Frequency response as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
1.6	Reactive Power Capabilities as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
1.7	Protection and fault levels as per Category C in the renewable Grid Code of South Africa	Yes/No	Yes	
2	**Plant Required Control Functions**			
2.1	Voltage Control	Yes/No	Yes	
2.2	Power Factor Control	Yes/No	Yes	
2.3	Reactive Power Control	Yes/No	Yes	
3	**Minimum required standards**			
3.1	Grid Connection Code for Renewable	Yes/No	Yes	
	Power Plants (RPPs) Connected to the Electricity Transmission system (TS) or the Distribution System (DS) in South Africa			
4	**Additional Information – To be listed by the Bidder**			
4.1	To be defined by the Bidder	-	-	

10. CONTROL AND MONITORING SYSTEM (CMS)

10.1 CMS CRITERIA

Table 21 CMS CRITERIA

Item No.	Description	Unit	Required	Response from Bidder
1	**Experience in CMS or SCADA systems for Utility scale PV plant applications**			
1.1	The Bidder shall provide proof of successful installation of the proposed CMS/SCADA network on PV plants. Proof shall be provided in a table of references with plant name, plant capacity, year commissioned, CMS system details.	-	Five (5) PV plants around the world, of ≥ 10MWac each, during the past 7 years	

1.2	The Bidder provides proof of experience with the proposed software. Proof shall be provided in a table of references with plant name, plant capacity, year commissioned, CMS system details, The CMS details shall include network layout, CMS overview report including Original Equipment Manufacturer (OEM) equipment information of all hardware and software, operator Human Machine Interface (HMI) screen dumps of the various display tabs.	-	Two (2) PV plants ≥ 10MW each, during the past 5 years	
2	**CMS Compliance**			
2.1	CMS network single line diagram showing Plant Interface architecture (high level)	Yes/No	Yes	
2.2	CMS equipment and cable list in tabular format (basic)	Yes/No	Yes	
2.3	Field wiring philosophy (basic)	Yes/No	Yes	
2.4	CMS power supply and power distribution diagram, showing UPS and battery bank sizing (high level)	Yes/No	Yes	
2.5	19" network cabinet specifications and general arrangement drawing (basic)	Yes/No	Yes	
2.6	CMS equipment panel specifications and general arrangement drawings (basic)	Yes/No	Yes	
2.7	CMS design report describing the hardware and software, the operating philosophy, information servers and data analysis tools (basic philosophy)	Yes/No	Yes	
2.8	Control and server room layout drawing (high-level)	Yes/No	Yes	
3	**C&I Design Criteria**			
3.1	The system shall be designed to ensure high availability, i.e., greater than 99.9%.	Yes/No	Yes	
3.2	Data shall be stored locally and externally, with periodic backups performed with external hard drives which are to be kept in a secure location.	Yes/No	Yes	
3.3	Compliance with Eskom's Standard for Demilitarised Zone (DMZ) Designs for Operational Technology (24079669677), Information Security – IT/OT and Third Party Remote Access Standard (32-373), Eskom Cyber Security Standard for Operation Technology (240-55410927), and Human Machine Interface Design Requirements Standard (24056355728)	Yes/No	Yes	
3.4	Open data exchange: data exchange interface must make it possible for the Employer's centralized control and monitoring system to exchange data with the SCADA system for both real time and historical data.	Yes/No	Yes	
3.5	The Plant SCADA system and field control system shall allow for automatic start-up and shut down of the Plant.	Yes/No	Yes	
3.6	The field control system shall be designed to ensure normal operation even in the event of loss of software communication link.	Yes/No	Yes	

3.7	The Contractor shall ensure that the SCADA system has an operational life span of 25 years from the Plant's Commercial Operations Date (COD), which involves being capable of adapting to software updates. The Contract shall provide a lifecycle management plan for the SCADA system hardware and the OS and APP software.	Yes/No	Yes	
3.8	A minimum of ten (10) user licenses shall be provided to the Employer, and it shall be possible to restrict user access to rational levels so as to protect the integrity of the system and prevent unwanted, unwarranted, and/or unsafe Project configuration changes	Yes/No	Yes	
3.9	The SCADA system vendor must be able to offer technical support for the operational life of the system. The Contractor shall provide a lifecycle management plan for the SCADA hardware and OS and APP software	Yes/No	Yes	
3.1	The Employer will require licenses and access to make changes to the SCADA system/PLC system and all programmable devices as and when required.	Yes/No	Yes	
4	**High-level plant interface Architecture**			
4.1	The Bidder will provide a High-level Plant Interface Architecture	-	To be provided by Bidder	

11. TECHNICAL SCHEDULES

Table 22 Control and Monitoring Systems Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Data Sheets and Manuals**			
1.1	CMS Servers	Yes/No	Yes	
1.2	Network Switches	Yes/No	Yes	
1.3	GPS time server	Yes/No	Yes	
1.4	Thin clients (CPU, monitors, keyboard, mouse)	Yes/No	Yes	
1.5	KVM extenders	Yes/No	Yes	
1.6	Firewall gateway	Yes/No	Yes	
1.7	Web server	Yes/No	Yes	
1.8	Fire panels	Yes/No	Yes	
1.9	Fire sensors and alarm equipment	Yes/No	Yes	
1.1	Programmable logic controllers	Yes/No	Yes	
1.11	IO cards / RTUs	Yes/No	Yes	
1.12	UPS and battery banks	Yes/No	Yes	
1.13	DC power supplies	Yes/No	Yes	
1.14	CMS application software for operating, monitoring and configuration (i.e., SCADA software manual)	Yes/No	Yes	
1.15	Antivirus software	Yes/No	Yes	
1.16	OPC server software	Yes/No	Yes	
1.17	BMS server/workstation	Yes/No	Yes	

1.18	BMS application software	Yes/No	Yes	
2	**CMS Servers**			
2.1	No of units	pcs	2 (dual redundant configuration)	
2.2	Manufacturer	-	To be provided by Bidder	
2.3	Product/Model/Type	Yes/No	Yes	
2.4	Communication capabilities Ethernet, Serial RS485, Optical fibre	Yes/No	Yes	
2.5	Redundant array of independent disks (RAID) configuration	Yes/No	Yes	
2.6	Redundant power supplies with dual power input ports	Yes/No	Yes	
2.7	Redundant case fans,	Yes/No	Yes	
2.8	19” (inch.) rack-mountable type enclosure for the servers and power supplies installed in the plant server room	Yes/No	Yes	
2.9	On-board database to continuously process and store all real time plant data for the lifespan of the plant,	Yes/No	Yes	
2.1	Front accessible universal serial bus (USB) ports.	Yes/No	Yes	
3	**SCADA/CMS Software**			
3.1	Microsoft Windows 11 Operating system	Yes/No	Yes	
3.2	Only industry recognised software shall be used.	Yes/No	Yes	
3.3	Licences for the software systems will be purchased by the Contractor and made available with step-in rights for the future purchasers and operators of the Plant.	Yes/No	Yes	
3.4	The Contractor shall provide all project specific software, firmware, and operating system developed for, and applicable to, the control and monitoring systems being provided. The SCADA system shall include novel modelling approaches and techno-financial indicators allowing the operators to predict failures, detect root causes of errors, and optimise the Plant operation in a cost-effective manner.	Yes/No	Yes	
3.5	The software shall be completely documented by the Contractor and be provided on a non-proprietary basis. The Contractor shall provide a remote monitoring system and software with a supervisory role and access to historic values.	Yes/No	Yes	
3.6	Custom software required to adapt or customise the control and monitoring systems shall be provided by the Contractor.	Yes/No	Yes	
3.7	CMS application software for comprehensive operating, monitoring and configuration of all plant equipment and sub-systems	pcs	≥ 2	
3.8	Web-server application software for remote clients	Yes/No	Yes	
3.9	Information server application software	pcs	≥ 2	

3.1	Hosting the anti-virus software	pcs	≥ 2	
3.11	Firewall software	Yes/No	Yes	
3.12	OPC server software	Yes/No	Yes	
3.13	Other 3rd party system software	-	To be provided by Bidder	
4	**Operator Thin Clients**			
4.1	No of CPU units	pcs	≥ 2	
4.2	Manufacturer	-	To be provided by Bidder	
4.3	Product/Model/Type	Yes/No	Yes	
4.4	Communication capabilities - Ethernet	Yes/No	Yes	
4.5	19-inch rack type	Yes/No	Yes	
4.6	100% operational availability per thin client	Yes/No	Yes	
4.7	19-inch (minimum)TFT LCD monitors	Pcs	6 (3 per thin client)	
4.8	40-inch (minimum)TFT LCD monitors	Pcs	2 (1 per thin client)	
4.9	Monitor Manufacturer	-	To be provided by Bidder	
4.1	Monitor Product/Model/Type	Yes/No	Yes	
4.11	Monitor Communication capabilities, HDMI, DisplayPort, VGA	Yes/No	Yes	
4.12	Number of keyboards and mouse sets	pcs	2	
4.13	Keyboard video and mouse (KVM) extenders per thin client	pcs	4 (2 per thin client)	
5	**CMS Web Server**			
5.1	On-site web-server for access to remote web-clients	Yes/No	Yes	
5.2	Number of web-client licences for remote monitoring (concurrent access)	-	20	
6	**Ethernet Network switches**			
6.1	No. in Server room (installed in 19” cabinet, rack mount)	pcs	2 (dual redundant)	
6.2	No. in Inverter Stations and switchgear rooms (installed in CMS panels, DIN mount)	pcs	10 (1 per location)	
6.3	Switch Manufacturer	-	To be provided by Bidder	
6.4	Product/Model/Type	-	To be provided by Bidder	
6.5	Product data sheet and manual	-	To be provided by Bidder	
6.6	Optical fibre and Ethernet ports	Yes/No	Yes	
6.7	Managed type with online management and configuration via the thin clients using a network management software installed on the CMS servers.	Yes/No	Yes	
6.8	Compatibility with Simple network management protocol version 3 (SNMP v3) and Internet protocol version 6 (IPv6).	Yes/No	Yes	

6.9	Online monitoring of the port connections, communication link status, bandwidth, and device heath status indicating alarms and faults to the server and remote users.	Yes/No	Yes	
6.1	Power supply from dual redundant power sources (230 Vac or 24 Vdc)	Yes/No	Yes	
6.11	Dual power input ports	Yes/No	Yes	
6.12	Optical fibre and Ethernet ports	Yes/No	Yes	
6.13	10% unused ports (rounded up)	Yes/No	Yes	
6.14	Wide operating temperature range (typically between -40C to +75C)	Yes/No	Yes	
6.15	Auto negotiation capability	Yes/No	Yes	
6.16	Auto crossover (MDIX) capability	Yes/No	Yes	
6.17	Full duplex communication capability	Yes/No	Yes	
6.18	Single fault tolerant, backbone CMS network	Yes/No	Yes	
6.19	Network topology (Ring, Star) with single fault tolerance	-	Ring with Redundancy Manager	
7	**Network Time Synchronisation**			
7.1	19” time server unit installed in server room	Yes/No	Yes	
7.2	GPS antenna	Yes/No	Yes	
7.3	NTP synchronisation via Ethernet	Yes/No	Yes	
7.4	Time stamping accuracy (UTC+2)	ms	10	
7.5	Automatic self-calibrating function	Yes/No	Yes	
7.6	Power source (UPS)	V	230	
7.7	On-board display and function keys	Yes/No	Yes	
8	**CMS Field Equipment Panels**			
8.1	Wall mounted	Yes/No	Yes	
8.2	Protection class (indoor)	IP	54	
8.3	Protection class for string combiner boxes and weather stations (outdoor)	IP	65	
8.4	Open/Close door sensor	Yes/No	Yes	
8.5	Internal ambient temperature sensor	Yes/No	Yes	
8.6	Power source (100% availability)	V	230	
9	**Server Room Network cabinets**			
9.1	19” rack type, 42U height	Yes/No	Yes	
9.2	Network and power cabling, bottom entry	Yes/No	Yes	
9.3	Use of grommets at cable entries	Yes/No	Yes	
9.4	Internal cable channels for routing of cables	Yes/No	Yes	
9.5	Removable blanking panels	Yes/No	Yes	
9.6	Perforated front and rear panels	Yes/No	Yes	
9.7	Perforated side panels	Yes/No	Yes	
9.8	Removable front and rear doors	Yes/No	Yes	
9.9	Open/close door sensors	Yes/No	Yes	
9.1	Internal lighting	Yes/No	Yes	
9.11	Internal ambient temperature sensor	Yes/No	Yes	
9.12	Supplied general arrangement (GA) drawings of server room network panels	Yes/No	Yes	
10	**Fire Detection System**			

10.1	No. of fire panels (depending on communication medium limits per zone)	pcs	To be provided by Bidder	
10.2	Protection class (indoor installation)	IP	54	
10.3	SANS 10139 compliance	Yes/No	Yes	
10.4	Product datasheet of fire panels	Yes/No	Yes	
10.5	Smoke/Heat sensors make and model	-	To be provided by Bidder	
10.6	Sensor and alarming products datasheet	Yes/No	Yes	
10.7	Real time monitoring at PV control room via operator HMI	Yes/No	Yes	
11	**CMS Power Supply**			
11.1	Dual- redundantly configured, online UPS system with seal-type battery backup, and back-up time of 12 hours	Yes/No	Yes	
11.2	Sealed type nickel cadmium or lithium ion batteries	Yes/No	Yes	
12	**CMS Interfaces**			
12.1	Meteorological systems (weather station, instruments), Modbus RS485	Yes/No	Yes	
12.2	String combiner boxes, Modbus RS485	Yes/No	Yes	
12.3	Central inverters, Modbus RS485 or TCP	Yes/No	Yes	
12.4	Switchgear MCCBs, Modbus RS485 or TCP, 24V potential free	Yes/No	Yes	
12.5	MV and LV Transformers, Modbus RS485, 4-20mA.	Yes/No	Yes	
12.6	Energy meters, Modbus RS485 or TCP	Yes/No	Yes	
12.7	Switchgear electrical protection relays, Modbus RS485 or TCP	Yes/No	Yes	
12.8	Electrical battery tripping units (BTU)	Yes/No	Yes	
12.9	CMS uninterruptable power supply (UPS) units	Yes/No	Yes	
12.1	Internal environmental sensors of equipment panels, network cabinets, Inverter Power Stations,	Yes/No	Yes	
12.11	Balance of plant (BoP) potable water and sewage tank levels	Yes/No	Yes	
12.12	Fire detection system	Yes/No	Yes	
12.13	Heating, ventilation and air-conditioning (HVAC) system	Yes/No	Yes	
12.14	Interface to Eskom Enterprise Historian. OPC DA	Yes/No	Yes	
12.15	Firewalled connectivity to internet for full remote monitoring functionality of the PV plant	Yes/No	Yes	
12.16	The Bidder to provide internet service provider (ISP) via ADSL or 3G for use on the plant during the installation and O&M period.	Yes/No	Yes	
12.17	Provision of an Eskom approved gateway for future interface to the NSP using the DNP3 protocol.	Yes/No	Yes	
12.18	CMS interface to Power station EOD	Yes/No	Yes	
12.19	A3 colour printer connected to CMS network	Yes/No	Yes	
13	**Data Communication Medium**			
13.1	Cat6 shielded twisted pair (STP)	Yes/No	Yes	
13.2	Single mode optical fibre > 2kM	Yes/No	Yes	
13.3	Multi-mode optical fibre < 2kM	Yes/No	Yes	

13.4	Wireless / Bluetooth communication	Yes/No	No	

12. CIVIL, STRUCTURAL AND INFRASTRUCTURE WORKS

12.1 CIVIL, STRUCTURAL AND INFRASTRUCTURE CRITERIA

Table 23 Civil, structural and infrastructure criteria

Item No.	Description	Unit	Required	Response from Bidder
1		**Work Methodology**		
1.1	Technical proposal detailing the work methodology, which complies to the full scope and describes how the scope will be executed (both design and construction phases of the project). Technical proposal must demonstrate understanding of the scope and include the following as a minimum: • Proposed plant, equipment and tools • Methodology for the proposed works • Foreseen risks and concerns • Health and safety requirements • Quality management requirements • Required temporary works (if any)	-	To be provided by Bidder	

12.2 TECHNICAL SCHEDULES

Table 24 Civil & Structural Compliance to Functional Specification

Item No.	Description	Unit	Required	Response from Bidder
1	**Geotechnical Investigation**			
1.1	Detailed geotechnical investigation to be carried out by the Bidder	Yes/No	Yes	
2	**Foundation for Mounting Structure**			
2.1	Foundation type	-	To be provided by Bidder	
2.2	Foundation design applicable to Environmental Permit and Water Use license permit	Yes/ No	Yes	
3	**Hydrological Impact Assessment**			
3.1	Detailed hydrological impact assessment to be carried out by the Bidder	Yes/ No	Yes	
4	**Topographical survey**			
4.1	Detailed topographical survey to be carried out by the Bidder	Yes/No	Yes	
5	**Supportive Documents**			
5.1	Indicative Plant Layout drawing, including roads, fence, O&M building, Laydown area, MV/LV inverters, substation buildings and yards.	Yes/No	Yes	
6	**Coal ash waste resource**			

6.1	Ash waste resource to be incorporated into the civil and structural designs as per 10.11.3 of the Employer's Requirements [375-172742]	Yes/No	Bidder to specify	
6.2	Additional information to be provided in relation to 6.1	Yes	Yes	

13. BALANCE OF PLANT

13.1 FIRE PROTECTION

Table 25 Fire protection Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**Fire protection system design**			
1.1	The Bidder shall submit a Fire Protection Services design philosophy, covering aspects such as the fire protection/detection assessment, system and component description, system sizing approach, system design and construction codes, and system process (diagram).	Yes/No	Yes	

13.2 WATER SUPPLY AND RETICULATION

Table 26 Water Supply and Reticulation Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**Potable and Process Water Supply and Reticulation System**			
1.1	The Bidder submits a Potable and Process Water Supply and Reticulation Design Philosophy Report. The report shall include system and component descriptions, system sizing approach, applicable system design and construction codes, treatment of water for cleaning PV modules, monitoring mechanisms, etc.	Yes/No	Yes	

13.3 HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

Table 27 HVAC Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**HVAC system design**			

1.1	The Bidder submits a HVAC Services Design Philosophy Report. The report shall include system and component descriptions, system sizing approach, applicable system design and construction codes, etc., thereby documenting the design philosophy for: - O&M Control room - O&M Server Room - Offices - O&M Spare Parts Workshop - O&M Ablutions and locker rooms - Inverter stations - Substations	Yes/No	Yes	

13.4 MONITORING AND METEOROLOGICAL EQUIPMENT AND INSTRUMENTATION

Table 28 Monitoring and Meteorological Equipment and Instrumentation Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**General**			
1.1	No. of meteorological stations	-	≥ 4	
2	**Meteorological Station Equipment and Instrumentation**			
2.1	**Irradiance**			
2.1.1	No. of Pyranometer installed at Horizontal plane to measure GHI	pcs	≥ 4	
2.1.2	No. of Pyranometer installed at POA to measure POA irradiance	pcs	≥ 4	
2.1.3	No. of albedometers for bifacial modules: No. horizontally mounted albedometer installed away from the solar array in an unobstructed area OR No. of in-plane rear-side irradiance albedometers	pcs	≥ 3 OR ≥ 9	
2.1.4	Product type	-	To be provided by Bidder	
2.1.5	Class (according to ISO 9060)	-	Second	
2.1.6	Measurement uncertainty	%	≤ 2%	
2.1.7	Product data sheet	Yes/No	Yes	
2.1.8	Calibration certificate	Yes/No	Yes	
2.2	**PV Array Temperature Measurement**			
2.2.1	No. of temperature sensors	pcs	≥ 8	
2.2.2	Manufacturer	-	To be provided by Bidder	
2.2.3	Product/Model/Type	Yes/No	Yes	
2.2.4	Product data sheet	Yes/No	Yes	
2.2.5	Measurement accuracy	°C	±1	
2.2.6	According to IEC 61724-1 or equivalent	Yes/No	Yes	
2.2.7	Temperature range	°C	-40 to 100°C	
2.3	**Ambient temperature measurement**			

2.3.1	No. of temperature sensors	pcs	≥ 4	
2.3.2	Manufacturer	-	To be provided by Bidder	
2.3.3	Product/Model/Type	Yes/No	Yes	
2.3.4	Product data sheet	Yes/No	Yes	
2.3.5	Measurement accuracy	±°C	1	
2.3.6	According to IEC 62724-1 or equivalent	Yes/No	Yes	
2.4	**Soiling**			
2.4.1	No. of soiling measurement instruments	pcs	≥ 4	
2.4.2	Manufacturer	-	To be provided by Bidder	
2.4.3	Product/Model/Type	Yes/No	Yes	
2.4.4	Product data sheet	Yes/No	Yes	
2.4.5	Calibration according to IEC 61724-1 Photovoltaic system performance.	Yes/No	Yes	
2.4.7	Uncertainty of measurement	%	≤ 3%	
2.4.8	Calibration certificate	Yes/No	Yes	
2.5	**Wind speed and Wind direction measurement**			
2.5.1	No of Anemometer	pcs	≥ 4	
2.5.2	Manufacturer/Product type	-	To be provided by Bidder	
2.5.3	Product data sheet	Yes/No	Yes	
2.5.4	Anemometer suitable of wind energy applications	Yes/No	Yes	
2.5.5	Operational Temperature	°C	-20 to 70	
2.5.6	Speed Range	m/s	0 to 70	
2.5.7	Wind direction accuracy	°	± 5°	
2.6	**Rainfall gauge**			
2.6.1	No. of rain gauge	pcs	≥ 4	
2.6.2	Manufacturer/Product type	-	To be provided by Bidder	
2.6.3	Product data sheet	Yes/No	Yes	
2.7	**Moisture Meter – Relative Humidity Measurement**			
2.7.1	No. of moisture meter	pcs	≥ 4	
2.7.2	Manufacturer/Product type	-	To be provided by Bidder	
2.7.3	Product data sheet	Yes/No	Yes	
2.7.4	Range	% RH	0 - 100	
2.7.5	Overall Accuracy	%	± 2 %	
2.7.6	Response Time	s	20 s (T90) or less	

13.5 SEWAGE AND WASTE DISPOSAL SERVICES

Table 29 Sewage and Waste Disposal Services Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**Sewage and Waste Disposal System**			

1.1	The Bidder submits a Sewage and Waste Disposal Design Philosophy Report. The report shall include system and component descriptions, system sizing approach, applicable system design and construction codes, monitoring mechanisms, etc.	Yes/No	Yes	

14. OPERATION AND MAINTENANCE

14.1 OPERATION AND MAINTENANCE PLAN

Table 30 Operations and Maintenance Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**Operations and Maintenance Plan**			
1.1	The Bidder shall submit a preliminary (high-level) operations and maintenance plan/ approach, providing a general overview for operations and preventative maintenance of the main components.	Yes/No	Yes	
1.2	The Bidder shall submit a preliminary corrective maintenance approach, including envisaged response and repair times for the main components.	Yes/No	Yes	

14.2 OPERATION AND MAINTENANCE TRAINING

Table 31 Training Schedule

Item No.	Description	Unit	Required	Response from Bidder
1	**Training Plan**			
1.1	The Bidder shall submit a preliminary training plan. The plan shall describe the timing, type, and level of detail for the various training interventions, including O&M, Inverter, SCADA/CMS, etc.	Yes/No	Yes	

15. GRID CONNECTION WORKS

a. It is a requirement that the Engineering Design be performed under the self-build agreement by the Contractor, be performed by a consulting engineer accredited by Eskom for Substations, Control Plant and HV lines. The same consultant shall also design the Solar Substation as both the Solar Substation and the Eskom Switching Station will share a common platform and adjacent earth mats. Details of the Consulting Engineer to be provided in Table 13-1

b. It is a requirement that the construction works performed under the self-build agreement be performed by a contractor accredited by Eskom for Substations, Control Plant, and HV lines. Details of the HV Subcontractor to be provided in Table 13-2

Table 32 General information about the Consulting Engineer

No.	Item	Details
1	Name of Consulting Engineer	

2	Home office address		
3	Regional office address		
4	Telephone / email address		
5	Name, Position and Title of contact person		
6	Legal form [1]		
7	Area of main business		
8	Signed letter of intent between Consulting Engineer and EPC Bidder	To be provided by Bidder	
9	Proof that the Consulting Engineer is accredited by Eskom	To be provided by Bidder	

Table 33 General information about the HV Subcontractor

No.	Item	Details	
1	Name of HV Subcontractor		
2	Home office address		
3	Regional office address		
4	Telephone / email address		
5	Name, Position and Title of contact person		
6	Legal form [1]		
7	Area of main business		
8	Signed letter of intent between HV Subcontractor and EPC Bidder	To be provided by Bidder	
9	Proof that the HV Subcontractor is Eskom approved	To be provided by Bidder	

16. GRID CONNECTION SCHEDULES

Table 34 Grid connection Schedules

Item No.	Description	Unit	Required	Response from Bidder
1	**Overhead line (OHL)**			
1.1	Provide documented evidence (data sheet or other) for the OHL phase conductor	Yes/No	Yes	
2	**HV/MV Transformer**			
2.1	**Product Information**			
2.1.1	Transformer manufacturer	Specify	To be provided by Bidder	
2.2	**General Requirements**			
2.2.1	No of Transformers	No.	2	
2.2.2	Nominal rating	MVA	80	
2.2.3	Primary Voltage	kV	33	
2.2.4	Secondary Voltage	kV	88	
2.2.5	Rated Frequency	Hz	50	
2.2.6	Maximum Flux density	T	1.7	
2.2.7	Tap-Changer Type	Specify	On-load	

2.2.8	Diverter Type	Specify	Vacuum	
2.2.9	Transformer insulating medium	Type	Biodegradable oil	
2.2.10	No-load Losses	W	To be provided by Bidder	
2.2.11	Load losses	W	To be provided by Bidder	
2.3	**General Design Conditions**			
2.3.1	Altitude above sea-level	m	1800	
2.3.2	Ambient air temperatures: Maximum Monthly Average Yearly Average Minimum	ºC	 38 31 25 -8	
2.3.3	Amount by which the temperature rise limits are reduced according to IEC60076-2	ºC	5	
2.3.4	Additional amount by which the temperature rise limit is reduced above the values stipulated in IEC60076-2, as per additional safety margin	ºC	5	
2.3.5	Total amount by which the temperature rise limit is reduced	ºC	5 + 5 = 10	
2.3.6	Humidity	%	61.5	
2.3.7	Solar radiation	kW/m2	2.5	
2.3.8	Atmospheric UV radiation	High/Low	High	
2.3.9	Pollution (Insulators)	IEC 60815 Table 1	IV- Very Heavy	
2.3.10	Seismic	IEC60068-3-3	Yes, Mining activity, according to IEC 60076 requirements	
2.4	**Transformer Design Review**			
2.4.1	The Contractor shall make commercial allowance for appointment of a 3rd party power transformer specialist to form part of the technical design reviews and factory acceptance tests.	Yes/No	Yes	
2.5	**Minimum required specifications**			
2.5.1	As per Eskom Specification 24068973110 – *Specification for Power Transformers rated for 1.25 MVA and above and highest voltage of 2.2 kV or above*	Yes/No	Yes	
2.6	**Monitoring system requirements**			
2.6.1	Continuous data logging to the CMS system for the transformer performance parameters including events and status.	Yes/No	Yes	
2.6.2	On-line gas analyser with alarming and status monitoring in the Control Room	Yes/No	Yes	
2.6.3	On-line Tap-changer monitoring	Yes/No	Yes	
2.7	**Supportive Documents**			

2.7.1	Transformer Datasheet	-	To be provided by Bidder	
6	**Additional Information – To be listed by the Bidder**			
6.1	To be defined by the Bidder	-	To be provided by Bidder	