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TERMS OF REFERENCE

50 kW PHOTOVOLTAIC POWER PLANT WITH SCADA INTEGRATION

BENEFICIARY: State Enterprise “Radiocommunication”

OBJECT: Design, supply, installation, integration, testing, and commissioning of a photovoltaic power plant with an installed capacity of approximately 50 kW, integrated into the Beneficiary’s energy and telecommunications infrastructure.

CONTRACT TYPE: EPC (Engineering – Procurement – Construction)

PREPARED BY:
Chairman of the Procurement Working Group
(Head of IT Department)

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Sergiu CAZAC

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Alexandru GRINICO

Content

Chapter I. General Information and Project Description

1. Legal Basis and Regulatory Framework

1.1. This Terms of Reference is prepared in accordance with the provisions of the legislation in force in the field of public procurement, in particular Law No. 131/2015 on public procurement, the Regulation on the procurement of goods, works and services within state-owned enterprises approved by Government Decision of the Republic of Moldova No. 351 of 10.06.2020, the Order of the Ministry of Finance No. 69 of 07.05.2021 on the approval of the Standard Documentation for public works procurement, as well as the applicable technical norms and standards in the energy sector (IEC, EN, ISO, CE);

1.2. The Terms of Reference establishes the technical requirements, functional specifications, minimum qualification conditions, as well as other mandatory requirements that must be fulfilled by the economic operators participating in the procurement procedure, in order to ensure the proper execution of the contract object;

1.3. The preparation of this document aims to ensure a clear, complete and non-discriminatory description of the procurement object, so that all interested economic operators have sufficient information for the preparation of their bids, under conditions of real and effective competition;

1.4. This Terms of Reference establishes the technical, functional and performance requirements for:

a. Technical design;
b. Supply of equipment;
c. Installation and integration of the system;
d. Commissioning;
e. Testing and final acceptance of a photovoltaic power plant integrated into the energy and telecommunications infrastructure of the State Enterprise “Radiocommunication”.

1.5. Within the procurement procedure, the fundamental principles of public procurement shall be observed, including the principles of transparency, equal treatment, non-discrimination, proportionality and efficient use of funds, while ensuring a fair competitive environment for all participants;

1.6. The Contractor shall comply with all technical requirements and international standards applicable to energy installations and telecommunications infrastructure. All equipment shall be new, certified and delivered with complete compliance documentation. The proposed solution must ensure reliable operation, operational safety and compatibility with the Beneficiary’s existing infrastructure;

1.7. The Contractor shall deliver a fully functional system, which shall include, without limitation:

a. Main and auxiliary equipment;
b. Cables and accessories required for installation;
c. Electrical protection systems;
d. Monitoring and control systems;
e. Integration into the Beneficiary's SCADA system.

2. General Description of the Contracting Entity:

2.1. Name of the contracting entity: State Enterprise "Radiocommunication";
2.2. IDNO: 1002600049442;
2.3. Postal address: MD-2021, Chisinau municipality, 28/2 Drumul Viilor Street;
2.4. E-mail address and website of the contracting entity:
office@radiocom.md, www.radiocom.md
2.5. Telephone/fax number: +373 22 876 300 / +373 22 876 499;
2.6. Description of the main activity of the contracting entity:

The State Enterprise "Radiocommunication" is the national operator in the field of radio and television broadcasting in the Republic of Moldova, providing radio and television broadcasting services across the entire territory of the country. The enterprise manages the technological infrastructure required for the transmission and broadcasting of audiovisual signals, including two radio broadcasting networks with national coverage in analog format, a wired radio broadcasting network in the municipality of Chisinau, and the public digital terrestrial television network – National Multiplex A. At the same time, the enterprise also manages the technical infrastructure intended for the operation of the second national digital multiplex – National Multiplex B.

The technical equipment of the enterprise includes television transmitters of various power levels used for broadcasting digital terrestrial signals through DVB-T2 networks (MUX A and MUX B), as well as radio transmitters and retransmitters operating in the FM band 87.5–108 MHz and in the medium wave band. The technological infrastructure of the enterprise includes telecommunications masts and towers located throughout the country, ensuring national coverage of broadcasting services.

In addition to its core activity, the State Enterprise "Radiocommunication" provides related services in the field of electronic communications and broadcasting, including transport of TV and radio programs in digital format, data transmission services, use of technological infrastructure for the installation of equipment belonging to telecommunications operators and audiovisual institutions, as well as services for installation, maintenance and operation of radiocommunication systems.

The enterprise is a legal entity carrying out entrepreneurial activity based on state-owned assets transferred for administration and operates on the principles of

economic self-management and financial autonomy. The founder of the enterprise is the State (Republic of Moldova), through the Public Property Agency, and its activity is carried out in accordance with sectoral policies promoted by the Ministry of Economic Development and Digitalization. The management of the enterprise is ensured by the Board of Directors and the Administrator of the enterprise, acting as the executive body.

3. Justification of the Procurement:

3.1. The project has a pilot character and aims to:

a. Reduction of energy costs of the technical infrastructure;

b. Increase of energy independence;

c. Accumulation of experience and technological testing for replication in other locations;

d. Possibility of subsequent integration of energy storage systems (BESS).

3.2. This Terms of Reference is prepared based on the Market Study regarding photovoltaic technologies available on the international market, carried out for the project of installing a photovoltaic system within the State Enterprise “Radiocommunication”;

3.3. The study analyzes technologies used in similar projects in Europe, the USA and Australia, as well as the main manufacturers and integrators active on the market, including:

a. Photovoltaic modules;

b. Inverters;

c. Energy storage systems (BESS);

d. EPC integrators active in the region.

3.4. The technical requirements included in this Terms of Reference reflect the current technological level of the market, in accordance with the conclusions of the study, without limiting the participation of other manufacturers or integrators that can provide technically equivalent or superior solutions;

3.5. The market study constitutes a supporting document for defining the technical requirements and for determining the level of the estimated value of the project;

3.6. The names of manufacturers, brands or technologies mentioned in this Terms of Reference are indicative and reflect the technological level existing on the international market at the date of preparation of the documentation. Technically equivalent or superior equipment is accepted, provided that their compliance with the established technical requirements is demonstrated;

3.7. The procurement is included in the General Procurement Plan for goods, works and services of the State Enterprise “Radiocommunication” for the year 2026 (item 4 of the Plan), approved in accordance with the internal procedure (Minutes No. 1-PA of 22.12.2025 of the meeting of the Procurement Working Group of the State Enterprise “Radiocommunication”), with the written approval of the founder – the Public Property Agency (letter No. 12-05-1127 of 17.02.2026), as well as by the approval of the Board of Directors (Annex No. 2 to Minutes No. 8 of the meeting of the Board of Directors of the State Enterprise “Radiocommunication” dated 22.12.2025);

3.8. The implementation of a 50 kW photovoltaic system, based on a hybrid inverter with backup function and high-voltage (HV) $LiFePO_4$ batteries, represents a modern technological solution, commonly used in energy projects in European Union Member States and other developed jurisdictions. This architecture ensures increased energy resilience of the site, reduction of dependence on the public electricity grid, and efficient integration of energy storage systems. The solution is scalable and allows replication across other infrastructures of the State Enterprise “Radiocommunication”, contributing to the optimization of operational costs and the modernization of the enterprise’s energy infrastructure;

3.9. The implementation of the pilot project will allow the technical and economic validation of an energy architecture based on photovoltaic systems with hybrid inverter and energy storage, with the possibility of gradual replication across the infrastructure of the State Enterprise “Radiocommunication”, including within radio and TV transmission sites, technical centers, and other facilities with permanent energy consumption.

4. Object and Type of Contract:

4.1. The object of the contract consists of the design, supply, installation, integration, testing and commissioning of a photovoltaic power plant with an installed capacity of approximately 50 kW, under EPC (Engineering – Procurement – Construction) regime, located on land under the administration of the State Enterprise “Radiocommunication”;

4.2. The quantity and estimated value of the requested works are presented in the following table:

Table No.1

No.	CPV Code	Description of requested services, goods or works	Quantity	Estimated Value (MDL, excl. VAT)	Full required technical specification
1.	45251100-2	PHASE 1: ENGINEERING	1 work (complete	1,000,000.00	In accordance with the specifications set out in

No.	CPV Code	Description of requested services, goods or works	Quantity	Estimated Value (MDL, excl. VAT)	Full required technical specification
		(Design)	EPC contract)		this Technical Specification
		PHASE 2: PROCUREMENT (Equipment Supply)			
		PHASE 3: CONSTRUCTION (Execution of Works)			

Total estimated value, MDL excl. VAT: 1,000,000.00

4.3. The system shall generate electricity from renewable sources for supplying the existing technical infrastructure;

4.4. Type of contract – EPC Contract (Engineering, Procurement, Construction), which includes:

a. Engineering – complete technical design;
b. Procurement – equipment supply;
c. Construction – execution of works;
d. Testing, commissioning;
e. SCADA integration;
f. Personnel training;
g. As-built documentation.

4.5. Location: State Enterprise “Radiocommunication” – Edineț city, Republic of Moldova;

4.6. The Beneficiary shall provide:

a. Land for the installation of the power plant;
b. Electrical connection point;
c. Access for execution of works.

4.7. The contracting entity has decided to award the contract as a single lot (integrated EPC contract), based on the following considerations:

a. The unitary nature of the investment – design, equipment supply and execution of works are technically and functionally interdependent;

b. The need for single-point responsibility – the EPC contract implies full responsibility of a single economic operator for the system performance;

c. Reduction of contractual risks – division into multiple lots would generate coordination risks, disputes between contractors and delays;

d. Ensuring a global warranty – the operation of the power plant must be guaranteed as an integrated system;

e. Economic efficiency – the integrated contract allows optimization of costs and timelines;

f. Splitting into lots would negatively affect the proper implementation of the project and would generate additional technical and financial risks.

5. General Description and Project Configuration:

5.1. Installed capacity of the power plant: ≈ 50 kW AC;

5.2. The DC capacity may exceed the AC capacity within the limits recommended by inverter manufacturers;

5.3. General configuration of the system:

5.3.1. The photovoltaic power plant shall include at least the following subsystems:

a. Photovoltaic modules;
b. Mounting structures;
c. Inverters;
d. DC and AC cables;
e. Electrical protections;
f. Electrical panels;
g. SCADA monitoring system;
h. Grounding system;
i. Energy metering;
j. Communication infrastructure;
k. Optional: BESS energy storage system.

5.3.2. The mandatory minimum technical requirements for bid admissibility are set out in Annex No. 2;

5.3.3. In case of any inconsistency between the general descriptions in Chapter I and the minimum conditions in Annex No. 2, Annex No. 2 shall prevail;

5.4. General technical requirements:

5.4.1. The proposed equipment must be new (unused), original, sourced from well-established manufacturers on the international market, and must hold valid conformity certificates for use within the European Union, in accordance with the applicable legislation and technical standards;

5.4.2. The equipment must comply with applicable international and European standards (IEC, EN, ISO) and shall be accompanied by a CE Declaration of Conformity issued in accordance with European Union legislation.

5.5. Technical Reference Requirements – Photovoltaic Modules:

5.5.1. The modules must meet at least the following requirements:

a. Technology: TOPCon or equivalent technology;

b. Type: bifacial or monofacial;

c. Rated power: minimum 550 Wp;

d. Efficiency: minimum 21%;

e. Estimated quantity: 85 – 90 modules;

f. Certifications: IEC 61215, IEC 61730;

g. Minimum warranties: product warranty of at least 12 years, linear performance warranty of at least 30 years, as well as submission of “flash test” reports for the delivered modules, issued by an accredited laboratory within the European Union;

h. Annual performance degradation shall not exceed 2% in the first year of operation and 0.55% annually for the subsequent period.

5.6. Technical Requirements – Inverters:

5.6.1. Type: grid-tied inverter or hybrid inverter, compatible with the integration of an energy storage system (BESS);
5.6.2. Total power: ≈ 50 kW;
5.6.3. Accepted configurations: 1 × 50 kW;
5.6.4. Minimum efficiency: ≥ 98%;

5.6.5. Integrated protections:

a. Overvoltage;

b. Overcurrent;

c. Anti-islanding protection;

d. Temperature protection.

5.6.6. Monitoring:

a. Ethernet / RS485;

b. SCADA integration.

5.6.7. Protection degree: minimum IP65.

5.7. Mounting Structure:

5.7.1. The mounting structure shall be made of galvanized steel, with anti-corrosion treatment, dimensioned and designed for outdoor operation, in accordance with applicable technical standards;

5.7.2. Structure type: fixed tilt;

5.7.3. Indicative tilt angle: ≈ 30°;

5.7.4. The mounting structure must be designed to withstand wind speeds of at least 120 km/h and snow loads established in accordance with applicable local technical standards and regulations;

5.7.5. The structure foundation shall be made using ground screws or concrete foundations, depending on the proposed technical solution and site conditions.

5.8. Cables and Electrical Infrastructure:

5.8.1. DC cables must be UV-resistant, intended for use in photovoltaic installations, and must be certified in accordance with applicable standards for solar cables (e.g. EN 50618 or IEC 62930);

5.8.2. AC cables: Alternating current cables shall be dimensioned in accordance with applicable technical standards and regulations, depending on the installed capacity, route length and operating conditions;

5.8.3. The installation shall be equipped with adequate protections, including:

a. Surge protection devices on the DC side (SPD DC);

b. Surge protection devices on the AC side (SPD AC);

c. Residual current devices (RCD), properly dimensioned according to the type of inverter used;

d. Automatic circuit breakers for overcurrent and short-circuit protection.

5.9. Monitoring System:

5.9.1. The power plant shall be equipped with a local and/or remote monitoring system (dedicated web platform), ensuring monitoring of energy production at system and inverter level, display and recording of relevant electrical parameters, monitoring of critical equipment temperature, automatic generation of alerts in case of faults or abnormal operation, and data archiving with the possibility of report generation;

5.9.2. Access to the monitoring system shall be ensured both locally (LAN) and remotely (via internet), with implementation of appropriate cybersecurity mechanisms, including secure authentication and communication encryption;

5.9.3. Operational data shall be accessible through a dedicated web platform and may be exported in standard formats for further processing, with the possibility of generating periodic reports and downloading historical data.

5.10. Energy Storage System (optional):

5.10.1. Optionally, the bidder may propose the integration of an energy storage system (BESS – Battery Energy Storage System) with an indicative nominal capacity of approximately 100 kWh, compatible with the inverter and the photovoltaic system architecture;

5.10.2. The BESS shall ensure operation in backup mode for priority consumers, increase the self-consumption rate of the generated energy, and enable load management by reducing peak demand and stabilizing the internal network.

5.11. Included Works:

5.11.1. The Contractor shall fully perform EPC-type services, including technical design, equipment supply, installation and cabling works, system integration and configuration, execution of acceptance tests (FAT/SAT, where applicable), and commissioning under normal operating conditions.

5.12. Documentation to be provided by the Contractor:

5.12.1. The Contractor shall submit to the Beneficiary the complete project documentation, including the technical design and execution details, single-line and multi-line electrical diagrams, operation and maintenance (O&M) manuals, preventive maintenance plan, certificates of conformity and CE declarations for the equipment, as well as updated “as-built” documentation in accordance with the actual site conditions.

5.13. Warranties:

5.13.1. The Contractor shall provide a commercial warranty for the delivered equipment, namely a minimum of 12 years for photovoltaic modules and a minimum of 5 years for inverters, as well as a warranty for installation and integration works for a period of at least 3 years, calculated from the date of signing the final acceptance report.

5.14. Execution Period:

5.14.1. Maximum implementation period: 90 days from the date of contract signing.

5.15. Bid Evaluation Criteria:

5.15.1. The evaluation of bids shall be carried out based on the following categories of criteria:
a. Technical criteria, which will include the analysis of the performance of the proposed equipment, warranty conditions and duration, as well as the reliability of the proposed technical solution;
b. Financial criteria, which will consider the total bid price and the estimated operation and maintenance (O&M) costs over the relevant operating period;
c. Operational criteria, which will include the availability of local support and service, as well as the delivery and commissioning timeframe.

5.15.2. The evaluation of bids shall be carried out in accordance with the provisions of Chapter III – “Evaluation of Bids”, based on the award criterion “best price-quality ratio”.

5.16. Estimated Budget:

5.16.1. The estimated project budget is provided in item 4.2 (Table No. 1) of this Terms of Reference and was determined based on the previously conducted market study.

5.17. Requirements for Bidders:

5.17.1. Bidders shall demonstrate similar experience in photovoltaic power plant projects, the technical and logistical capacity necessary for contract execution, the availability of qualified specialized personnel (design engineers, authorized electricians, etc.), as well as the existence of a support and service system capable of ensuring interventions within reasonable timeframes.

5.18. Deliverables upon Project Completion:

5.18.1. Upon completion of the works, the Contractor shall deliver a fully functional photovoltaic power plant, commissioned and accepted in accordance with contractual provisions, complete technical documentation (including “as-built” documentation), and shall provide training to the Beneficiary’s personnel for system operation and maintenance;

5.18.2. The model and structure of the accepted bid are regulated in Chapter II of this Terms of Reference.

5.19. Technical and Financial Evaluation Form:

5.19.1. A weighted scoring system shall be used for the evaluation of bids;

5.19.2. The maximum score is 100 points, distributed proportionally in the tables below;

5.19.3. Technical Criteria:

Table No. 2

Technical Criteria and Their Weighting

Criterion	Weight
Module performance	15%
Inverter quality	15%
Equipment warranties	10%
Monitoring system	5%
Total technical:	**45%**

5.19.4. Financial Criteria:

Table No. 3

Financial Criteria and Their Weighting

Criterion	Weight
Bid price	30%
O&M price	5%
Total financial:	**35%**

5.19.5. Operational Criteria:

Table No. 4

Operational Criteria and Their Weighting

Criterion	Weight
Local service	10%
Delivery time	5%
Experience in similar projects	5%
Total operational:	**20%**

5.19.6. Determination of the Total Bid Score:

a. The total score of each bid shall be calculated by summing the scores obtained for the technical, financial and operational components:

Total Score = Technical Score + Financial Score + Operational Score

b. The bid obtaining the highest total score shall be declared the winner, subject to compliance with all mandatory minimum requirements set out in the procurement documentation;

c. The overall structure of the evaluation weights is as follows:
- Technical component – 45%;
- Financial component – 35%;
- Operational component – 20%;

d. The detailed scoring methodology, including the calculation formulas applicable to each evaluation factor, is provided in Chapter III – Evaluation of Bids.

5.20. Documents to be submitted by bidders:

5.20.1. Bidders shall submit supporting technical documentation, including official manufacturer technical datasheets, certificates of conformity and CE declarations, a statement regarding warranty conditions and duration, a phased implementation plan, an execution schedule aligned with the contractual timeline, as well as evidence of similar experience (executed contracts, acceptance reports or references).

5.21. Indicative Project Schedule:

Table No. 5

Stage	Duration
Design	2 weeks
Equipment delivery	4–6 weeks
Execution	3 weeks
Commissioning	1 week

Total duration: ≈ 3 months

5.22. Project Evaluation:

5.22.1. An example of an EPC bid evaluation table is provided in Annex No. 5.

5.23. Project Scalability:

5.23.1. The project has a pilot character, being designed as a model for the implementation of a scalable technical solution, with the possibility of replication and extension to other sites of the State Enterprise “Radiocommunication”, for the

purpose of optimizing the energy and operational infrastructure, depending on the results of subsequent technical and economic evaluation;

5.23.2. The proposed technical architecture shall be designed based on principles of modularity and interoperability, allowing:

increase of installed capacity without major changes to the base configuration;
implementation of the solution at other sites of the State Enterprise "Radiocommunication";
subsequent integration of an energy storage system (BESS);
compatibility with a centralized monitoring and energy management system (EMS/SCADA);

5.23.3. The technical configuration proposed by the bidder must be modular and allow expansion without major modifications to the existing architecture.

5.24. System Performance Guarantee:

5.24.1. The EPC Contractor shall ensure the performance guarantee of the photovoltaic power plant, by committing that the system will achieve a minimum Performance Ratio (PR) of 80%, calculated in accordance with the methodology provided by IEC 61724 standard (or equivalent);

5.24.2. The method of determination, reference period and measurement conditions shall be established in the contractual documentation and validated during the performance acceptance stage;

5.24.3. The Contractor shall present in the bid the detailed methodology for estimating the annual electricity production, including calculation assumptions, meteorological data used (solar irradiation, temperature, etc.), considered losses (electrical losses, thermal losses, degradation, system availability), the simulation software used, and the technical parameters of the equipment introduced into the model.

5.24.4. In the event that, during the performance testing period or within the contractually established timeframe, the achieved Performance Ratio (PR) is lower than the guaranteed value, the Contractor shall have the obligation to implement corrective technical measures within a reasonable period established contractually;

5.24.5. In case the non-compliance persists, penalties or financial compensation mechanisms shall be applied, in accordance with the contractual clauses regarding the performance guarantee.

Chapter II. Technical Guidelines for Bid Preparation

1. Photovoltaic Plant Sizing and Conceptual Layout:

1.1. The project aims at the implementation of a photovoltaic field with an installed capacity of approximately 50 kW, in pilot regime, at the site of the State Enterprise “Radiocommunication” located in Edineț city, Republic of Moldova, geographic coordinates 48.18253 N, 27.29990 E (Fig. No. 1). The site is served by the urban road, ensuring access for equipment transportation and technical interventions.

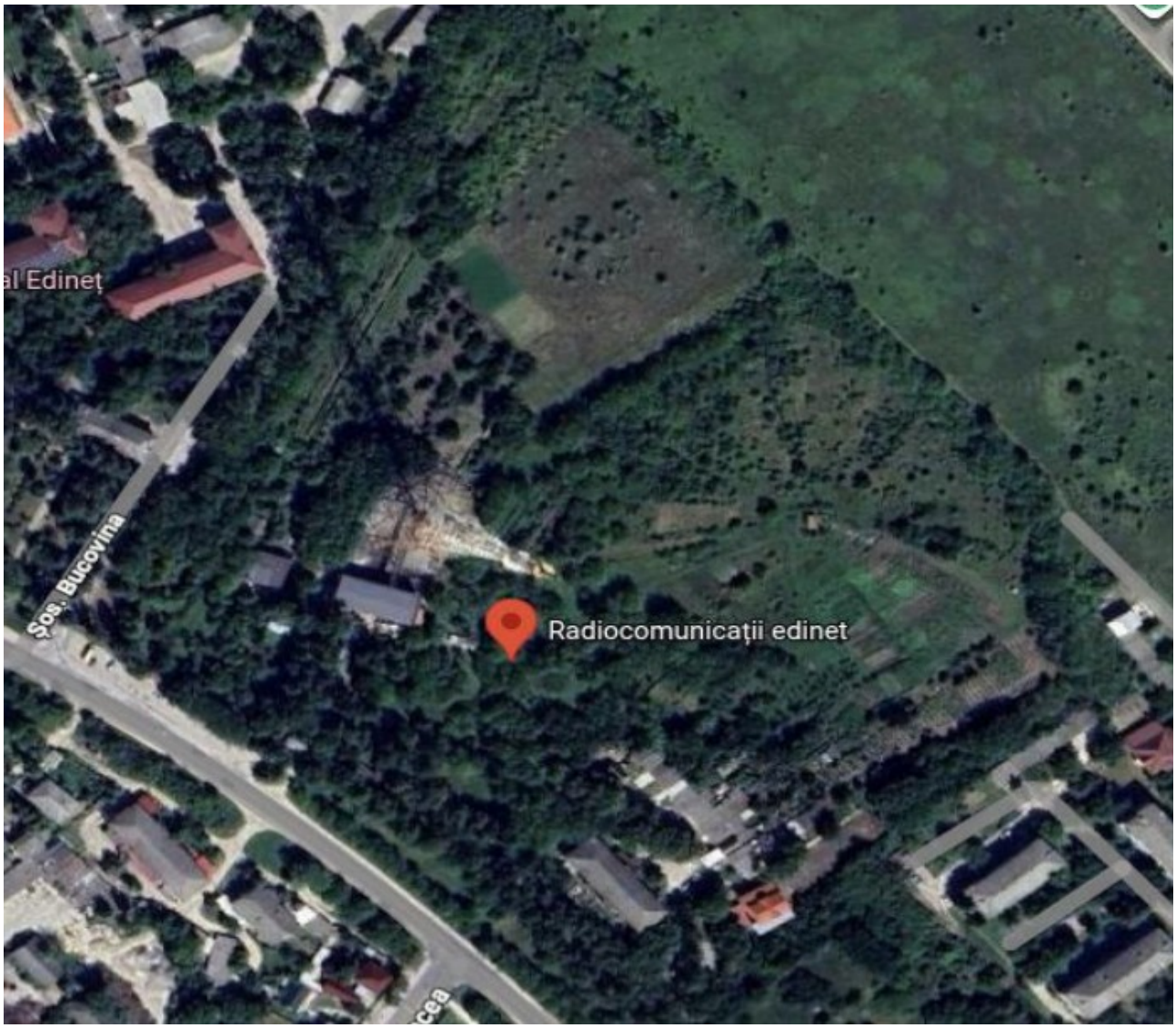

Fig. 1. Object Edinet, I.S. Radiocomunicații

(48.182537758392684, 27.2999091249227)

1.2. Site Description:

1.2.1. The project location is situated in the area of Edineț village, Republic of Moldova, on land belonging to the infrastructure of the State Enterprise “Radiocommunication”;

1.2.2. The site presents the following technically relevant characteristics: relatively flat terrain, easy access to existing technical infrastructure, proximity to the internal electrical network of the site, and direct access from the national road R20;

1.2.3. These conditions allow the installation of a ground-mounted photovoltaic power plant, without the need for

1.3. Solar Parameters of the Location:

1.3.1. The climatic data for the coordinates 48.18253 / 27.29990 E are estimated based on European climatic databases and are presented in Table No. 6:

Table No. 6

Climatic Data for the “Edineț” Site

Parameter	Value
Annual global irradiation	1350 – 1450 kWh/m²/year
Specific PV production	1150 – 1250 kWh/kWp/year
Average annual temperature	~10°C
Estimated system losses	14 – 18%

1.4. Installed Capacity:

1.4.1. The nominal installed capacity of the photovoltaic system shall be approximately 50 kWp. The system configuration may предуса a slight oversizing of the installed capacity on the direct current (DC) side relative to the nominal inverter capacity (AC), in order to optimize the annual energy production.

1.5. Configuration of the Photovoltaic Field:

1.5.1. The use of bifacial TOPCon photovoltaic modules with a nominal power of approximately 580 W per module is envisaged;

1.5.2. To achieve an installed capacity of approximately 50 kWp, the indicative estimation of the number of modules is as follows:
50,000 W / 580 W ≈ 86 modules;

1.5.3. The exact number of modules shall be determined during the technical design phase, depending on the final system configuration, DC/AC ratio and optimized technical solution;

1.5.4. The technical parameters of the proposed modules are presented in Table No. 7.

Table No. 7

Module Configuration

Parameter	Value
Module power	580 W
Module area	~2.3 m²
Efficiency	~22%

1.6. Estimation of Occupied Area:

1.6.1. The total area of the photovoltaic modules is estimated as follows:
86 modules × approximately 2.3 m²/module ≈ 198 m²;

1.6.2. In the case of a ground-mounted system, a spacing factor between module rows is applied, required to avoid mutual shading effects and to ensure technical access for maintenance;

1.6.3. For preliminary estimation, a land occupation factor between 3 and 3.5 has been used;

1.6.4. Thus, the total estimated area required for system installation is approximately 600 – 700 m².

1.7. Row Configuration:

1.7.1. A preliminary configuration of 4 rows with 21–22 modules per row is recommended, with the final arrangement to be determined during the technical design phase, based on site analysis and shading study;

1.7.2. This configuration provides the following technical and operational advantages: ensures easy access for maintenance interventions, contributes to reducing energy losses caused by mutual shading between rows, and offers flexibility in adapting the arrangement of photovoltaic panels to the specific configuration of the available land.

1.8. Orientation and Tilt:

1.8.1. The photovoltaic field shall be oriented towards the south, with an approximate azimuth of 180°, in order to maximize solar radiation capture throughout the year;

1.8.2. The tilt angle of the modules shall be approximately 30°, a value considered optimal for the latitude of the Republic of Moldova, ensuring an efficient compromise between total annual production and seasonal system performance.

1.9. Distance Between Rows:

1.9.1. In order to avoid shading effects during the winter season, the design phase shall предуса a distance between module rows ranging between 3 and 4 meters;

1.9.2. This distance allows the limitation of production losses caused by the low sun angle during winter and ensures, at the same time, sufficient space for access of operation and maintenance teams.

1.10. Estimated Dimensions of the Photovoltaic Field:

1.10.1. The estimated dimensions of the photovoltaic field are as follows: row length of approximately 48 m, total site width between 14 and 16 m, resulting in a total estimated area of approximately 700 m²;

1.10.2. The indicated values are indicative and may be adjusted during the technical design phase, depending on the final module configuration, inter-row distances, tilt angle and specific site conditions.

1.11. Electrical Configuration:

1.11.1. The use of a three-phase inverter with a nominal power of approximately 50 kW is recommended, compatible with the proposed configuration of the photovoltaic field;

1.11.2. The string configuration is estimated at approximately 6 strings, with 14–15 modules connected in series per string, depending on the electrical parameters of the modules (open-circuit voltage – Voc, voltage at maximum power – Vmp) and the inverter operating voltage range;

1.11.3. The final string configuration shall be determined during the technical design phase, in compliance with allowable voltage and current limits, including minimum and maximum temperature conditions specific to the site.

1.12. Placement of Main Equipment:

1.12.1. The main equipment of the photovoltaic system shall be positioned and configured so as to ensure safe and efficient operation of the installation, as follows: photovoltaic module field ground-mounted on a dedicated structure, inverters installed on the mounting structure or on a separate technical support, AC electrical panel, monitoring and data integration system, as well as the connection to the existing electrical panel of the site;

1.12.2. The final arrangement of the equipment shall be determined through the technical design, in compliance with electrical regulations and safety requirements.

1.13. BESS System (optional):

1.13.1. In case of implementation of an energy storage system (BESS – Battery Energy Storage System), an indicative capacity of approximately 100 kWh is envisaged;

1.13.2. The required area for equipment installation is estimated at approximately 6–10 m², depending on the proposed technical solution and the type of batteries used;

1.13.3. The equipment may be installed either in a dedicated outdoor cabinet designed for outdoor operation, or within an existing technical space of the State Enterprise “Radiocommunication”, in compliance with ventilation, fire protection and electrical safety requirements. Alternatively, the system may be positioned in proximity to the AC panel, in order to optimize cabling routes and ensure efficient integration into the site’s energy system.

1.14. Estimated Annual Energy Production:

1.14.1. The estimated annual production of the photovoltaic system is approximately 60,000 kWh/year;

1.14.2. Depending on actual climatic conditions, variations in solar irradiation, technological losses and system availability, the realistic production range is estimated between 55,000 and 63,000 kWh/year.

1.15. Monthly Production Distribution:

Table No. 8

Monthly Production

Month	Estimated Energy
January	1,000 kWh
February	2,500 kWh
March	6,500 kWh
April	8,500 kWh
May	10,000 kWh
June	10,500 kWh
July	10,500 kWh
August	9,500 kWh
September	7,000 kWh
October	4,000 kWh
November	1,500 kWh
December	1,000 kWh
Annual total: ≈ 60,000 kWh	

1.16. Replication Potential:

1.16.1. The bidder shall demonstrate, through the proposed technical solution, the modular, scalable and replicable nature of the pilot project, so that its implementation can be extended and adapted to other sites of the State Enterprise “Radiocommunication”, with minimal structural modifications and optimization of subsequent implementation costs.

Table No. 9

Power/Area Ratio

Power	Area (±20% deviation)
75 kW	~800 m²
100 kW	~1400 m²

1.17. Technical Conclusion Regarding Sizing:

1.17.1. The sizing of the photovoltaic system for the Edineț site shall demonstrate the following:

a. Technical feasibility of the project in relation to site conditions and existing infrastructure;

b. The need for a relatively small land area for implementation;

c. Ensuring sufficient annual production for validation of a pilot demonstration project;

d. The possibility of replication and extension of the technical solution to other locations of the State Enterprise “Radiocommunication”.

1.17.2. Based on the preliminary analysis, the following indicative configuration is recommended:

a. Approximately 86 bifacial TOPCon photovoltaic modules;

b. 2 string-type inverters, each with a nominal power of 25 kW;

c. Ground-mounted structure with a tilt angle of approximately 30°;

d. Total occupied area estimated at approximately 700 m²;

e. Estimated annual production of approximately 60 MWh.

1.17.3. The final configuration shall be determined through the technical design for execution, following validation of electrical calculations, shading analysis and energy production simulation.

2. Site Layout Plan (Edineț Location – 50 kW + BESS Option):

2.1. Figure No. 2 presents an indicative layout of the site, overlaid on a satellite image of the location, highlighting the main elements of the proposed configuration, as follows:

a. The photovoltaic field of approximately 50 kW, configured in 4 rows of approximately 22 modules each;

b. The area designated for the installation of inverters and the AC electrical panel;

c. The area reserved for the energy storage system (BESS) with an indicative capacity of 100 kWh (optional);

d. The indicative route of the AC cable to the existing connection point (Point of Connection – PoC).

2.2. The layout has an informative and preliminary character, and the exact positioning of the equipment and cable routes shall be established through the technical design for execution, in accordance with technical standards and actual site conditions;

2.3. The bidder shall present the system layout solution based on the actual cadastral configuration of the land, on the basis of measurements and verifications performed on site, in accordance with the requirements set out in item 2.4 (Chapter II). The placement of equipment shall be carried out with strict compliance with the protection zone of the tower and the applicable technical restrictions.

Fig. 2. Layout of the Photovoltaic Panels Arrangement

2.4. Proposed Physical Configuration (for Technical Design):

2.4.1. The photovoltaic field shall be organized into 4 rows of approximately 22 modules per row, resulting in an indicative total of approximately 88 modules. The final number of modules shall be determined during the technical design phase, within the estimated range of 85–90 modules, depending on the selected model and optimization of the DC/AC ratio;

2.4.2. The tilt angle of the modules shall be approximately 30°, with orientation towards the south (approximate azimuth 180°), in order to maximize annual energy production;

2.4.3. The distance between rows shall be between 3 and 4 meters, dimensioned so as to reduce losses generated by shading during the winter period and to ensure access for operation and maintenance works;

2.4.4. The inverters and the AC electrical panel shall be installed at ground level, in a compact area located in proximity to the photovoltaic field, in order to minimize the length of DC cables and reduce electrical losses;

2.4.5. In case of optional implementation of the energy storage system (BESS), it shall be installed in proximity to the AC panel and/or the inverters, in order to facilitate technical integration and ensure the shortest and most efficient AC routing.

2.5. Requirements for Technical Delivery Documentation (EPC):

2.5.1. The bidder shall include in the bid the preliminary technical documentation necessary for validation of the proposed solution, as follows:

a. System layout plan, in DWG and/or PDF format, indicating the proposed configuration and equipment positioning;

b. DC and AC cabling plan, including representation of routes, approximate lengths and cable cross-sections dimensioned according to electrical calculations;

c. Layout plan of the main equipment (inverters, electrical panels, BESS – where applicable), ensuring compliance with minimum safety distances and operational requirements;

d. Grounding and lightning protection plan (lightning protection system), correlated with the existing infrastructure;

e. Plan regarding access and maintenance organization, including technical pathways and spaces required for interventions;

f. The layout solution shall strictly comply with the tower protection zone and all technical restrictions related to the existing infrastructure.

2.5.2. The final “as-built” documentation shall be prepared and delivered to the Beneficiary after completion of the works, in accordance with the actual site conditions.

3. Electrical Sizing (DC/AC), Protections and Integration at the Connection Point:

3.1. The technical values presented below are indicative and represent the reference sizing used within the Terms of Reference (minimum requirements and accepted ranges);

3.2. The final system sizing shall be confirmed by the EPC Contractor within the technical design, based on the actual datasheets of the selected modules and inverters, as well as by providing design schematics and documentation related to execution and acceptance stages, in accordance with the provisions of item 3.12 (Chapter II).

3.3. Recommended Electrical Architecture:

3.3.1. As a reference option for bidding, the use of a three-phase hybrid inverter with a nominal power of approximately 50 kW is recommended, compatible with the subsequent integration of an energy storage system (BESS), where applicable;

3.3.2. The Terms of Reference accepts a DC/AC ratio within the range of 1.05 – 1.25, in order to optimize annual energy production and ensure efficient inverter operation;

3.3.3. The final system configuration shall be substantiated by electrical calculations and validated within the technical design, in compliance with voltage, current and temperature limits allowed by the equipment manufacturer.

3.4. Basic Data for Calculation (Standard Assumptions):

3.4.1. Photovoltaic Modules (PV):

3.4.1.1. For reference sizing, a configuration based on bifacial TOPCon photovoltaic modules is considered, with nominal power ranging between 550 and 600 Wp, compatible with 1,500 V DC systems (recommended);

3.4.1.2. Typical technical parameters, to be verified and confirmed based on official datasheets provided in the bid, are as follows:

a. Open-circuit voltage (Voc_STC): approximately 49–53 V;
b. Voltage at maximum power point (Vmp_STC): approximately 40–43 V;
c. Temperature coefficient of Voc: approximately (-0.25…-0.30)%/°C;
d. Minimum design temperature: -20°C (in accordance with the requirements of the Terms of Reference).

3.4.1.3. String sizing shall be carried out taking into account the increase of Voc voltage at low temperatures and ensuring compliance with the maximum allowable voltage limit of the inverter and the system (1,500 V DC).

3.4.2. String Configuration (DC):

3.4.2.1. The bidder shall demonstrate, through technical calculations included in the execution design, the following aspects regarding the electrical sizing of the system:

a. The maximum open-circuit voltage (Voc) of the string, determined at the minimum design temperature, does not exceed the maximum DC voltage allowed by the inverter (e.g. 1,100 V or 1,500 V, as applicable);
b. The voltage at maximum power point (Vmp), under real operating conditions, falls within the MPPT operating range of the selected inverter;

c. The number of strings and their distribution across MPPT inputs comply with the maximum current limits allowed for each MPPT, according to the manufacturer’s technical specifications.

3.4.3. Indicative Configuration for 86 Modules (≈50 kWp DC):

For an installed capacity of approximately 50 kWp DC, the following indicative configuration may be considered:

3.4.3.1. Variant A (standard, balanced configuration):
System configuration into 6 strings of 14 modules each, resulting in a total of 84 modules and an installed capacity of approximately 48.7 kWp, assuming the use of 580 W modules. Depending on the exact nominal power of the selected module, the EPC Contractor may propose an adjustment of the configuration to a total of 85–90 modules, including by using 6 strings of 14–15 modules/string, while respecting the electrical limits of the inverter.

3.4.3.2. Variant B (suitable for configuration with 2 inverters of 25 kW each and multiple MPPTs):
The system may be divided between two inverters, each serving 3 strings. The distribution of strings across MPPT inputs shall be performed in accordance with the manufacturer’s requirements, requiring at least one string per MPPT, and, preferably, a symmetrical distribution across the MPPTs of each inverter.

3.4.3.3. The final string configuration, the exact number of modules and the distribution across MPPTs shall be determined by the EPC Contractor within the technical design, based on the actual electrical parameters of the proposed modules and inverters, the minimum design temperature conditions and the allowable voltage and current limits.

3.5. Inverters – Electrical Requirements

3.5.1. Minimum Requirements (reiteration and completion):

3.5.1.1. The proposed inverter must meet at least the following technical requirements:

a. Type: string inverter (three-phase, for on-grid applications);

b. Maximum efficiency: minimum 98%;

c. Integrated protections or provided through dedicated equipment: anti-islanding protection, reverse polarity protection on DC, DC switch (DC isolator), surge protection (SPD – integrated or external), thermal protection;

d. Protection degree: minimum IP65, suitable for outdoor installation;

e. Communications: Ethernet and RS485, with support for Modbus TCP and/or Modbus RTU protocols;

f. Compliance: conformity with IEC 62109 standard, CE marking, and compatibility with the electrical grid of the Republic of Moldova.

3.5.2. Network Settings:

3.5.2.1. The inverter must be configured and parameterized in accordance with the requirements of the grid operator and applicable local technical regulations. In this regard, the equipment must allow implementation of the following functionalities, if required by the grid connection approval or grid code:

a. Limitation of active power injected into the grid;

b. Power factor control and reactive power regulation functions (Q(U), P(f) or other functions imposed by the operator);

c. Automatic reconnection to the grid after restoration of normal voltage and frequency parameters.

3.5.2.2. The bidder shall confirm, through the technical datasheet and declaration of conformity, that the proposed inverter supports these functionalities and can be configured in accordance with the grid operator requirements.

3.6. DC Side – Equipment and Protections

3.6.1. DC Cables:

3.6.1.1. The cables used on the direct current (DC) side must meet the following minimum requirements:

a. Solar cable certified in accordance with EN 50618 or equivalent standard;

b. UV resistance and operating temperature range between -40°C and +90°C;

. Use of MC4-type connectors or equivalent compatible connectors, certified for photovoltaic applications.

3.6.1.2. Indicative cross-sections for cable sizing (for the purpose of substantiating the Terms of Reference) are:

a. String → inverter route: typically 4–6 mm², depending on route length and nominal string current.

3.6.1.3. The EPC Contractor shall determine the final cable cross-sections based on electrical calculations and shall demonstrate that the voltage drop on the DC side does not exceed 1.5% of the system nominal voltage.

3.6.2. DC Protections:

3.6.2.1. On the direct current (DC) side, the system must include the following mandatory protection elements:

a. DC switch/disconnector, integrated into the inverter or installed separately, dimensioned according to the electrical parameters of the system;

b. DC surge protection device (SPD) type II, installed at the inverter input, either integrated into the equipment or mounted in a dedicated DC enclosure;

c. String fuses, in cases where multiple strings are connected in parallel to the same MPPT, when this measure is required by the inverter manufacturer or results from reverse current calculations.

3.6.3. Grounding:

.6.3.1. The system shall include a grounding scheme in accordance with applicable regulations, which shall ensure:

a. Connection to the grounding system of all metallic support structures;

b. Grounding of the photovoltaic module frames;

c. Connection of equipment enclosures (inverters, panels, junction boxes) to the grounding system.

3.6.3.2. The EPC Contractor shall provide the grounding scheme and demonstrate its compliance with the applicable technical standards.

3.7. AC Side – Panels, Protections and Cables

3.7.1. Voltage Level:

3.7.1.1. The inverter output shall be three-phase, with a nominal voltage of 3×400 V AC and a frequency of 50 Hz, in accordance with the electrical grid standard of the Republic of Moldova;

3.7.1.2. The inverter shall be compatible with the existing distribution system of the Beneficiary and shall comply with voltage and frequency tolerance requirements imposed by the grid operator.

3.7.2. AC Panel (PV-AC-DB):

3.7.2.1. The AC electrical panel (PV-AC-DB) must be designed and equipped to ensure proper protection, isolation and monitoring of the photovoltaic installation. It shall include at least the following equipment:

a. Main circuit breaker (MCCB), properly rated according to the total system current;

b. Overcurrent and short-circuit protection for each connected inverter;

c. Residual current protection, according to the design solution and applicable technical standards;

d. AC surge protection device (SPD) type II;

e. Metering system and/or energy analyzer, where measurement is not performed at the point of connection.

3.7.2.2. The minimum protection degree of the panel shall be IP54, suitable for installation conditions (indoor/protected outdoor).

3.7.3. AC Cables:

3.7.3.1. The sizing of AC cables shall be performed by the EPC Contractor based on electrical calculations and actual installation conditions;

3.7.3.2. The Contractor shall demonstrate through supporting calculations that:

a. The voltage drop along the route between the inverter and the AC panel does not exceed 1%;

b. The total voltage drop from the inverter to the point of connection (PoC) complies with the limits set by applicable technical standards.

3.7.3.3. Indicative cross-sections for substantiating the Terms of Reference are as follows:

a. For a 25 kW inverter → AC panel: typical copper cable 5×10…5×16 mm², depending on route length and installation method;

b. For the route AC panel → point of connection (PoC): cross-section determined depending on distance and calculated current, typically 5×16…5×35 mm².

3.7.3.4. The final cable cross-sections shall be determined in the technical design, in compliance with maximum allowable current, installation conditions, operating temperature and protection selectivity.

3.8. Point of Connection (PoC) and Metering

3.8.1. Requirements for the Point of Connection (PoC):

3.8.1.1. The Point of Connection (PoC) shall be established by mutual agreement with the Beneficiary, depending on the configuration of the existing electrical installation (main switchboard, BMPT or other internal distribution point);

3.8.1.2. The connection of the photovoltaic installation to the PoC shall be carried out with clear and identifiable separation of the PV circuit, including at least the following elements:

a. Dedicated main circuit breaker for the photovoltaic installation;

b. Appropriate electrical protections (overcurrent, short-circuit, residual current, as applicable);

c. Bidirectional meter, where the operating regime involves energy injection into the grid and if required by the technical approval or by the grid operator.

3.8.1.3. The connection scheme shall be presented in the technical design and shall comply with applicable technical standards and the conditions established by the grid operator.

3.8.2. Operating Regime:

3.8.2.1. The photovoltaic system may operate in one of the following regimes, depending on the conditions imposed by the grid connection approval and the requirements of the grid operator:

a. Self-consumption with controlled injection into the grid;

b. Self-consumption without injection into the grid (zero-export regime), where such regime is imposed by the grid operator.

3.8.2.2. Technical Requirement: The inverter and/or energy management system (EMS) must allow:

a. Limitation of energy export to the grid, including configuration of maximum injection thresholds;

b. Control of active and reactive power, in accordance with grid operator requirements (including P and Q control functions).

3.8.2.3. The bidder shall confirm through technical documentation that the proposed equipment supports these functionalities and can be configured in accordance with the required operating regime.

3.9. Grounding and Lightning Protection:

3.9.1. The photovoltaic system shall include a grounding and lightning protection installation dimensioned in accordance with applicable technical standards.

3.9.2. Mandatory requirements:

a. Design and installation of the grounding system, including performance of the corresponding measurements;

b. Connection to the grounding system of all metallic parts (support structures, module frames, equipment enclosures, electrical panels);

c. Installation and coordination of surge protection devices (SPD) on DC and AC sides, in accordance with selectivity and energy coordination principles.

3.9.3. The site is equipped with an existing lightning protection system. The EPC Contractor shall integrate the photovoltaic system into the existing lightning protection installation, in accordance with the technical design and applicable regulations.

3.9.4. Delivery Requirements:

3.9.4.1. Upon completion of the works, the Contractor shall provide:

a. Grounding resistance measurement report;

b. Grounding scheme in “as-built” version, reflecting the actual site conditions.

3.10. SCADA Integration / Monitoring:

3.10.1. The photovoltaic system shall be equipped with a monitoring solution compatible with integration into the Beneficiary’s supervision system;

3.10.2. Minimum requirements:

a. Monitoring of energy production (instantaneous and cumulative);

b. Generation and transmission of equipment operation alarms;

c. Secure remote access;

d. Possibility of data export (CSV, Excel or equivalent format).

3.10.3. Communication Interface:

a. Support for Modbus TCP and/or Modbus RTU protocol, or manufacturer-provided API (vendor API), technically documented.

3.10.4. Delivery Requirement:

3.10.4.1. The EPC Contractor shall provide:

a. Administration (admin) accounts for the Beneficiary, with full configuration and monitoring rights;

b. User manual and technical documentation of the monitoring system;

c. Communication network topology (logical diagram), including IP addresses, used ports and communication parameters required for integration into the monitoring center of the State Enterprise “Radiocommunication”.

3.11. BESS Integration (if option is selected):

3.11.1. In the event that integration of an energy storage system (BESS) is selected, the proposed technical solution must ensure compatibility and proper integration within the photovoltaic system architecture;

3.11.2. Accepted architecture:

a. Use of a hybrid inverter compatible with batteries or a dedicated PCS (Power Conversion System);

b. Implementation of an energy management system (EMS) ensuring operational logic for backup, peak-shaving and/or zero-export.

3.11.3. The BESS shall be installed in proximity to the AC panel, in a designated and protected area, ensuring dedicated electrical and mechanical protections;

3.11.4. Minimum Electrical Requirements

3.11.4.1. The BESS system must include:

a. Specific protections on AC and DC sides, dimensioned according to nominal parameters of the battery and converter;

b. Electrical interlocks and emergency stop function (E-Stop), accessible and clearly marked;

c. Integration of alarm systems and operating parameters into the Beneficiary's SCADA/monitoring platform.

3.12. Mandatory Electrical Deliverables (in the bid and upon completion of works):

3.12.1. Documents to be submitted in the bid

The bidder shall include in the bid documentation at least the following technical elements:

a. Proposed single-line diagram (Single Line Diagram – SLD);

b. String sizing calculation, including verification of Voc voltage at minimum design temperature (Tmin), Vmp voltage and compliance with the MPPT range;

c. Calculations regarding voltage drops on DC and AC sides;

d. List of proposed electrical protections, including justification of their selectivity;

e. List of main equipment (BOM – Bill of Materials), accompanied by manufacturer datasheets.

3.12.2. Documents to be submitted at acceptance ("as-built" documentation)

Upon completion of the works, the EPC Contractor shall deliver to the Beneficiary:

a. Final single-line diagram (SLD) and cabling plan, updated according to actual execution;

b. Testing and verification reports, including insulation resistance measurements, protective conductor (PE) continuity, SPD verification and testing of protection functions;

c. Main inverter and/or EMS settings (essential operating parameters);

d. Grounding resistance measurement report.

3.13. Schematic Example of SLD (Indicative Description)

3.13.1. The single-line diagram (Single Line Diagram – SLD) shall reflect the energy flow and connection structure of the photovoltaic system, as follows:

a. Photovoltaic (PV) strings are connected to the DC inputs of the inverter(s);

b. The AC output of the inverter(s) is connected to the AC panel dedicated to the photovoltaic installation (PV-AC-DB);

c. The PV-AC-DB panel is connected to the point of connection (PoC), respectively to the existing electrical panel or BMPT, according to the established solution;

d. In case of optional implementation of a BESS/PCS system, it shall be connected to the AC panel (PV-AC-DB) through dedicated protections;

e. The monitoring system (SCADA) shall collect data from the inverters and the metering system, through a router/switch, ensuring secure remote access.

3.13.2. The final diagram shall be detailed in the technical design and shall include protections, measurement points and separation elements required, in accordance with applicable regulations.

4. Electrical Sizing (DC/AC) for PoC Distance = 150 m:

4.1. The following presents an indicative sizing (model) for a distance of approximately 150 m between the inverter/PV panel area and the existing electrical panel (PoC). The final sizing shall be prepared and submitted by the EPC Contractor within the technical execution design, based on the proposed solution, actual equipment datasheets and corresponding design calculations.

4.2. Recommended Final Electrical Architecture

4.2.1. The recommended electrical architecture for system implementation is as follows:

a. 2 string-type inverters, each with a nominal power of 25 kW, three-phase output 3×400 V AC, 50 Hz;

b. AC panel dedicated to the photovoltaic installation (PV-AC-DB), located in proximity to the inverters, in the photovoltaic field area;

c. Main AC route between the PV-AC-DB panel and the point of connection (PoC), with an estimated length of approximately 150 m.

4.2.2. Technical requirement: The accepted DC/AC ratio is within the range 1.05 – 1.25, with the exact sizing to be justified through electrical calculations and energy simulation in the technical design.

4.3. Nominal Current on the AC Side (Reference for Sizing)

4.3.1. For a total installed AC power of approximately 50 kW, the reference three-phase current is determined according to the relation:

$I = P / (\sqrt{3} \times U \times \cos\varphi)$

Where:
P = 50,000 W
U = 400 V
$\cos\varphi = 0.95$
$\sqrt{3} = 1.732$
P – active power
U – line voltage (line-to-line)
I – line current
$\cos\varphi$ – power factor of the load
$\sqrt{3}$ (≈1.732) – coefficient used in three-phase power calculations

Result:
$I \approx 50{,}000 / (1.732 \times 400 \times 0.95)$
$I \approx 50{,}000 / 658.16$
$I \approx 76$ A

4.3.2. The sizing of the conductor and protection equipment shall be based on the calculated current I ≈ 76 A, determined according to item 4.3.1;

4.3.3. When selecting the conductor cross-section, the following shall be considered:
- allowable current of the conductor (according to applicable standards);
- installation conditions (installation in air, duct, conduit, etc.);
- ambient temperature;
- applicable correction factors.

4.3.4. The following condition shall be ensured:
$I_z \geq I$

Where:
I_z – allowable current of the conductor [A]
I – calculated current [A]

4.3.5. The overcurrent protection shall also be selected such that:
$I_n \geq I$
Where:
I_n – rated current of the protection device [A]

4.3.6. It is recommended to select a technical margin (≥10–15%) for sizing conductors and protections.

4.4. DC Configuration (Strings) – Requirements

4.4.1. The indicative system configuration on the DC side is as follows:

a. 85–90 TOPCon photovoltaic modules, with nominal power ranging between 550–600 Wp;

b. 6 strings with 14–15 modules/string (indicative configuration).

4.4.2. The EPC Contractor shall demonstrate through technical calculations that:

a. The maximum open-circuit voltage (Voc), determined at minimum design temperature (e.g. -20°C), is lower than the maximum DC voltage allowed by the inverter (Udc_max);

b. The voltage at maximum power point (Vmp), under operating conditions, falls within the MPPT operating range of the inverter;

c. The currents on each MPPT input comply with the maximum limits allowed by the inverter manufacturer.

4.4.3. Additional requirement: The voltage drop on the DC side shall not exceed 1.5% for each branch between string and inverter.

4.5. AC Cable Sizing for 150 m

4.5.1. Inverters → PV-AC-DB (local short route):

4.5.1.1. For the route between each inverter and the AC panel dedicated to the photovoltaic installation (PV-AC-DB), an estimated length of 10–20 m is considered;

4.5.1.2. Indicative sizing recommendation:

a. For each 25 kW inverter: typical copper cable 5×10 mm²;

b. If the route length exceeds approximately 30 m, the use of a 5×16 mm² cross-section is recommended.

4.5.1.3. Technical requirement: The voltage drop on this section shall not exceed 1% of the nominal voltage;

4.5.1.4. Final sizing shall be performed by the EPC Contractor based on electrical calculations, considering nominal current, installation method, operating temperature and applicable correction factors.

4.5.2. PV-AC-DB → PoC (150 m) – main cable:

For the main route between the PV-AC-DB panel and the point of connection (PoC), with an estimated length of approximately 150 m and a reference current of about 72 A, the following design requirement is established:

4.5.2.1. Technical target: Voltage drop on this section ≤ 1% of nominal voltage;

4.5.2.2. Standard recommendation (for substantiating the Terms of Reference):

a. Copper cable 2×5×35 mm², nominal voltage 0.6/1 kV, installed underground or on cable tray, in conduit/trench in accordance with applicable standards.

4.5.2.3. Accepted variant (conditional):

Copper cable 2×5×25 mm², permitted only if the EPC Contractor justifies through detailed calculations that the following conditions are simultaneously met:

a. Voltage drop limit ≤ 1%;

b. Allowable thermal loading under actual installation conditions (installation method, soil/air temperature, correction factors, cable grouping).

4.5.2.4. Mandatory requirement in the bid

The EPC Contractor shall provide:

a. Detailed voltage drop calculation;

b. Verification of conductor heating and maximum allowable current under installation conditions;

c. Justification of the selected cross-section;

d. If the Contractor cannot demonstrate compliance with the above conditions, the minimum recommended cross-section of 2×5×35 mm² shall be applied.

4.6. AC Protection Sizing (indicative)

4.6.1. Equipment and Protections in PV-AC-DB (PV panel)

The AC panel dedicated to the photovoltaic installation (PV-AC-DB) shall mandatorily include the following equipment and protections:

4.6.1.1. PV Main Circuit Breaker (MCCB):

a. Indicative rated current: 100 A;

b. Thermal-magnetic characteristic, with adjustable settings if required for protection selectivity and coordination.

4.6.1.2. Individual protection for each inverter:

a. MCB or MCCB dedicated to each inverter;

b. Indicative rated current: approximately 50 A for each 25 kW inverter;

c. Final selection shall be performed by the EPC Contractor based on inverter maximum current and manufacturer requirements.

4.6.1.3. AC Surge Protection Device (SPD) Type II:

a. Configuration: 3P+N;

b. Coordinated with the grounding system and with any SPD devices installed upstream or downstream.

4.6.1.4. Residual current protection (RCD), where applicable:

a. Applied according to the inverter manufacturer’s electrical scheme and applicable technical standards;

b. In systems with integrated residual current monitoring in the inverter, selectivity shall be ensured at the level of the main panel.

4.6.1.5. Minimum protection degree of the panel: IP54 (for outdoor installation, IP65 protection degree is recommended).

4.6.2. Equipment and Protections at PoC (existing panel)

4.6.2.1. At the point of connection (PoC), respectively in the existing electrical panel of the Beneficiary, the following minimum requirements shall be implemented:

a. Installation of a dedicated circuit breaker for supply from the photovoltaic system, with clear separation and distinct identification of the PV circuit;

b. Ensuring coordination and selectivity of protections between the PV-AC-DB panel and the existing panel, so that tripping is limited to the affected zone;

c. Installation of metering equipment (if required by the connection regime) and/or an energy measurement system for SCADA integration.

4.6.2.2. The connection scheme and protection coordination shall be detailed in the technical execution design, based on the parameters of the existing installation.

4.7. Grounding and Surge Protection:

4.7.1. The photovoltaic installation shall be implemented in compliance with technical standards regarding grounding and surge protection.

4.7.2. Minimum requirements:

a. Connection to the grounding system of all metallic support structures, photovoltaic module frames, inverter enclosures and the PV-AC-DB panel;

b. Installation of a protective bar (PE bar) in the PV-AC-DB panel;

c. Installation of a DC surge protection device (SPD) type II, located at the inverter or within dedicated DC enclosures;

d. Installation of an AC SPD type II in the PV-AC-DB panel;

e. Depending on distance, exposure and risk analysis, the EPC Contractor shall assess the need for installing an additional SPD at the point of connection (PoC).

4.7.3. Energy coordination of DC and AC SPD devices shall be ensured in accordance with selectivity principles and applicable standards;

4.7.4. Mandatory deliverable: Grounding measurement report, prepared and signed by authorized personnel.

4.8. Cable Route 150 m – Execution Requirements

4.8.1. For the main route between PV-AC-DB and the point of connection (PoC), with an estimated length of approximately 150 m, the EPC Contractor shall implement the following execution measures:

a. Installation of underground route in trench, with sand layer, warning tape and protection in conduit (PVC/PEHD/Copex), or installation on a dedicated cable tray, in accordance with applicable standards;

b. Route marking and update of the layout plan in the “as-built” documentation;

c. Ensuring additional mechanical protection in crossing areas (roads, pathways or technical zones), for example rigid conduit or additional protection;

d. Maintaining separation distance from data and communication cables, recommended minimum 0.3–0.5 m, or use of separate conduits.

4.8.2. Execution of works shall comply with technical standards for low-voltage cable installation and applicable safety requirements.

4.9. SCADA / Communications (for 150 m distance)

For integration of the photovoltaic system into the monitoring platform (SCADA), the communication route corresponding to the distance of approximately 150 m between the inverter area and the integration point into the existing network shall be implemented as follows:

4.9.1. Technical Recommendation:

a. Use of optical fiber or outdoor-rated UTP cable, installed in a separate conduit from power cables, depending on existing infrastructure and the proposed technical solution;

b. For a distance of 150 m, the use of UTP cable is possible, however it is recommended:

c. Installation of an intermediate switch, if necessary, for signal stability and amplification; or

d. Use of optical fiber, preferred due to immunity to surges, potential differences and electromagnetic interference.

4.9.2. Minimum Requirements:

4.9.2.1. Ensuring secure remote access to the system;

4.9.2.2. Possibility of data export for integration into the Beneficiary’s internal systems.

4.10. Mandatory Numerical Requirements (according to general requirements)

4.10.1. For the sizing of the electrical installation, the following minimum mandatory requirements are established:

a. Voltage drop on the DC side: ≤ 1.5%;
b. Voltage drop on the AC side:
- Inverter → PV-AC-DB route: ≤ 1%;
- PV-AC-DB → PoC route (approx. 150 m): ≤ 1%;

c. Main AC cable for the 150 m route:
- Minimum recommended cross-section: Cu 5×35 mm²;
- Cu 5×25 mm² cross-section is accepted only if the EPC Contractor demonstrates through detailed calculations and justifies, based on installation method, thermal conditions and correction factors, that both voltage drop and allowable thermal loading limits are met simultaneously;

d. PV main circuit breaker in PV-AC-DB panel: rated current 100 A;
e. Mandatory installation of DC SPD type II and AC SPD type II;
f. PV-AC-DB panel for outdoor installation: minimum protection degree IP54.

4.11. SLD – Final Description

4.11.1. The final single-line diagram (Single Line Diagram – SLD) of the installation shall reflect the following functional and architectural flow:

a. Photovoltaic (PV) strings are connected to the DC inputs of the inverter, each line being equipped with a DC switch and DC surge protection (SPD DC);

b. The 25 kW inverters are connected to the PV-AC-DB panel through dedicated individual protections;

c. The PV-AC-DB panel, equipped with a main MCCB (100 A), AC SPD and protective bar (PE), is connected to the point of connection (PoC) via the main copper cable 5×35 mm²;

d. In case of optional implementation of a BESS/PCS system, it shall be connected to the PV-AC-DB panel through dedicated protections and integrated according to the electrical scheme;

e. The monitoring system (SCADA) shall collect data from the inverters and/or meter, through the communication infrastructure (preferably optical fiber), with integration into the IT network of the State Enterprise “Radiocommunication”.

4.11.2. The final scheme shall be detailed in the technical execution design and shall include all necessary protection, measurement and isolation elements, in accordance with applicable standards.

4.12. Requirements for Underground Cable Route (150 m):
Main AC Cable

4.12.1. For the main route between PV-AC-DB and PoC (approx. 150 m), the following requirements are established:

a. Copper cable 5×35 mm², 0.6/1 kV – recommended as the minimum cross-section for this distance;

b. Alternatively, the use of 5×25 mm² cable is accepted only if the bidder demonstrates through detailed calculations that:

- voltage drop over 150 m is ≤ 1%;
- thermal loading is safe for the proposed installation method, considering temperature, correction factors and grouping.

4.12.2. Trench Execution (standard requirements):

a. Minimum installation depth: 0.7 m (for normal soil conditions);

b. Sand bedding: minimum 10 cm below the cable and 10 cm above the cable;

c. Additional mechanical protection (plates, protective bricks or rigid conduit) in vulnerable areas or at crossings;

d. Warning tape installed at 30–40 cm above the cable;

e. Restoration of the ground by compaction and reinstatement to its original condition.

4.12.3. Cable Separation (power vs. data):

a. If the communication route (SCADA/Ethernet) follows the same corridor, it shall be installed in a separate conduit or at an adequate lateral distance from the power cable;

b. For reliability and immunity to surges, the use of optical fiber over the 150 m distance is recommended.

4.12.4. Protections for Long Route:

a. Mandatory installation of AC SPD type II in the PV-AC-DB panel;
b. Proper implementation of the grounding system and connection of all equipment;
c. If the PoC panel is located at the end of the route and exposure to surges is high, the EPC Contractor shall assess the need for an additional SPD at PoC, based on the technical design.

5. Mandatory EPC Requirements for Technical Design and Execution of the Photovoltaic Plant:

5.1. General Principles

5.1.1. The EPC Contractor is responsible for:
a. Preparation of the complete technical design of the photovoltaic plant;
b. Verification of actual site conditions and alignment of the technical solution with the existing situation;
c. Final sizing of equipment and electrical installations;
d. Ensuring compliance of the installation with applicable technical standards and regulations;
e. Compliance with the tower protection zone and technical restrictions related to the existing infrastructure.

5.1.2. All calculations and values presented in this Terms of Reference are indicative and serve to define and guide the minimum project requirements;

5.1.3. The final sizing and the definitive technical solution shall be determined by the EPC Contractor within the technical execution design, based on performed verifications and actual parameters of the proposed equipment.
5.2. Minimum Content of the Technical Design

The Contractor shall prepare the complete technical design of the photovoltaic plant, which shall include, at minimum, the following documents and drawings:

5.2.1. General Documentation

The technical design shall include:
a. General technical report;
b. Detailed description of the photovoltaic system;
c. Installation operation diagram;

d. Justification of the selected technical solution (including sizing and configuration);

e. Demonstration of compliance with applicable standards and regulations (IEC, EN and local regulations).

5.2.2. Layout Plans

The technical design must include at least:

a. Layout plan of photovoltaic modules;

b. Layout plan of inverters;

c. Layout plan of electrical panels;

d. Layout plan of the BESS system (if implemented);

e. Plans showing DC and AC cable routes;

f. Plans showing communication routes;

g. Plan regarding maintenance access;

h. Alignment of equipment placement with the tower protection zone and existing infrastructure.

5.2.2.1. The plans shall be delivered in the following formats:

a. PDF format (for approval and archiving);

b. Editable DWG format (for further use and integration into the Beneficiary's technical documentation).

5.2.3. Electrical Schematics

The Contractor shall provide:

a. Complete single-line diagram (SLD);

b. DC connection diagram;

c. AC connection diagram;

d. Detailed schematics of electrical panels;

e. Grounding and earthing system diagram;

f. Monitoring and communication system diagram.

5.3. Mandatory Technical Calculations

The EPC Contractor is required to present, within the bid and subsequently in the technical execution design, the following supporting technical calculations:

5.3.1. String Configuration Calculation

5.3.1.1. The string configuration calculation must explicitly demonstrate that:

a. The Voc voltage at the minimum design temperature (-20°C) does not exceed the maximum DC voltage allowed by the inverter;

b. The Vmp voltage under operating conditions falls within the inverter MPPT range;

c. The current corresponding to each MPPT does not exceed the maximum limit allowed by the inverter manufacturer.

5.3.1.2. The calculation shall be presented in tabular form and shall include at least the following parameters: module type, number of modules per string, Voc_STC, temperature coefficient, Voc@Tmin, Vmp_STC, inverter MPPT range, maximum MPPT current.

5.3.2. DC Cable Calculation

5.3.2.1. The Contractor must provide the DC cable sizing calculation, including:

a. Determination of cable cross-section;

b. Maximum operating current;

c. Voltage drop on each section.

5.3.2.2. Mandatory minimum requirement:

a. Voltage drop on the DC side ≤ 1.5% for each string → inverter branch.

5.3.3. AC Cable Calculation

5.3.3.1. For the main route between the PV-AC-DB panel and the point of connection (PoC), the Contractor shall provide:

a. Detailed voltage drop calculation;

b. Verification of thermal loading of cables (considering installation method, temperature and correction factors);

c. Verification of short-circuit protection and tripping times.

5.3.3.2. Mandatory AC voltage drop requirements:

a. Inverter → PV-AC-DB: ≤ 1%;

b. PV-AC-DB → PoC: ≤ 1%.

5.3.4. Electrical Protection Calculation

5.3.4.1. The Contractor must demonstrate, through calculations and selectivity diagrams:

a. Protection selectivity across the entire electrical chain;

b. Proper sizing of circuit breakers;

c. Overcurrent protection;

d. Short-circuit protection, including verification of breaking capacity.

5.3.5. All calculations shall be signed by the responsible designer and shall form an integral part of the technical documentation. Responsibility for the correctness of sizing and the technical solution lies entirely with the EPC Contractor.

5.4. Mounting Structure Design

5.4.1. The mounting structure of the photovoltaic field shall be designed based on the following factors:

a. Wind loads, in accordance with applicable standards;
b. Snow loads, in accordance with climatic zoning;
c. Geotechnical characteristics of the soil at the site;
d. Actual site conditions (slope, drainage, stability).

5.4.2. The EPC Contractor is required to provide:

a. Structural calculation of the support structure (including load combinations);
b. Proposed foundation solution (metal screws, concrete foundations or other technically justified solution);
c. Construction details (connections, anchoring, anticorrosion protection);
d. Installation plan of the structure and modules.

5.4.3. The structural calculation shall demonstrate:

a. Stability against overturning and sliding;
b. Uplift resistance of the foundations;
c. Compliance with applicable structural standards (EN/Eurocode or equivalent).

5.4.4. Responsibility for the sizing and safety of the structure lies entirely with the EPC Contractor.

5.5. Grounding System Design

5.5.1. The EPC Contractor is required to design and size the grounding system of the photovoltaic installation, ensuring protection of personnel and equipment.

5.5.2. The grounding system shall cover at least the following elements:

a. Metal support structure;
b. Photovoltaic module frames;
c. Inverters;
d. Electrical panels (PV-AC-DB and associated equipment).

5.5.3. The Contractor shall perform and provide:

a. Grounding resistance calculation;

b. Grounding network layout (including PE conductors, equipotential bonding bars and connection points);

c. Integration of the newly designed system with the existing grounding system of the site.

5.5.4. The system sizing shall be performed in accordance with applicable standards and regulations, taking into account actual site conditions and coordination with surge protection devices (SPD);

5.5.5. Acceptance Requirement

Upon completion of the works, the Contractor shall provide:

a. Grounding measurement report, issued based on measurements performed in accordance with applicable standards;

b. “As-built” grounding system diagram.

5.5.6. Responsibility for the correctness of the sizing and the effectiveness of the grounding system lies entirely with the EPC Contractor.

5.6. Surge and Lightning Protection:

5.6.1. The EPC Contractor is required to design and implement surge protection systems and ensure proper integration with the existing lightning protection system of the site;

5.6.2. The following shall be mandatorily provided:

a. DC SPD type II on the direct current side (integrated in the inverter or installed in dedicated DC enclosures);

b. AC SPD type II on the alternating current side (in the PV-AC-DB panel);

c. Coordination of surge protection devices with the existing lightning protection system (LPS) and the site grounding system.

5.6.3. The Contractor shall perform lightning and surge risk analysis in accordance with applicable standards;

5.6.4. If the risk analysis indicates the need for additional measures, the Contractor shall propose and technically justify:

a. Installation of additional lightning protection (extension/adaptation of LPS);

b. Installation of additional SPD devices (e.g. at PoC or other sensitive points of the installation).

5.6.5. Responsibility for the sizing and coordination of protections lies entirely with the EPC Contractor.

5.7. SCADA Integration

5.7.1. The EPC Contractor is required to deliver and commission a fully functional monitoring system integrated with the photovoltaic installation;

5.7.2. Mandatory minimum requirements:

a. Monitoring of energy production;

b. Monitoring of inverter operating parameters;

c. Alarm system for events and faults;

d. Secure remote access.

5.7.3. The monitoring system must allow:

a. Data export (standardized format, e.g. CSV, API or Modbus);

b. Administrative access for the Beneficiary (full configuration and visualization rights);

c. Integration with IT systems and the monitoring center of the State Enterprise “Radiocommunication”.

5.7.4. Detailed technical conditions regarding integration (IP addresses, VLAN, ports, cybersecurity requirements, accepted protocols, etc.) shall be communicated to the bidder/contractor during the design phase;

5.7.5. The Contractor is responsible for ensuring compatibility of the proposed solution with the existing IT infrastructure, as well as for proper operation of the monitoring system at the time of final acceptance.

5.8. Testing and Commissioning

5.8.1. Prior to final acceptance, the EPC Contractor is required to perform all necessary tests and verifications to confirm the correct and safe operation of the photovoltaic installation;

5.8.2. At minimum, the following tests shall be performed:

a. Cable insulation test (DC and AC);

b. Continuity test of protective conductors and the grounding system;

c. Functional testing of inverters (including verification of main parameters and imposed limitations);

d. Verification of monitoring system (SCADA) operation;

e. Verification of electrical protections operation (tripping, selectivity, SPD – where applicable).

5.8.3. All test results shall be recorded and submitted to the Beneficiary within:

a. The testing and commissioning report, which shall form part of the acceptance documentation.

5.8.4. The report shall include measured values, test equipment used, date of testing and the signature of the Contractor’s responsible technical representative.

5.9. “As-Built” Documentation

5.9.1. Upon completion of the works, the EPC Contractor is required to provide the Beneficiary with the complete set of final technical documents (“As-Built”), reflecting the actual condition of the constructed works and installations, including all modifications compared to the initial technical design;

5.9.2. The “As-Built” documentation shall include at least:

a. “As-built” layout plans;

b. Final electrical schematics (SLD, DC, AC, grounding);

c. Final configuration of the monitoring system (main parameters, inverter/EMS settings);

d. List of installed equipment (final BOM), including equipment serial numbers;

e. Installation operation manual;

f. Preventive maintenance plan and operational recommendations.

5.9.3. The documentation shall be delivered in electronic format (PDF + editable format, where applicable) and shall form an integral part of the technical dossier of the installation;

5.9.4. Final acceptance shall not be considered completed without full delivery of complete and compliant “As-Built” documentation.

5.10. Operational Transfer

5.10.1. Upon project completion, the EPC Contractor is required to ensure full operational transfer of the installation to the Beneficiary;

5.10.2. For this purpose, the Contractor shall ensure:

a. Training of personnel designated by the Beneficiary regarding operation and maintenance of the photovoltaic system;

b. Handover of all access credentials (passwords, administrative accounts, configuration rights) related to the SCADA system and smart equipment;

c. Delivery of complete technical documentation of the system, including manuals, schematics, “as-built” plans and operating procedures.

5.10.3. The training shall be documented through a training report, signed by both parties, and shall cover both normal operation and management of alarm and intervention situations.

5.10.4. The operational transfer shall be considered completed only after full delivery of documentation and access rights to the Beneficiary.

6. Energy Performance Requirements and Guaranteed Production:

6.1. General Principles on Energy Performance:

6.1.1. The photovoltaic plant shall be designed and implemented to ensure optimal energy production for the specific climatic conditions of the Edineț site, Republic of Moldova;

6.1.2. The EPC Contractor is required to demonstrate, through calculations and specialized simulations (industry-recognized software), the energy performance of the proposed system;

6.1.3. The performance analysis shall be based on relevant climatic data for the location (solar irradiation, temperature, climatic losses) and shall include the assumptions used in the modeling;

6.1.4. Energy performance evaluation shall be carried out based on the following criteria:

a. Estimated annual energy production (kWh/year);
b. Overall system efficiency (including Performance Ratio – PR);
c. Identification and quantification of technological losses (DC, AC, temperature, cables, mismatch, shading, etc.);
d. System availability and estimated operation at nominal conditions.

6.1.5. The simulation report shall be attached to the bid and shall include: input parameters, system configuration, assumptions used and detailed simulation results.

6.2. Energy Production Modeling

6.2.1. The EPC Contractor is required to provide a detailed simulation of the energy production of the proposed photovoltaic system, using industry-recognized specialized software, such as:

a. PVsyst;
b. Helioscope;
c. PV*Sol;
d. Or other equivalent software accepted in international technical practice.

6.2.2. The simulation shall be based on climatic data from recognized databases, such as:

a. PVGIS;
b. Meteonorm;
c. Solargis;
d. Or other scientifically validated sources.

6.2.3. The modeling must reflect the actual technical configuration of the proposed system (number of modules, inverter type, orientation, tilt, cable losses, temperature, system losses, etc.).

6.2.4. The simulation report shall include at least:

a. Estimated annual energy production (kWh/year);
b. Estimated monthly production (kWh/month);
c. Performance Ratio (PR);
d. Detailed system loss analysis (DC, AC, temperature, cables, mismatch, shading, degradation, etc.).

6.2.5. The simulation report shall be attached to the bid and shall include the input parameters used, software version, selected climatic database and calculation assumptions.

6.2.6. Responsibility for the correctness of the modeling and the consistency of the input data lies entirely with the EPC Contractor.

6.3. Estimated Annual Energy Production

6.3.1. The estimation of energy production is based on climatic data corresponding to the site coordinates: 48.18253 N, 27.29990 E (Edineț city, Republic of Moldova);

6.3.2. Based on recognized climatic databases and the preliminary study conducted, the estimated specific production for the location is within the range:
1150 – 1250 kWh/kWp/year;

6.3.3. For a photovoltaic plant with an installed capacity of approximately 50 kWp, the estimated annual production is within the range:
55,000 – 63,000 kWh/year;

6.3.4. The reference value used in the evaluation of bids is:
≈ 60,000 kWh/year;

6.3.5. This estimate is indicative and may vary depending on:

a. Module and inverter technology;
b. DC/AC ratio;
c. Technological losses;
d. Mounting solution and actual site conditions.

6.3.6. The final estimated production value shall be substantiated through the energy simulation submitted by the Contractor, in accordance with the requirements under item 6.2.

6.4. Performance Ratio (PR)

6.4.1. The EPC Contractor is required to design the photovoltaic system to ensure a minimum Performance Ratio (PR) of 80%, calculated under standard operating conditions and in accordance with international practices applicable to photovoltaic systems;

6.4.2. The Performance Ratio shall be determined in accordance with relevant standards (e.g. IEC 61724 or equivalent) and shall reflect the overall system performance relative to the theoretical energy available from incident irradiation;

6.4.3. The PR calculation shall include at least the following losses:
a. Temperature effects on modules;
b. Losses in DC and AC cables;
c. Inverter efficiency;
d. Module mismatch;
e. Other system losses (soiling, initial degradation, unavailability, shading, etc.).

6.4.4. The Contractor shall provide in the bid:
a. Detailed system loss budget (loss diagram);
b. Calculation methodology used;
c. Percentage values assigned to each loss category.

6.4.5. Responsibility for achieving the declared minimum PR value lies entirely with the EPC Contractor.

6.5. Acceptable Technological Losses

6.5.1. Total system losses of the photovoltaic installation shall fall within the range of 14% – 18%, relative to the theoretical energy available from incident irradiation;

6.5.2. The typical loss structure (temperature losses, DC/AC cables, inverter, mismatch, soiling, unavailability, etc.) is presented in Table No. 10;

6.5.3. The EPC Contractor shall present in the bid the detailed loss breakdown and justify the assumed values for each category based on the energy simulation;

6.5.4. Any deviation from the indicated range shall be technically substantiated and justified based on the specific conditions of the proposed solution.

Table No. 10

Typical Loss Structure

Loss Type	Typical Range
Temperature losses	6 – 8%
Inverter losses	1 – 2%
Cable losses	1 – 2%
Module mismatch losses	1 – 2%
Soiling losses	1 – 3%
Other component losses	1 – 2%

6.5.5. The Contractor is required to present the complete system loss diagram, clearly detailing all categories of technological losses and the percentage impact of each on the estimated energy production.

6.6. System Availability

6.6.1. The photovoltaic plant shall be designed to ensure a minimum operational availability of 98%;

6.6.2. Operational availability represents the percentage of time during which the system is capable of producing electrical energy under normal solar irradiation and grid operating conditions;

6.6.3. The following shall not be included in availability calculations:

a. Downtime caused by grid unavailability or imposed limitations;

b. Force majeure events;

c. Extreme weather conditions or other circumstances beyond the Contractor’s control.

6.6.4. The Contractor shall describe in the bid the methodology for calculating availability and how it will be monitored through the SCADA system.

6.7. Photovoltaic Module Degradation

6.7.1. The proposed photovoltaic modules must comply with the following maximum power degradation limits:

a. First-year degradation: ≤ 2% of nominal power;
b. Subsequent annual degradation: ≤ 0.55%/year.

6.7.2. Based on these parameters, the minimum guaranteed output of the module shall be at least 84.8% of nominal power after 30 years of operation, in accordance with the manufacturer’s performance warranty;

6.7.3. The Contractor shall provide in the bid:

a. Official technical datasheet of the module;
b. Performance warranty certificate issued by the manufacturer;
c. Guaranteed degradation curve (linear performance warranty).

6.7.4. Responsibility for the compliance of the modules with these requirements lies entirely with the EPC Contractor.

6.8. Performance Tests at Commissioning

6.8.1. Upon commissioning of the photovoltaic plant, the EPC Contractor is required to perform the necessary verifications to confirm the initial performance of the system;

6.8.2. At minimum, the following verifications shall be performed:

a. Verification of each string operation (voltage, current, polarity);
b. Verification of inverter production and operating parameters;
c. Verification of SCADA system operation and data transmission;
d. Verification of the accuracy of energy metering.

6.8.3. Following the tests, an initial performance report shall be prepared, which shall include at least:

a. Instantaneous power output at the time of testing;
b. Solar irradiance measured at the time of testing;
c. Temperature of photovoltaic modules;
d. Inverter efficiency under test conditions.

6.8.4. The report shall be signed by the Contractor’s representative and shall form an integral part of the acceptance documentation.

6.9. Performance Monitoring

6.9.1. The monitoring system must allow real-time tracking of the photovoltaic plant performance and the operational status of equipment;

6.9.2. At minimum, the following parameters shall be monitored:

a. Total energy production;

b. Individual production per inverter;

c. Main electrical parameters (voltages, currents, active/reactive power, frequency);

d. System operating status;

e. Alarms and events.

6.9.3. The Beneficiary must have permanent access to:

a. Historical data (at least daily, monthly, and annual level);

b. Production and performance graphs;

c. Possibility to export data in standard formats (e.g. CSV, Excel, API).

6.9.4. Data must be stored and accessible in a secure manner, and the monitoring system must allow integration with the Beneficiary's IT infrastructure.

6.10. Long-Term Performance Analysis

6.10.1. The SCADA system must allow short-term and long-term performance analysis in order to evaluate the operation and efficiency of the photovoltaic plant;

6.10.2. The system shall ensure at least the following functionalities:

a. Daily production analysis;

b. Monthly production analysis;

c. Annual production analysis;

d. Comparison between estimated production (based on simulation) and actual recorded production;

e. Identification and highlighting of any performance losses or deviations from the designed parameters.

6.10.3. The system must allow automatic report generation and data export for further analysis performed by the Beneficiary.

6.11. Key Performance Indicators (KPI)

6.11.1. For the evaluation of photovoltaic plant performance, at least the Key Performance Indicators (KPI) described in Table No. 11 shall be used;

6.11.2. These indicators shall form the basis for technical monitoring of the installation, energy performance analysis and, where applicable, verification of compliance with the parameters guaranteed by the EPC Contractor;

6.11.3. The calculation methodology and interpretation of each KPI shall be defined in the technical documentation and correlated with the data provided by the SCADA system.

Table No. 11

KPI Indicators

Indicator	Target Value
Annual production	≥ 55,000 kWh
Specific production	≥ 1100 kWh/kWp
Performance Ratio	≥ 80%
System availability	≥ 98%

6.12. Purpose of Performance Requirements

6.12.1. The performance requirements established in this chapter have the following objectives:

a. Ensuring efficient and stable operation of the photovoltaic plant under real operating conditions;

b. Enabling continuous monitoring and performance evaluation throughout the system lifecycle;

c. Providing a technically substantiated basis for replication and scaling of the solution to other locations of the State Enterprise “Radiocommunication”.

6.12.2. These requirements constitute the minimum framework for design, implementation and performance verification of the photovoltaic system and shall be used as a reference in the evaluation and acceptance process of the works.

7. Operation and Maintenance (O&M) Requirements

7.1. General Principles on Operation and Maintenance (O&M)

7.1.1. After commissioning of the photovoltaic plant, the EPC Contractor shall provide the necessary technical support for operation and maintenance of the installation, in accordance with contractual provisions.

7.1.2. The purpose of operation and maintenance (O&M) activities is:

a. To ensure continuous and safe operation of the system;

b. To maintain energy performance at the designed parameters;

c. To prevent failures and reduce the risk of system unavailability;

d. Extension of the service life of equipment and system components.

7.1.3. O&M activities shall be carried out in accordance with:

a. Equipment manufacturers’ recommendations and manuals;
b. Applicable standards and technical regulations;
c. Best practices in the photovoltaic industry.

7.1.4. Responsibilities and frequency of O&M activities shall be detailed in the maintenance plan submitted by the Contractor and approved by the Beneficiary.

7.2. Maintenance Period

7.2.1. The EPC Contractor is required to provide:
a. Technical support throughout the entire warranty period of the installation;
b. Preventive maintenance for a minimum period of 12 months from the commissioning date.

7.2.2. Preventive maintenance shall include at least periodic inspections, visual checks, functional tests and necessary interventions to maintain system performance parameters;

7.2.3. Bidders may optionally propose:
a. An extended maintenance contract for a period of 3–5 years, including detailed description of services, intervention frequency and financial terms.

7.3. Preventive Maintenance Activities

7.3.1. The EPC Contractor is required to perform at least two preventive inspections per year during the minimum contractual maintenance period;

7.3.2. Preventive maintenance activities shall include at least the following operations:

7.3.2.1 Visual inspection (to be checked):

a. Integrity of photovoltaic modules (cracks, delamination, mechanical damage);
b. Condition of mounting structure (fixings, corrosion, stability);
c. Integrity of cables and connectors (DC and AC);
d. Condition of electrical panels;
e. Operation of monitoring equipment.

7.3.2.2 Verification of electrical connections (to be checked):

a. Condition and tightening of DC connections;
b. Condition and tightening of AC connections;

c. Terminals in electrical panels;
d. Continuity and integrity of the grounding system.

7.3.2.3 Inverter verification (to be checked):

a. Inverter operating parameters;
b. Equipment temperature;
c. Alarm history and messages;
d. Firmware updates (if applicable and according to manufacturer recommendations).

7.3.2.4 Monitoring system verification (to be checked):
a. Communication between inverters and the SCADA system;
b. Remote access functionality;
c. Accuracy and consistency of recorded production data.

7.3.3. For each preventive inspection, a maintenance report shall be prepared, including findings, any non-conformities and proposed corrective measures.
7.4. Cleaning of Photovoltaic Modules

7.4.1. Cleaning of photovoltaic modules shall be performed depending on local operating conditions (dust level, pollution, organic deposits, etc.), in order to maintain system energy performance;

7.4.2. Recommended indicative frequency: 1–2 cleanings per year;

7.4.3. The cleaning operation shall be carried out:
a. Using water (preferably demineralized or low mineral content, where applicable);
b. Without the use of abrasive substances or aggressive detergents;
c. Without equipment or tools that may damage the glass or module surface.

7.4.4. Cleaning shall be performed under safe conditions, in compliance with occupational safety regulations and manufacturer recommendations.
7.5. System Monitoring

7.5.1. The monitoring system shall be used for:
a. Continuous tracking of energy production;
b. Rapid identification of faults and deviations from nominal parameters;
c. Analysis of system performance over time.

7.5.2. The Beneficiary shall have permanent and secure access to the following information:

a. Daily energy production;
b. Monthly production;
c. Annual production;
d. System alarms and event history.

7.5.3. Data must be available in real time and archived for further analysis, with access ensured both locally and remotely, in accordance with IT integration requirements.

7.6. Corrective Interventions

7.6.1. In case of faults or malfunctions of the photovoltaic installation, the EPC Contractor is required to provide technical support for their identification and remediation;

7.6.2. Maximum response time for intervention: 48 hours from notification by the Beneficiary;

7.6.3. In critical situations affecting energy production or system safety, the Contractor shall ensure intervention within 24 hours from notification;

7.6.4. Intervention timeframes shall be detailed in the technical proposal and contract, and all interventions shall be documented through an intervention report.

7.7. Spare Parts

7.7.1. The EPC Contractor is required to ensure availability of spare parts necessary for maintaining continuous operation of installed equipment during the warranty period and in accordance with contractual conditions;

7.7.2. Critical spare parts shall include at least:
a. Internal components of inverters;
b. Electrical protection equipment and devices (MCB, MCCB, SPD, fuses, etc.);
c. Components of the monitoring and communication system.

7.7.3. The Contractor shall specify in the bid:
a. The list of critical spare parts;
b. Estimated delivery time for each category;
c. Method of ensuring availability (local stock, authorized distributor, manufacturer).

7.7.4. Availability of critical spare parts shall be correlated with the intervention timeframes specified under item 7.6.

7.8. Maintenance Report

7.8.1. After each corrective intervention or preventive inspection, the EPC Contractor is required to provide the Beneficiary with a maintenance report;

7.8.2. The maintenance report shall include at least:

a. Description of performed activities;

b. Identified defects or non-conformities;

c. Corrective measures applied (if applicable);

d. Recommendations for operation and prevention of similar situations;

e. Relevant photographs documenting the condition of the installation or performed works (where applicable).

7.8.3. The report shall be submitted in electronic format and shall form an integral part of the technical operation dossier of the photovoltaic plant.

7.9. Training of Beneficiary Personnel

7.9.1. The EPC Contractor is required to organize at least one training session for personnel designated by the Beneficiary, in order to ensure proper and safe operation of the photovoltaic plant;

7.9.2. The training shall include at least the following topics:

a. Operating principles of the photovoltaic plant;

b. Use and basic configuration of the monitoring system;

c. Interpretation of alarms and system messages;

d. Basic operational procedures for operation and intervention.

7.9.3. The training session shall be documented through a training report signed by both parties and shall be accompanied by supporting materials (presentation, manuals, operation guide).

7.10. Operation Documentation

7.10.1. Upon project completion and prior to final acceptance, the EPC Contractor is required to provide the Beneficiary with the complete operational documentation of the photovoltaic plant;

7.10.2. The documentation shall include at least:

a. Plant operation manual (system description, operating modes, main parameters);

b. Maintenance guide (preventive activities, frequency, manufacturer recommendations);

c. Procedures for intervention in case of alarms or faults;

d. Contact details for technical support (manufacturers, distributors, authorized service providers).

e. The documentation shall be delivered in electronic format (PDF) and shall form part of the final technical dossier of the installation.

7.11. System Lifetime

7.11.1. The photovoltaic plant shall be designed and implemented to ensure a minimum estimated lifetime of 25–30 years, under normal operating and maintenance conditions;

7.11.2. The estimated lifetime of the main components (photovoltaic modules, inverters, mounting structure, cables, electrical equipment, etc.) is presented for guidance in Table No. 12;

7.11.3. The EPC Contractor shall demonstrate, through technical datasheets and manufacturer warranties, the compliance of the proposed equipment with the estimated lifetime;

7.11.4. System design shall consider:

a. Adequate anti-corrosion protection;

b. Local climatic conditions;

c. Possibility of replacing components with shorter lifetime (e.g. inverters) without affecting the overall system structure.

Table No. 12

Lifetime of Main Components

Component	**Estimated Lifetime**
Photovoltaic modules	30 years
Mounting structures	25–30 years
Inverters	10–15 years
Cables	25 years

7.12. Maintenance Objective

7.12.1. Operation and maintenance (O&M) activities aim to ensure efficient, safe and durable operation of the photovoltaic plant;

7.12.2. Proper implementation of O&M activities shall ensure:

a. Maintaining energy production at designed parameters;
b. Safe operation of the installation and reduction of technical risks;
c. Protection of equipment against premature degradation;
d. Maximization of system lifetime.

7.12.3. Maintenance activities shall be carried out in a manner that supports maintaining the performance indicators defined in the energy performance chapter.

Chapter III. Evaluation of Bids

1. General Evaluation Principles

1.1. Evaluation of bids submitted within the procurement procedure for the implementation of the 50 kW pilot photovoltaic system shall be carried out based on the award criterion “best value for money”, by applying a weighted scoring matrix, in accordance with the provisions of this chapter;

1.2. Items 5.5–5.10 (from Chapter I) establish the general technical requirements applicable to system components. The mandatory minimum technical requirements, compliance with which conditions the admissibility of the bid, are set out in Annex No. 2 – Minimum Technical Specifications;

1.3. Failure to comply with one or more minimum requirements specified in Annex No. 2 shall result in rejection of the bid as non-compliant, without being subject to further comparative evaluation;

1.4. The winning bid shall be the one obtaining the highest total score resulting from the cumulative evaluation of technical, financial and operational criteria.

2. Stages of the Evaluation Process

2.1. The evaluation process shall be carried out in two distinct stages:

a. Verification of administrative and technical compliance (fulfillment of mandatory minimum requirements);

b. Comparative evaluation of admissible bids by applying the established scoring matrix.

2.2. Bidders who do not meet the mandatory minimum requirements shall be disqualified prior to the application of the comparative scoring.

3. Structure of the Evaluation Matrix

Table No. 13

Evaluation Matrix

No.	Evaluation Criteria	Weight	Evaluation Method
1	**Technical Criteria**		
1.1	Module technical performance	15%	Technical evaluation
1.2	Equipment quality	15%	Verification of certifications and mandatory technical documentation
1.3	Warranties offered	10%	Warranty period (years)

No.	Evaluation Criteria	Weight	Evaluation Method
1.4	Monitoring system	5%	Technical evaluation
	Total technical	**45%**	
2	**Financial Criteria**		
2.1	Total bid price (CAPEX)	30%	Comparative formula
2.2	O&M support price	5%	Comparative formula
	Total financial	**35%**	
3	**Operational Criteria**		
3.1	Local service availability	10%	Availability assessment
3.2	Delivery time	5%	Number of days specified in the bid
3.3	Experience in similar projects	5%	Evidence of similar project implementation
	Total operational	**20%**	
	Total bid score:	**100%**	

Note:

For the purpose of bid evaluation, a weighted scoring matrix shall be applied, within which the maximum total score is 100 points. The evaluation structure is distributed as follows:
45% for technical criteria, 35% for financial criteria and 20% for operational criteria.

Each percentage weight corresponds to an equivalent maximum score, and the final score of the bid results from the totalization of the points awarded according to the established criteria.

Technical Criteria (45%)

These cover the quality and performance of the system:

- Module technical performance (15%): Evaluation based on efficiency, shading loss reduction, layout flexibility, etc.;
- Equipment quality (15%): Evaluation based on certifications, technical datasheets and compliance documents submitted;
- Warranties offered (10%): Score proportional to warranty years (e.g. 25+ years for modules);
- Monitoring system (5%): Technical evaluation of functionality (e.g. remote access, alarms).

Financial Criteria (35%)

- Total bid price (CAPEX, 30%): Comparative formula normalizes price per installed kWp, favoring value for money;
- O&M price (OPEX, 5%): Comparative formula normalizes annual support cost per installed kWp. Bidders may optionally indicate post-warranty support conditions, separate from the base offer.

Operational Criteria (20%)

- Local service (10%): Availability in Chișinău/Moldova (repairs <48h);
- Delivery time (5%): Days until installation (according to specification requirements = maximum score);
- Experience in similar projects (5%): Evidence of similar implemented projects, confirmed by acceptance reports, references or equivalent documents.

3.1. Technical Criteria

3.1.1. Evaluation of technical performance (the following parameters shall be assessed):

Table No. 14

Technical Performance Evaluation

Parameter	Maximum Score
Photovoltaic module efficiency	8
Inverter efficiency	7
SCADA monitoring system	4
BESS integration (optional)	1
Total	**20 points**

3.1.2. Evaluation of equipment quality (origin and certification of equipment shall be analyzed):

Table No. 15

Equipment Quality Evaluation

Criterion	Points
Proven track record and evidence of projects implemented in the region	5
Full IEC certifications	5
EU grid-code compatibility	5
Total	**15 points**

3.1.3. Evaluation of Warranties:

Table No. 16

Warranties Evaluation

Warranty Type	Score
Module product warranty ≥ 12 years	3
Performance warranty ≥ 25 years	3
Inverter warranty ≥ 10 years	2
Structure warranty ≥ 10 years	2
Total	**10 points**

Total technical score, maximum: 45 points

3.2. Financial Criteria

3.2.1. Total Bid Price (includes):

a. Design;
b. Equipment;
c. Installation;
d. Commissioning;
e. SCADA integration;
f. Technical documentation.

Scoring formula:

Score = (Minimum Price / Bid Price) × 30

Where:

Minimum Price = the lowest valid financial bid submitted (not necessarily the overall winning bid);

Bid Price = The bidder with the lowest price receives the maximum of 30 points; other bids receive proportional scores (example: if Minimum Price = 100k€ and Bid Price = 110k€, score = (100/110) × 30 ≈ 27.3 points).

Total bid price score, maximum: 30 points

3.2.2. O&M Support Price (includes):

a. Annual post-warranty support.

Scoring formula:

Score = (Minimum Price / Bid Price) × 5

Total O&M price score, maximum: 5 points

Total financial score, maximum: 35 points

3.3. Operational Criteria

3.3.1. Technical Support Evaluation:

Table No. 17

Support Evaluation

Criterion	Points
Local service presence in the Republic of Moldova	3
Intervention time < 48 hours	3
Availability of spare parts	4
Total	**10 points**

3.3.2. Delivery Time Evaluation

Scoring formula:

Score = (Minimum Delivery Time / Bid Delivery Time) × 5

Where:

- Minimum Delivery Time = the shortest delivery time among valid submitted bids (not necessarily the overall winning bid);
- The bidder with the shortest delivery time receives the maximum of 5 points.

Total: 5 points

3.3.3. Bidder Experience Evaluation:

a.
The bidder’s experience shall be evaluated based on similar projects implemented, confirmed by acceptance reports, references, or equivalent documents.

Table No. 18

Experience Evaluation

Experience	Points
≥ 1 MW installed	5

Experience	Points
> 100 kW	4
> 50 kW	2
< 50 kW	1
Total	**5 points**

Total operational score, maximum: 20 points

3.4. Offer Evaluation Table (Template)

Table No. 19

Evaluation Template

Bidder	Technical (45 pts)	Financial (35 pts)	Operational (20 pts)	Total
Bidder 1				
Bidder 2				
…				
Bidder N				

3.5. Tie-Breaking Rules

3.5.1 The percentage weights indicated in the evaluation matrix shall be converted into equivalent maximum scores, such that the total maximum achievable score is 100 points.

3.5.2 In the event that two or more admissible bids obtain the same total score, the tie-breaking shall be performed by applying the following criteria successively, in the order below:

a. The bid demonstrating superior technical efficiency of the proposed system;
b. The bid offering a longer warranty period;
c. The bid proposing a shorter delivery and implementation time.

3.5.3 If the tie persists after applying the above criteria, the contracting authority shall apply an additional tie-breaking rule предусмотрена in the procurement documentation or shall request clarifications, in accordance with the applicable legislation.

3.6. Mandatory Bidder Documents

3.6.1 In order to demonstrate compliance of the bid with the requirements of the procurement documentation, bidders shall submit at least the following documents:

a. Technical datasheets of the proposed photovoltaic modules;
b. Technical datasheets of the proposed inverter(s);
c. Certificates and/or declarations of conformity, including applicable IEC certifications;

d. Project implementation plan;
e. Execution schedule;
f. Supporting documents demonstrating experience in similar projects (references, contracts, acceptance reports, or other relevant documents).

3.6.2 The submitted documents must allow verification of the technical characteristics of the proposed equipment, compliance with applicable standards and the bidder’s capability to execute the contract under the required conditions.

3.7. Project Scalability (Extension)
3.7.1 Considering the pilot nature of the 50 kW project, the technical proposal must include elements demonstrating the possibility of future expansion of the proposed solution.

3.7.2 For this purpose, bidders shall provide:
a. Calculations, technical arguments, and design criteria demonstrating compatibility of the proposed solution with replication and scaling to other locations of S.E. “Radiocomunicații” and/or to higher installed capacities;
b. Analysis and calculations regarding the possibility of future integration of an energy storage system (BESS), including electrical and functional compatibility of the proposed equipment.

3.7.3 Preference will be given to technical solutions that are modular, scalable and adaptable, allowing expansion with minimal impact on the base system configuration.

Annex No. 1

Examples of Reference Manufacturers and Equipment

(Indicative vendor shortlist based on market study)

1. General Principles

1.1 The equipment offered must originate from manufacturers with proven experience in the field of photovoltaic systems and must be certified in accordance with applicable international standards (IEC or equivalent).

1.2 This annex aims to:

a. Ensure system reliability;
b. Guarantee availability of spare parts;
c. Ensure technical support and long-term operational sustainability.

1.3 Bidders may propose equipment from different manufacturers, provided that such equipment is technically and commercially equivalent or superior to the reference level indicated in this annex.

1.4 To demonstrate compliance, the bidder shall provide relevant documents confirming the use of the proposed equipment in similar projects, as well as the corresponding technical and certification documentation.

1.5 The names of manufacturers, brands, models, or technologies mentioned in this document are indicative and reflect the technological level available on the international market at the time of preparation of the documentation.
These references are non-restrictive and do not limit the participation of other manufacturers or bidders capable of supplying technically equivalent or superior equipment.

2. Photovoltaic Modules

2.1 Reference manufacturers identified in the market study:

Table No. A1.1

Manufacturer	Country	Notes
LONGi Solar	China	Global leader in mono modules
Jinko Solar	China	Tier 1 Bloomberg
JA Solar	China	Global manufacturer
Trina Solar	China	Widely used in utility projects
Canadian Solar	Canada	Strong reputation

2.2 Accepted technologies:

a. TOPCon;
b. HJT;
c. Mono PERC (acceptable if performance requirements are met).

2.3 Minimum characteristics:
a. Power ≥ 550 Wp;
b. Efficiency ≥ 21%;
c. IEC certifications;
d. Performance warranty ≥ 30 years.

3. Photovoltaic Inverters

3.1 Reference manufacturers identified in the market study:

Table No. A1.2

Manufacturer	Country	Notes
Huawei	China	Global leader in string inverters
Sungrow	China	Widely used in utility-scale
SMA	Germany	Premium manufacturer
Solis (Ginlong)	China	Reliable cost-effective solution
Fronius	Austria	Widely used in Europe

3.2 Minimum characteristics:
a. Efficiency ≥ 98%;
b. Integrated protections;
c. Modbus communication support;
d. EU grid compatibility.

4. Mounting Structures

4.1 The mounting structure must be produced by companies specialized in photovoltaic systems.

4.2 Reference manufacturers:

Table No. A1.3

Manufacturer	System Type
Schletter	Premium structure
K2 Systems	European structure
Arcelor / Magnelis	Industrial structures
Certified local manufacturers	Accepted if compliant

4.3 Accepted materials:

a. Hot-dip galvanized steel;
b. Magnelis steel;
c. Anodized aluminum.

5. BESS Systems (Optional)

5.1 Energy storage systems may be proposed from manufacturers with experience in industrial systems.

5.2 Examples of relevant manufacturers:

Table No. A1.4

Manufacturer	Notes
Huawei	Integrated PV + BESS solutions
Sungrow	Utility-scale solutions
BYD	Recognized LFP batteries
Fluence	Industrial BESS systems

5.3 Accepted technologies:

a. $LiFePO_4$;
b. Other certified equivalent technologies.

6. Monitoring System

6.1 The monitoring system must ensure continuous supervision of the photovoltaic installation and be compatible with the beneficiary’s integration requirements.

6.2 The monitoring system must:

a. Be integrated with inverters and main equipment;
b. Provide web-based interface with secure remote access;
c. Be compatible with integration into the Beneficiary’s SCADA system.

6.3 The proposed solution may include:

a. Native monitoring system provided by the inverter manufacturer;
b. Dedicated monitoring platforms, provided compatibility is ensured.

6.4 The bidder shall present the monitoring solution, main functionalities, communication protocols, and integration method with the Beneficiary’s IT/SCADA infrastructure.

7. Acceptance of Equivalent Equipment

7.1 Bidders may propose equipment from other manufacturers, provided that:

a. Fully complies with technical specifications;
b. Is certified according to IEC or equivalent standards;
c. Has been used in comparable PV projects.

7.2 The Beneficiary reserves the right to request:
a. References for similar projects;
b. Additional technical documentation;
c. Confirmation of service and support availability.

7.3 Equivalence will be assessed based on submitted documentation.
The simple statement “equivalent” is not sufficient without technical proof.

8. Service Availability

8.1 The bidder must demonstrate:
a. Technical support availability in Europe;
b. Availability of spare parts;
c. Authorized service (direct or via partners).

8.2 The bidder shall provide documents regarding service network, support channels, and spare parts availability.

8.3 Preference will be given to bidders with:
- regional support,
- reasonable delivery times for parts,
- fast intervention capability.

9. Purpose of this Annex

9.1 This annex establishes the technical reference framework for equipment selection, aiming to:
a. Ensure use of high-quality equipment;
b. Prevent use of non-certified equipment;
c. Maintain open and non-discriminatory competition.

9.2 The requirements are indicative and do not limit bidders offering equivalent or superior solutions.

Annex No. 2

Minimum Technical Specifications for Equipment and Materials

(minimum compliance grid)

1. General Requirements

The technical requirements specified below represent the minimum admissibility criteria for the bid.

1.1 Photovoltaic Modules (PV Modules)

1.1.1 Mandatory minimum requirements:

a. Technology: TOPCon / HJT / equivalent;
b. Type: monocrystalline, bifacial accepted (recommended);
c. Module power: ≥ 550 Wp;
d. Module efficiency: ≥ 21%;
e. System voltage: 1,500 V DC (1,000 V DC accepted only if justified by EPC without performance reduction);
f. Junction box: IP68, MC4-compatible connectors;
g. Mechanical resistance: ≥ 5,400 Pa snow, ≥ 2,400 Pa wind;
h. Operating temperature: -40…+85°C;
i. Certifications: IEC 61215, IEC 61730, CE;
j. Manufacturer: ISO 9001 and ISO 14001.

1.1.2 Minimum warranties:

a. Product warranty: ≥ 12 years;
b. Performance warranty: ≥ 30 years;
c. Degradation: year 1 ≤ 2%, thereafter ≤ 0.55%/year;
d. Guaranteed power at 30 years: ≥ 84.8% of nominal.

1.1.3 Mandatory documents in the bid:

a. Official datasheet;
b. IEC/CE certificates;
c. Warranty declaration (signed/stamped);
d. Serial numbers / traceability (upon delivery).

1.2 Inverters (String Inverters)

1.2.1 Mandatory minimum requirements:

a. Type: string inverter, 3-phase;
b. Total AC power: ≈ 50 kW (1×50 kW or 2×25 kW);
c. AC voltage: 3×400 V, 50 Hz;
d. Max efficiency: ≥ 98%;
e. European efficiency: ≥ 97%;
f. MPPT: ≥ 2 MPPT per inverter;
g. Max DC voltage: ≥ 1,100 V (preferably 1,500 V if system is 1,500 V);
h. MPPT range: suitable for string configuration (to be demonstrated by EPC);
i. Integrated protections: anti-islanding, DC reverse polarity, over/under-voltage, over-current, over-temperature;
j. Protection degree: minimum IP65;
k. Communications: Ethernet + RS485, Modbus TCP/RTU (or equivalent);
l. Certifications: IEC 62109, CE.

1.2.2 Minimum warranties:

a. Inverters: ≥ 5 years (bidder shall indicate extension options up to 10 years).

1.2.3 Mandatory documents:

a. Datasheet;
b. IEC/CE certificates;
c. Warranty declaration;
d. List of available grid-code parameters (P/Q control, zero-export if applicable).

1.3 Mounting Structures (Ground-Mount)

1.3.1 Mandatory minimum requirements:

a. Type: fixed tilt;
b. Material: hot-dip galvanized steel / Magnelis / equivalent;
c. Corrosion protection: ≥ 70 μm galvanization (or equivalent);
d. Lifetime: ≥ 25 years;
e. Wind/snow design: according to local standards (EPC provides structural calculation);
f. Foundations: metal screws / concrete (depending on soil).

1.3.2 Mandatory documents:

a. Structure drawings + foundation details;
b. Structural calculation / design declaration;
c. Material certificates (where applicable).

1.4 DC Cables and Connectors

1.4.1 Mandatory minimum requirements:

a. Solar cable: EN 50618 (or IEC equivalent), UV/ozone resistant;
b. Operating temperature: -40…+90°C;
c. Cross-section: to be sized by EPC; DC voltage drop ≤ 1.5%;
d. Connectors: MC4-type compatible, same family compatibility guaranteed.

1.5 AC Cables (0.6/1 kV)

1.5.1 Mandatory minimum requirements:

a. Type: 0.6/1 kV, copper, 5 conductors (L1-L2-L3-N-PE);
b. Main cable PV-AC-DB → PoC (150 m): minimum Cu 5×35 mm² (5×25 mm² accepted only with calculations proving ≤ 1% voltage drop and thermal compliance);
c. AC voltage drop:

- inverter → PV-AC-DB: ≤ 1%;
- PV-AC-DB → PoC: ≤ 1%.

1.6 Panels and Protections (DC/AC)

1.6.1 DC protections:

a. DC switch/disconnector (integrated or separate);
b. SPD DC: Type II (mandatory);
c. String fuses: if required by inverter or configuration.

1.6.2 PV-AC-DB (AC panel):

Minimum requirements:

a. Protection degree: min. IP54 (IP65 recommended outdoor);
b. Main PV breaker: MCCB 100 A (indicative);
c. Individual protections per inverter;
d. SPD AC: Type II, 3P+N;
e. PE and N bars, full labeling;
f. Full PV system isolation capability.

1.6.3 Protections at PoC:

a. Dedicated PV breaker in existing panel;
b. Coordination/selectivity with PV-AC-DB (to be demonstrated by EPC).

1.7 Grounding and Equipotential Bonding

a. Grounding of structures, module frames, inverters, panels;
b. Ground resistance measurement at commissioning (mandatory report);
c. SPD coordinated with grounding system.

1.8 Monitoring / Communications

a. Production monitoring + alarms + history;
b. Remote access + data export;
c. For 150 m distance: fiber optic recommended (UTP outdoor allowed in separate conduit with protections);
d. Connection diagram.

1.9 Correlation Table – Minimum Technical Solution

Table No. A2.1

Indicative Minimum List of Components for an Admissible Solution

No.	Component / Minimum Work	Unit	Indicative Quantity	Correlation with Annex No. 2	Remarks
1	Photovoltaic modules mono 550–600Wp	pcs	85–90	Item 1.1	The resulting total power must support the solution of approx. 50 kW AC
2	String inverters 1×50kW or 2×25kW	set	1	Item 1.2	The exact solution is chosen by the bidder
3	Ground-mounted galvanized structure + fixing elements	set	1	Item 1.3	According to design and structural requirements
4	Solar DC cables + routing accessories	lot	1	Item 1.4	EPC shall size; DC voltage drop ≤ 1.5%
5	DC connectors, MC4-compatible type	lot	1	Item 1.4	Compatibility guaranteed, same family
6	Local AC cables inverter → PV-AC-DB	lot	1	Item 1.5	Cross-section results from calculations
7	Main AC cable PV-AC-DB → PoC, Cu 5×35mm², 150 m route	lot	1	Item 1.5	5×25 mm² accepted only with justified calculations
8	Fully equipped PV-AC-DB	pcs	1	Item 1.6.2	Includes main MCCB, individual protections, PE/N

No.	Component / Minimum Work	Unit	Indicative Quantity	Correlation with Annex No. 2	Remarks
					bars, labeling
9	SPD DC Type II	set	min. 1 set	Item 1.6.1	Final number determined by design, depending on architecture
10	SPD AC Type II, 3P+N	set	min. 1 set	Item 1.6.2	Integrated or separate, depending on proposed solution
11	Protections at PoC / dedicated PV breaker in existing panel	set	1	Item 1.6.3	With demonstrated selectivity
12	Grounding and equipotential bonding system	set	1	Item 1.7	Includes electrodes, conductors, connections, measurements
13	Monitoring / communication / SCADA system	set	1	Item 1.8	Includes logger/gateway/licenses, as applicable
14	Communication infrastructure for 150 m distance	set	1	Item 1.8	Fiber optic recommended; alternatively outdoor UTP in separate conduit, with protections
15	Bidirectional energy metering	lot / pcs / set	1	Item 1.8 / connection scheme	Included if required by connection scheme / approved technical solution

Optional:

No.	Equipment	Qty
16	BESS 100 kWh	1 set

Annex No. 3

Detailed CAPEX Budget Model (50kW) – EU Format

(template + indicative ranges from market study)

This is a budget model (financial BoQ) for comparing offers.

Table No. A3.1

Financial BoQ

No.	Component	Unit	Indicative Quantity	Unit Price (bidder)	Total (bidder)	Indicative Range (EUR)
1	PV Modules 550–600Wp	pcs	85–90			12,000 – 18,000
2	Hybrid inverters (1×50kW)	set	1			5,000 – 9,000
3	Ground-mounted structure + fixings	set	1			8,000 – 14,000
4	DC cables + connectors + accessories	lot	1			2,000 – 4,000
5	Local AC cables inverter → PV-AC-DB	lot	1			500 – 1,500
6	Main AC cable Cu 5×35mm² (150m) + accessories	lot	1			3,500 – 7,500
7	PV-AC-DB (fully equipped AC panel)	pcs	1			1,500 – 3,500
8	SPD protections DC/AC, breakers, fuses (if not included)	lot	1			1,000 – 2,500
9	Grounding, PE bars, electrodes, equipotential bonding	lot	1			800 – 2,000
10	Monitoring / SCADA (data logger, gateway, licenses)	set	1			1,000 – 3,000
11	Civil works: 150m cable trench + land restoration	lot	1			2,500 – 6,000
12	Mechanical + electrical installation (complete installation)	lot	1			6,000 – 12,000
13	Engineering, permits, project management, commissioning, testing	lot	1			4,000 – 8,000
14	Logistics / transport / site organization	lot	1			2,000 – 5,000

Indicative total CAPEX (PV only): ~ 45,000 – 65,000 EUR

CAPEX – BESS Option (50kW / 100kWh)

Table No. A3.2

No.	BESS Component	Unit	Quantity	Unit Price	Total	Indicative Range (EUR)
B1	LiFePO4 HV Battery 100kWh (cabinet/container) + BMS	set	1			25,000 – 55,000
B2	PCS / battery inverter or hybrid inverter (~50kW)	set	1			8,000 – 18,000
B3	EMS (self-consumption / backup / export limitation strategy)	set	1			2,000 – 6,000
B4	BESS protections (AC/DC), auxiliary panels, E-Stop	lot	1			1,500 – 4,000
B5	Cabling + BESS integration into PV-AC-DB / PoC	lot	1			1,000 – 3,000
B6	Installation + commissioning + functional testing	lot	1			2,000 – 6,000

Indicative BESS total (added to PV): ~ 35,000 – 80,000 EUR
Total PV + BESS project: ~ 80,000 – 145,000 EUR

1. Requirements for Offer Submission:

1.1 In addition to the financial form, the bidder shall present the offer in a clear and detailed structure, with distinct breakdown of main cost categories;

1.2 The financial offer shall mandatorily include:

1.2.1 Separate pricing for each of the following categories: equipment, works, engineering and permits, commissioning/testing, monitoring system;

1.2.2 Separate indication, as optional, of the BESS component, as a distinct item in the offer;

1.2.3 Indication of delivery timelines for equipment (lead time) and execution timeline for works;

1.2.4 Explicit specification of warranty and service conditions, clearly stating whether they are included in the price or offered separately.

1.3 The offer shall be presented in a form that allows transparent and comparable evaluation of the proposed financial components.

Annex No. 4

Financial Offer Form

Project: Photovoltaic Plant ~ 50kW

The bidder shall complete all fields in the table below.
Prices shall be expressed in EUR, excluding VAT.

1. Main Equipment

Table No. A4.1

No.	Equipment Name	Unit	Quantity	Unit Price (EUR)	Total Value (EUR)
1	Photovoltaic modules ≥550Wp	pcs	90		
2	Photovoltaic inverters (1×50kW or equivalent)	set	1		
3	Ground-mounted structure (complete)	set	1		
4	Monitoring system / data logger	set	1		

Sub-total main equipment: _____ EUR

2. Electrical Materials

Table No. A4

No.	Material	Unit	Quantity	Unit Price (EUR)	Total Value (EUR)
1	Solar DC cable	lot	1		
2	MC4 connectors and accessories	lot	1		
3	AC cables inverter → PV panel	lot	1		
4	Main AC cable Cu 5×35mm² (150m)	lot	1		
5	Protection conduits / cable trays	lot	1		

Sub-total electrical materials: _____ EUR

3. Panels and Protections

Table No. A4.3

No.	Equipment	Unit	Quantity	Unit Price (EUR)	Total Value (EUR)
1	PV AC panel (PV-AC-DB) fully equipped	pcs	1		
2	SPD DC protections	set	1		
3	SPD AC protections	set	1		
4	Main PV circuit breaker	pcs	1		
5	Grounding and equipotential bonding system	lot	1		

Sub-total protections: _____ EUR

4. Installation Works

Table No. A4.4

No.	Works	Unit	Quantity	Unit Price (EUR)	Total Value (EUR)
1	Structure installation works	lot	1		
2	PV module installation	lot	1		
3	DC cable installation	lot	1		
4	AC cable installation	lot	1		
5	150 m cable trench execution	lot	1		
6	System commissioning	lot	1		

Sub-total installation works: _____ EUR

5. Engineering and Services

Table No. A4.5

No.	Service	Unit	Quantity	Unit Price (EUR)	Total Value (EUR)
1	PV system technical design	lot	1		
2	Permits / documentation	lot	1		
3	Project management	lot	1		
4	Testing and commissioning	lot	1		

Sub-total services: _____ EUR

6. BESS Option (optional)

Table No. A4.6

No.	Component	Unit	Quantity	Unit Price (EUR)	Total Value (EUR)
1	LiFePO4 battery system ~100kWh	set	1		
2	Battery inverter / PCS ~50kW	set	1		
3	EMS / energy management system	set	1		
4	BESS integration into system	lot	1		

Sub-total BESS: _____ EUR

7. Financial Offer Summary

Table No. A4.7

Component	Value
Main equipment	_____ EUR
Electrical materials	_____ EUR
Panels and protections	_____ EUR
Installation works	_____ EUR
Engineering and services	_____ EUR

TOTAL PV PROJECT (excluding VAT): _____ EUR

8. Optional

TOTAL BESS (excluding VAT): _____ EUR

9. Post-warranty support (O&M) (excluding VAT)

Total O&M: _____ EUR

10. Bidder Declaration

The bidder declares under its own responsibility that:

a. All offered equipment complies with the technical specifications set out in the Terms of Reference;
b. The offered prices include delivery, installation, and commissioning of the system;
c. The system will be delivered complete, installed, and operational, in accordance with the procurement documentation requirements.

Bidder: _____

Date: _____

Signature: _____

Stamp: _____

Annex No. 5

EPC Offer Evaluation Table

Project: Photovoltaic Plant 50kW – S.E. “Radiocomunicații”, Edineț

The evaluation of offers shall be carried out by applying a total scoring system of 100 points, in accordance with the technical, economic, and operational criteria presented in the table below, whose weights and subcriteria are established in line with the provisions of Chapter III – “Evaluation of Offers” of the Terms of Reference.

1. EPC Evaluation

Table No. A5.1

Evaluation Criteria Table

No.	Component	Sub-criterion	Description	Weight
1	Technical (45%)	Module performance	PV modules, compliance with standards, efficiency	15%
		Equipment quality	Inverters, BESS, main components	15%
		Equipment warranties		10%
		Monitoring system	System architecture, SCADA, equipment compatibility, extensibility	5%
2	Financial (35%)	Offer price (CAPEX)	Total cost of design, equipment, installation, commissioning	30%
		O&M cost	Post-warranty services, maintenance, monitoring	5%
3	Operational (20%)	Local service & support	Intervention capacity, response time, local presence	10%
		Implementation period	Design + delivery + execution + commissioning duration	5%
		EPC experience	Similar implemented projects (photovoltaic/EPC)	5%

Total: 100%

Table No. A5.2

Bidder Evaluation Matrix

Bidder	Technical (45p)	Financial (35p)	Operational (20p)	Total
Bidder 1				
Bidder 2				
…				
Bidder N				

Table No. A5.3

Equipment Performance Evaluation (technical sub-criterion – 25%)

Indicator	Minimum Requirement
Module technology	Monocrystalline TOPCon / equivalent
Module efficiency	≥ 21%
Product warranty	≥ 12 years
Performance warranty	≥ 25 years
Inverter efficiency	≥ 97%
BESS compatibility	Mandatory
Monitoring	Online platform

Table No. A5.4

EPC Experience Evaluation (operational sub-criterion – 5%)

Criterion	Score
>10 similar projects	10
5–10 projects	7
2–5 projects	4
<2 projects	1

2. Scoring Methodology

2.1 CAPEX price:
score = (minimum price / offered price) × maximum score

2.2 O&M:
score = (minimum cost / offered cost) × maximum score

2.3 Implementation period:
proportional score (minimum duration = maximum score)

2.4 Technical:
evaluation based on compliance + qualitative scoring according to grids A5.3

2.5 Operational:
scoring according to grids (experience, service, timeline)

Annex No. 6

Documents to be Submitted by Bidders

In order to demonstrate compliance with qualification requirements, technical and professional capacity, as well as conformity of the offer with the procurement documentation requirements, bidders shall mandatorily submit the following documents, confirmed by applying the electronic signature of the economic operator:

1.1 Documents Constituting the Offer

1.1.1 Participation request;
1.1.2 Single European Procurement Document (ESPD), fully completed;
1.1.3 Declaration regarding the validity of the offer;
1.1.4 Technical proposal, prepared in accordance with the requirements of the Terms of Reference and its annexes;
1.1.5 Financial proposal / financial offer form, completed in accordance with the model included in the procurement documentation;
1.1.6 Detailed estimate / budget of the offer, with separate indication, as applicable, of the costs related to:

a. Design;
b. Equipment supply;
c. Installation and assembly works;
d. Testing and commissioning;
e. Monitoring system and SCADA integration;
f. BESS option, if offered separately.

1.2 Technical Compliance Documents

1.2.1 Official manufacturer datasheets for the main equipment offered, including at least for:

a. Photovoltaic modules;
b. Inverters;
c. Mounting structure;
d. DC and AC cables;
e. Electrical panels;
f. Surge protection devices (SPD);
g. Monitoring / SCADA system;
h. Energy storage system (BESS), if offered.

1.2.2 Certificates of conformity and/or relevant test reports for the offered equipment, issued in accordance with applicable standards;
1.2.3 CE/EU declarations of conformity for the offered equipment;

1.2.4 Documents attesting relevant technical certifications of the equipment, including applicable IEC/EN/ISO standards;
1.2.5 Compliance table completed with reference to the minimum technical requirements set out in Annex No. 2 of the Terms of Reference;
1.2.6 Bidder’s declaration regarding full compliance of the offered equipment, works, and services with the Terms of Reference;

1.2.7 Warranty declaration, which shall explicitly include:
a. Warranty period for photovoltaic modules;
b. Warranty period for inverters;
c. Warranty period for installation and integration works;
d. Warranty conditions.

1.2.8 Energy production simulation, prepared using industry-recognized specialized software, including:
a. Climatic data used;
b. Calculation assumptions;
c. Estimated annual production;
d. Estimated monthly production;
e. Performance Ratio (PR);
f. Loss diagram.

1.2.9 Preliminary layout plan of the proposed solution;
1.2.10 Preliminary electrical schematic / single line diagram;
1.2.11 Concept for integration of the monitoring system into the Beneficiary’s SCADA infrastructure;
1.2.12 Phased implementation plan and execution schedule of the contract.

1.3 Documents Regarding Bidder Qualification Capacity

1.3.1 Extract from the State Register of legal entities / individual entrepreneurs or equivalent document, valid at the date of bid opening;
1.3.2 Certificate regarding absence or existence of outstanding debts to the national public budget, issued by the competent authority, valid at the date of bid opening;
1.3.3 Certificate / document regarding bank account assignment;
1.3.4 General information about the bidder, including identification data and persons responsible for contract execution;

1.3.5 Documents regarding similar experience, by presenting at least one or more executed contracts related to design, supply, installation, or commissioning of photovoltaic systems and/or similar works;

1.3.6 Supporting documents confirming proper execution of similar contracts, such as:

a. Acceptance reports;
b. Recommendations;
c. Certificates of proper execution;
d. Other relevant documents.

1.3.7 Information regarding key personnel proposed for contract execution, including:

a. Design engineer;
b. Authorized electrician/specialist;
c. Automation / SCADA integration specialist, where applicable;
d. Technical execution manager, where applicable.

1.3.8 Documents confirming professional qualification, certification, authorization, or right to perform activities by key personnel, as required by applicable legislation;

1.3.9 Declaration regarding technical and logistical capacity necessary for contract execution;
1.3.10 Declaration or supporting documents regarding availability of technical support services, service, and spare parts for the offered equipment.

1.4 Documents Regarding Integrity and Eligibility

1.4.1 Declaration confirming the identity of ultimate beneficial owners and their non-inclusion in situations provided by applicable legislation;
1.4.2 Declaration on own responsibility regarding non-inclusion of the economic operator in exclusion situations provided by public procurement legislation, where such information is not already included in the ESPD;
1.4.3 Other declarations or documents requested through the procurement documentation, necessary for verification of eligibility, professional activity capacity, technical and professional capacity, or offer compliance.

1.5 Documents Submitted Upon Request / by the Winning Bidder

1.5.1 The contracting authority reserves the right to request, during the evaluation stage, any clarifications and/or additional supporting documents necessary to verify the accuracy of the information provided by the bidder, without allowing substantial modification of the offer;

1.5.2 The winning bidder shall submit, upon request and within the indicated deadline, supporting documents corresponding to the submitted declarations,

including documents confirming beneficial owners, absence of exclusion grounds, and other documents required by law or procurement documentation.

1.6 Requirements Regarding Document Format

1.6.1 All documents included in the offer shall be submitted in Romanian or accompanied by an authorized Romanian translation;
1.6.2 Documents issued by competent authorities from other states shall be submitted as copies, accompanied by authorized Romanian translation, if applicable;
1.6.3 All documents submitted shall be confirmed by applying the electronic signature of the economic operator;
1.6.4 Failure to submit, incomplete submission, or non-compliant submission of documents may lead to rejection of the offer.

Table No. A6.1

Table of Mandatory Documents for Participation Notice

No.	Document Name	Description / Requirement	Minimum Requirement	Proof Method
1	Participation request	According to standard form	Mandatory	Original, electronically signed
2	ESPD	Fully completed	Mandatory	Original, electronically signed
3	Offer validity declaration	According to procurement documentation	Min. as required	Original, electronically signed
4	Technical proposal	According to ToR and annexes	Mandatory	Original, electronically signed
5	Financial proposal	According to model	Mandatory	Original, electronically signed
6	Detailed budget	Structured by categories	Mandatory	Original, electronically signed
7	Equipment datasheets	For all main equipment	As per technical requirements	Copy, electronically signed
8	Certificates of conformity	IEC/EN/ISO/CE or equivalent	Mandatory	Copy, electronically signed
9	CE declarations	For offered equipment	Mandatory	Copy, electronically signed
10	Compliance table	According to Annex No. 2	Mandatory	Original, electronically signed
11	Offer compliance declaration	Confirms full compliance	Mandatory	Original, electronically signed
12	Warranty declaration	Includes warranty terms	Min. as required	Original, electronically signed
13	Energy simulation	Software + PR + losses	Mandatory	Copy, electronically signed

No.	Document Name	Description / Requirement	Minimum Requirement	Proof Method
14	Layout plan	Proposed solution	Mandatory	Copy, electronically signed
15	Single line diagram (SLD)	Electrical configuration	Mandatory	Copy, electronically signed
16	SCADA integration concept	System compatibility	Mandatory	Copy, electronically signed
17	Implementation plan	Phasing and timeline	Mandatory	Copy, electronically signed
18	State register extract	Bidder identification	Valid at submission	Copy, electronically signed
19	Tax certificate	Public budget status	No debts / compliant	Original/copy, electronically signed
20	Bank account certificate	Account confirmation	Mandatory	Copy, electronically signed
21	Similar experience	Executed contracts	Min. 1 relevant contract	Copy, electronically signed
22	Proof of execution	Acceptance / recommendations	Mandatory	Copy, electronically signed
23	Key personnel	CVs and roles	Mandatory	Copy, electronically signed
24	Qualification documents	Authorizations	As per legislation	Copy, electronically signed
25	Technical capacity declaration	Resources and logistics	Mandatory	Original, electronically signed
26	Service and support declaration	Service, spare parts	Mandatory	Original, electronically signed
27	Beneficial owners declaration	As per legislation	Mandatory	Original, electronically signed
28	Exclusion declaration	If not in ESPD	Mandatory	Original, electronically signed

Note:

1. All documents shall be submitted in Romanian (for local companies) or with authorized translation;
2. All documents shall be electronically signed;
3. Failure to submit or incomplete submission may lead to rejection of the offer;
4. The contracting authority reserves the right to request clarifications in accordance with Law no. 131/2015;
5. The winning bidder shall submit supporting documents upon request.