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GJU

ESMES

Tender Documents for:

"Energy Smart Mediterranean School Network"

ESMES

Renewable Energy and Energy Efficiency Solutions for Public Schools in Jordan

February 2022

م. سناء الخطيب
20.2.2022

م. انس محمد السواعير
20.2.2022

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Definitions

Item	Description
Acceptance Date	The date that the project is officially accepted by the client through the university appointed committee.
Applicable Law	The laws and any other instruments having the force of law in the Hashemite Kingdom of Jordan, as they may be issued and enforced from time to time.
AVR	Automatic voltage regulator.
Bid	The proposal(s) submitted in response to the present tender.
Bidder	The party submitting a proposal(s) in response to the present tender.
Client	German Jordanian University (GJU), with the Ministry of Education (MoE) being the beneficiary.
Contract	The agreement and decision of award between the Client and the Contractor and all documents included or incorporated by reference into it.
Contractor	The winning bidder(s) of the Contract - successful bidder(s).
Contract Price (Sum)	The value mentioned in the final agreement and the decision of award.
Decision of Award	The formal acceptance by the Client of the Tender with any additional conditions accepted before the Contract is signed by the Parties involved.
DLD	Delay liquidated damage
Documents	The documents defined in the Contract and which form an integral part of the Contract.
EMRC	Energy and Minerals Regulatory Commission
ESMES	Energy Smart Mediterranean School Network
GJU	The German Jordanian University; Jordanian partner of the ESMES project.
IDECO	Irbid District Electric Company.
JEPCO	Jordan Electric Power Company.
JOD	Jordanian Dinar.
Ministry	The Ministry of Education (MoE)
Operation Date	The date when the installed interventions are officially operated following approval from the Client. For the PV system: the date when the PV system is officially operated following approval from the responsible electricity distribution company.
REEE	Renewable energy and energy efficiency.
PR	Performance ratio.
PFC	Power factor compensator.
Works	Any and all obligations and activities to be performed by the Contractor(s) in order to comply with the conditions of the Contract(s), including all activities of engineering, procurement, installation/construction, testing, commissioning, operation, and maintenance.

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1. Introduction

1.1. About GJU

The German Jordanian University (GJU) is a public university founded in 2005 by a Royal Decree, in accordance with a memorandum of understanding between the Ministry of Higher Education and Scientific Research of the Hashemite Kingdom of Jordan and the Federal Ministry of Education and Research of the Federal Republic of Germany.

GJU is modeled on the German applied-sciences model, characterized by their focus on putting knowledge into practice and on promoting knowledge transfer. By taking advantage of the best educational practices in both Jordan and Germany, the University has positioned itself as a leader in its field. GJU recognizes research and research-led teaching as primary responsibilities of its academic staff and places value on fostering, publishing, and disseminating research of the highest quality internationally.

1.2. About ESMES

The "Energy Smart Mediterranean School Network" (ESMES) project is one of the 41 projects funded by the European Neighbourhood Instrument (ENI), the largest multilateral initiative for cross-border cooperation (CBC) in the Mediterranean area - ENI CBC MED Program. The Program has a budget of €209 million and is managed by the Autonomous Region of Sardinia (Italy). Creation of innovative start-ups, development of Mediterranean-wide economic value chains, diversification of tourism, technological transfer, inclusion of women and NEETS in the labour market, better management of waste, water and coastal areas, and improvement of energy efficiency in public buildings are the main challenges addressed by the 41 projects selected for funding in the framework of the first call for standard projects out of 439 project proposals submitted. The value of the 41 projects is €110 million, of which €100 million are of EU contribution.

ESMES is implemented in five Mediterranean countries, involving five partner organizations, in addition to the beneficiary Institute for University Cooperation (ICU): the **German Jordanian University (GJU)**, the Lebanese Center for Energy Conservation (LCEC), the National Agency for Energy Management of Tunisia (ANME), the Ribera Consortium of Valencia (CRIB), and the Alcamo Municipality in Italy (Alcamo). ESMES addresses the issues of growing energy demand, fossil fuel dependence and increasing CO_2 emissions in the Mediterranean area. ESMES tackles the common challenge of fostering renewable energies and reducing energy use, with the common perspective of:

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adapting to Mediterranean climate conditions, finding innovative, effective ways of optimizing renovation investments and reducing the effects on the electricity network. Buildings have high energy consumption, causing 36% of CO_2 and high economic costs. Intervention in public schools is critical, being a relevant part of building stock with a low/often unknown energy performance.

ESMES focuses on the optimization of energy consumption in public schools through innovative, monitoring-based renewable energy and energy efficiency (REEE) pilot actions and will improve the capacity of public institutions in order to implement innovative energy rehabilitations.

1.3. Overview

As ESMES focuses on the optimization of energy consumption in public schools through innovative, monitoring-based REEE pilot actions, this tender call is related to the installation of REEE solutions at three public schools in Jordan: a) Jrainah Technical School for Boys, b) Bait Yafa School for Girls, and c) Madaba Technical School for Boys.

1.3.1. Jrainah Technical School for Boys

Jrainah Technical School for Boys is located in Madaba, 30 km south of Amman. It is the main agricultural and veterinary technical school in the Governorate. The school consists of several buildings, in which most of them are only single-floor buildings, with an area of 2500 m^2. It contains a total of 12 classrooms, 4 technical workshops, 3 laboratories, and several administrative rooms and other facilities. The location on Google Maps and a satellite image of the school is shown in Figure 1. The building is typically operational from the 24th of August to the 16th of January, from the 7th of February to the 24th of June, and from the 25th of July to the 2th of August (summer course for agricultural students only), which totals to 309 calendar days (excluding the winter break), and around 214 working days (excluding weekends and public holidays for the year 2019/2020).

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Figure 1: Location of Jrainah Technical School.

The school's current annual electricity consumption is approximately 23,416 kWh. The school has a 3-phase electricity meter and is served by Jordan Electric Power Company (JEPCO). As this present tender includes the supply of interventions that would increase the electrical energy consumption, the school's expected annual energy consumption is approximately 27,768 kWh.

The school uses a variety of fluorescent and LED lights, having had some relatively recent renovation to the lighting fixtures. However, the current light distribution and intensity is not acceptable, and produces very low lux levels in most areas including most classrooms. The current lights are mostly very poor quality and need replacement. The school's lighting design and fixtures distribution is not acceptable for school activity, having around 70-200 lux in classrooms, labs, offices, and most workshops even when there is some ambient light. The lights are manually controlled by the staff and are turned on or off as needed, depending on the occupation of the classroom. Lights in most areas are mixed, damaged, and designed incorrectly.

The Project is looking to provide the following interventions at Jrainah Technical School:

A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 16kW and close to the minimum PV capacity of 20 kWp.

   The PV system shall include:

   1. PV modules
   2. PV mounting structure
   3. On-grid inverters
   4. DC and AC cables & conduits

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5. AC distribution boxes
6. Data logging & monitoring system with required internet connection
7. Irradiance sensor connected to a data logger integrated with the inverter to calculate the production ratio (PR).
8. Any other components deemed necessary to successfully operate the system according to governing regulations.

In addition to the above, the Contractor (i.e. successful bidder) shall also provide:

1. Maintenance & cleaning services
2. Training
3. Testing & commissioning

More details on the aspects indicated above are provided in subsequent sections.

B. Lighting Redesigning and Retrofitting

The lighting systems in several zones around the school require redesigning and/or retrofitting. The goal is to ensure that all school zones are supplied with adequate lighting that is suitable for their respective uses while using energy-efficient lighting technology.

C. Window Maintenance

See the "Scope of Work" section for more details on the required specifications.

1.3.2. Bait Yafa School for Girls

Bait Yafa School for Girls is located in the village of Bait Yafa, 7 km south-west of the city of Irbid. It serves several villages as the main vocational school in the area. The school building consists of four asymmetric floors, with a total area of 7,076 m^2. The building includes 26 classrooms, four laboratories, three workshops, and several administrative rooms and other facilities. The location on Google Maps and a satellite image of the school is shown in Figure 2. The building's typical occupancy schedule is from 7:40 a.m. to 2:00 p.m. on weekdays. It is closed on weekends and public holidays, and is operational from the 25th of August to the 20th of June, which totals to 300 calendar days and 205 workdays (excluding weekends and public holidays for the year 2019/2020).

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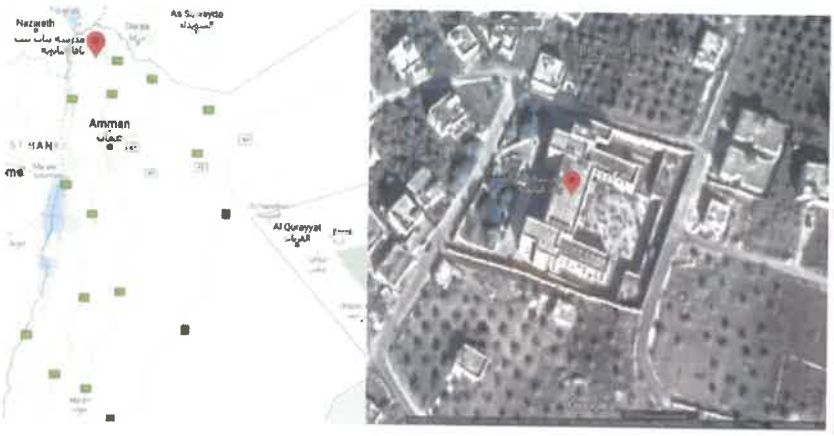

Figure 2: Location of Bait Yafa School.

The school's annual electricity consumption is approximately 47,592 kWh, costing a total of 9,737 JOD per year. The school has a 3-phase electricity meter and is served by Irbid District Electric Company (IDECO). As this present tender includes the supply of interventions that would increase the electrical energy consumption, the school's expected annual energy consumption is approximately 82,056 kWh.

As for cooling, the school currently uses 51 ceiling fans to provide cooling for three months annually. The available cooling system is not sufficient enough to reach comfort levels, especially in the classrooms on the southern facade.

The school uses 1200 T8 fluorescent lamps for all lighting needs, except for a few incandescent lambs in the theater. The lights are manually controlled by the staff and are turned on or off as needed, depending on the occupation of the classroom and the ambient light level.

The windows are of single-pane glass in an aluminum frame with clear glazing.

The Project is looking to provide the following interventions at Bait Yafa School:

A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 50kW and close to the minimum PV capacity of 60 kWp.

   The PV system shall include:

   1. PV modules
   2. PV mounting structure
   3. On-grid inverters
   4. DC and AC cables & conduits

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5. AC distribution boxes
6. Data logging & monitoring system with required internet connection
7. Irradiance sensor connected to a data logger integrated with the inverter to calculate the production ratio (PR).
8. Any other components deemed necessary to successfully operate the system according to governing regulations.

In addition to the above, the Contractor (i.e. successful bidder) shall also provide:

1. Maintenance & cleaning services
2. Training
3. Testing & commissioning

More details on the aspects indicated above are provided in subsequent sections.

B. In each of the 26 classrooms:

1. Install one two-ton inverter AC unit;
2. Install two ceiling fans;
3. Retrofit lighting using LED technology;
4. Install motion sensors for the lighting system;
5. Install window/door sensors to manage AC control;
6. Perform window maintenance.

C. In each of the administrative offices:

1. Install one two-ton inverter AC unit;
2. Install one ceiling fan;
3. Retrofit lighting using LED technology;
4. Install motion sensors for the lighting system;
5. Install window/door sensors to manage AC control;
6. Perform window maintenance.

See the "Scope of Work" section for more details on the required specifications.

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1.3.3. Madaba Technical School for Boys

Madaba Technical School for Boys is located in Madaba, 30 km south of Amman. It is the main technical secondary school in the Governorate. The school consists of several buildings, most of which are only single-floor buildings, with an area of 10,000 m². It contains a total of 17 classrooms, 9 technical workshops, 3 laboratories, and several administrative rooms and other facilities. A Google Maps location and satellite image of the school is shown in Figure 3. The school's typical occupancy schedule is 8:00 a.m. to 1:30 p.m. on weekdays, and it is closed during weekends and holidays. The school is typically operational from the 25th of August to the 20th of June and during July (for summer courses), which totals to 309 calendar days (excluding the winter break), and around 214 working days (excluding weekends and public holidays for the year 2019/2020).

Figure 3 Location of Madaba Technical School.

The school's annual electricity consumption is approximately 41,709 kWh, costing a total of 8,533 JOD per year. The school has a 3-phase electricity meter and is served by Jordan Electric Power Company (JEPCO). As this present tender includes the supply of interventions that would increase the electrical energy consumption, the school's expected annual energy consumption is approximately 54,912 kWh.

The Project is looking to provide the following interventions at Madaba Technical School.

A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 32kW and close to the minimum PV capacity of 48 kWp.

   The PV system shall include:

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1. PV modules
2. PV mounting structure
3. **Hybrid on-grid inverter with batteries (an inverter that enables the storage of excess solar energy in a battery system connected on the high voltage side. i.e. has the capability to be coupled with high voltage batteries, and battery discharge may be controlled).**
4. **Power Plant Controller, that measures load conditions and initiates inverter dynamic reactive power compensation.**
5. DC and AC cables & conduits
6. AC distribution boxes
7. Data logging & monitoring system with required internet connection
8. Irradiance sensor connected to a data logger integrated with the inverter to calculate the production ratio (PR).
9. **Automatic voltage regulator (AVR) and power factor compensator (PFC) solution.**
10. Any other components deemed necessary to successfully operate the system according to governing regulations.

In addition to the above, the Contractor (i.e. successful bidder) shall also provide:

1. Maintenance & cleaning services
2. Training
3. Testing & commissioning

B. In each of the 17 classrooms:

1. Install one two-ton inverter AC unit;
2. Install two ceiling fans;
3. Retrofit lighting using LED technology;
4. Install motion sensors for the lighting system;
5. Install window/door sensors to manage AC control;
6. Perform window maintenance.

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C. In each of the administrative offices:

1. Install one two-ton inverter AC unit;
2. Install one ceiling fan;
3. Retrofit lighting using LED technology;
4. Install motion sensors for the lighting system;
5. Install window/door sensors to manage AC control;
6. Perform window maintenance.

See the "Scope of Work" section for more details on the required specifications.

2. Terms and Conditions

For the purpose of this tender, GJU is defined as the "Client," whereas the Ministry of Education is the "beneficiary".

2.1. It is the Bidder's sole responsibility to collect necessary information about the nature of the sites (i.e. the schools), their infrastructure, and any relevant data that would influence the Contract price. This is to be done at the Bidder's own expense.

2.2. Bidders are encouraged to make site visits to get acquainted with the existing electrical systems and relevant site characteristics. This is to ensure that the proposed interventions are compatible with the existing equipment and infrastructure, as well as build new infrastructures/systems when necessary.

2.3. The Bidder and/or Contractor is fully responsible for verifying any information that is made available to them. Under no circumstance will the Client be deemed responsible for any unintentional inaccurate information.

2.4. Bidders requiring further information or clarifications may request such from the Client in writing to the Central Tendering Department. The Client will respond in writing to any request for information or clarifications about the tender.

2.5. The Bidder shall submit a proposal that includes the full design, installation, training, maintenance, and monitoring and cleaning. Failure to submit any of these requirements will result in the disqualification of the Bidder.

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2.6. The Bidder may consider the technical specifications indicated in the "Scope of Work" section **as a guideline for the minimum requirements of the required interventions.**

2.7. It is the Bidder's sole responsibility to make sure that the offered designs and interventions are complete and checked for completeness.

2.8. It is the Bidder's sole responsibility to guarantee that all proposed interventions are compatible with the existing infrastructure at installation locations, and design and build required electricity networks where necessary.

2.9. Any fees required by the designated electricity distribution company, Energy and Minerals Regulatory Commission (EMRC), or any other entity must be covered by the Contractor. This does not include the additional costs imposed as a result of the Grid Impact Study by the utility company. All permits required to execute the works are the responsibility of the Contractor. The Contractor shall identify known permit requirements, whereby the cost of preparing, filling, and obtaining the permits shall be included in the contract price. The Contractor shall provide the Client copies of all approved permits and applications for permits still in process on the effective date of the Contract.

2.10. It is the responsibility of the Contractor to submit all the data and documents required by the designated electricity distribution company.

2.11. The Bidder must quote clustered prices for all components included in their submitted solution, including bill of quantities (BOQ) along with description, specifications, country of origin, manufacturer of equipment, materials, tools, training, maintenance, etc.

2.12. The Bidder must quote in the proposal all auxiliary items (equipment, infrastructure, components, etc.) that are required for the systems to function as expected. If an item that was not quoted in the original proposal is needed during installation, it is the Bidder's responsibility to provide it at no additional cost to the Client. However, any omission of any part of the BOQ shall be deducted from the Contract price.

2.13. The Client has the right to exclude items and change the quantities when awarding this tender so that the available budget is met without affecting the technical requirements and actual needs.

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2.14. To assist in the analysis, evaluation, and comparison of bids, the Client may ask the Bidder in writing for any clarifications on the submitted bid. No change in the price or substance of the bid is permitted once the bid is submitted.

2.15. The three sections of this tender may be awarded in two lots (one for Madaba Schools and one for Bait Yafa), and thus up to two Bidders may be selected. Bidders that submit the most suitable technical and financial proposals to the Client and include all requirements will be awarded. Bidders may submit proposals for more than one lot; however, **separate financial proposals must be submitted for each lot**.

2.16. **The Client will rank the submitted bids according to the proposed contract price. The Client will then determine the technically most proper responsive bid, examining the lowest-priced proposal first. The least-priced, technically viable bid will be awarded.**

2.17. The Client will determine as it sees fit whether a Bidder is qualified to satisfactorily perform the requested works, even if the Bidder submitted the lowest-priced bid for a certain lot.

2.18. The awarded Contractor must coordinate with the Ministry of Education's designated directorate (إدارة الأبنية والمشاريع الدولية) throughout the implementation of the works.

2.19. Bidders must complete, sign, and stamp the compliance sheet(s) shown in the relevant Annexes as appropriate to the submitted bid(s).

3. Bidder Qualifications

The following are the minimum qualifications required for any Bidder. The previous experience of the Bidder shall be considered in the evaluation of the technical proposal. References, when applicable, should be included in the proposal.

- Bidders must have enough experience and certified technical staff to perform the design, installation, training, testing, and maintenance of the required interventions. Both sufficient experience and formal qualifications are required, as well as Bidder's experience in designing similar projects in the last (2) years with at least one project of similar scope and size that has been executed and is operational.

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- Name, experience, certificates and CVs of the engineering staff that will supervise the installations should be included.
- The Bidder must nominate in the offer a qualified project manager who will lead the Bidder's team during the implementation of the works and be the official point of contact.
- The Bidder should demonstrate within the technical proposal a bank certificate confirming its financial capability to carry out the Contract and approve the cash flow required for the bank guarantees.
- The Bidder should demonstrate that during the last three years, the aggregate annual weighted average of turnover was at least equal to the tender price.
- The Bidder must be licensed to complete the required works by the appropriate authorities in the Hashemite Kingdom of Jordan.

4. Tender Format

The tender proposals submitted by the Bidder shall include but not limited to the following sections:

- Overview;
- Detailed description of the proposed solutions;
- Comprehensive and full: design, simulations, specifications, calculations, drawings, technical details, etc.;
- Month to month expected electrical generation and (PR) for the lifetime of the project
- Installation, commissioning, and testing plan;
- Operation, cleaning, and monitoring;
- Warranty, maintenance, and after-sale services;
- Supporting documentation (datasheets, drawings, etc.);
- Training plan;
- Quality assurance/quality control plan;
- Health and safety plan;

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- Completed, signed, and stamped compliance sheet(s) provided in the Annexes of this tender document, as appropriate to the submitted bid(s);
- Financial proposal(s): prices of all components of the proposed solutions in the form of a BOQ. The BOQ shall be in Euro (€), must be clear and itemized, and shall exclude all customs and taxes. If an item is not priced, then the proposal may be considered unsatisfactory, and/or considered to be at no-cost. **Separate financial proposals must be submitted for bids on different lots;**
- Bidder qualifications;
- Tender bond.

5. Tender Bonds

The Bidder's offer will not be considered unless it is accompanied by a tender bond not less than 3% of the bidder offer. This guarantee should be:

- Issued by a licensed local bank, approved by the Client.
- Issued in the name of GJU. The guarantor will pay this amount on the first demand if it becomes evident that information given by the Contractor contains false statements.
- Valid for not less than 90 days from the opening date of the proposals and be renewable for future periods as the Client deems necessary.
- Will be returned after signing the Contract and a performance security bond has been duly entered and executed.

If the successful Bidder fails to provide a performance bond and sign the Contract within 14 days of being requested by the Client to do so, the full amount of the tender bond shall become payable to the Client as compensation for failure to do such.

6. Proposal Submission

6.1. Bids shall be submitted in two copies including technical and financial proposals.

6.2. Separate financial proposals must be submitted for bids on different lots.

6.3. An electronic copy on a CD must be submitted that includes all hardcopy documents and submittals.

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7. Scope of Work

REEE solutions for Jrainah Technical School, Bait Yafa School, and Madaba Technical School. The following describes the technical design specifications required. These specifications are the minimum requirements and are considered a guideline. The Bidder must offer a comprehensive and full design that meets the minimum requirements. The design must include all equipment and components necessary.

7.1. Jrainah Technical School for Boys

The following describes the specifications of the required interventions.

A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 16kW and close to the minimum PV capacity of 20 kWp.

The Contractor must conduct the necessary studies to determine if the available rooftops can withstand the additional weight loads imposed by the PV system installation. This shall include examining the structural strength and ability of the rooftop to withstand the load of the PV system and performing a core test (if required). The Contractor shall bear full responsibility for any structural issues or damages that may arise in the future as a result of installing the PV system. Also, before installation works are commenced, the Contractor shall invite a Ministry of Education representative to inspect the rooftop insulation, so the Contractor avoids any responsibility for pre-existing insulation damages after the PV system is installed.

1. PV Modules

The modules must be based on polycrystalline or monocrystalline silicon technology and must fulfil the following (or comparable to the following) technical specifications and standards, certified by an official institute if applicable:

- The modules must be Tier 1 manufactured in 2021 or 2022.
- Cell type: monocrystalline or polycrystalline; most effective technology is preferred.
- The output power of the crystalline module should not be less than 450 Wp at standard test condition (STC).
- Module efficiency shall be at least 18%.
- Operating PV temperature ranges between -10°C and + 85°C.
- Module weight should not exceed 30 kg.

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- Electrical connection shall be on a robust terminal block in an IP65 junction box or higher.
- The warranty for module defects after installation should be at least 10 years.
- The successful bidder shall provide a manufacturing power guarantee for all PV modules that will be installed that guarantees that the loss of the output is not more than 10% during the first 10 years and up to 20% in total after 20 years. Serial numbers of PV modules must also be provided.
- Mechanical stability – IEC 61215: design qualification and type approval for crystalline silicon terrestrial PV modules.
- PV module safety qualification standard: IEC/EN 61730 for safety class II test.
- Mechanical load tests up to 5400 Pa, damp heat, thermo cycle, humidity, and freeze tests.

2. PV Mounting Structure

The modules must be mounted on metallic sub-constructions of suitable height from the ground and with the necessary declination between 20° to 30° in relation to the horizontal plane to gain the maximum amount of solar radiation and energy production. Determination of the appropriate tilt angle must be based on shade analysis and simulations, which must be included in the technical proposal.

The supporting structure must be compatible with the offered PV modules and should be made of aluminum or galvanized steel as long as the specific guarantees are given by the manufacturer for non-corrosion due to weather conditions for rooftop installation.

The minimum specifications of the mounting structure are:

- Minimum wind speed of 160 km/h shall be considered for the mounting structure design.
- Made of aluminum or hot-dip galvanized steel or Magnelis for rooftops.
- The aluminum alloy shall be in compliance with the Jordanian Standards (ا ق م \ 380-2 \ 2003).
- The connections must be "High Strength Bolts according to ISO 898-1 Standard Grade8.8".

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- The anodizing coating of the aluminum profile shall be according to the British Standards (BS 1615) and level of (GradeAA15) and BS 3987 with color.
- The mounting structure shall be all fitted (no welding).
- A detailed structural analysis shall be submitted taking into account the Jordanian Loads Code specifying the safety factor.
- Manufacturer's warranty should be at least 10 years.

3. On-Grid Inverters

The on-grid inverters should meet the following specifications:

- The inverter shall comply with the responsible electricity distribution company regulations and standards.
- Must have dynamic reactive power support capability.
- The inverter should be designed to operate the PV array near its Maximum Power Point (MPP).
- The inverter should be transformerless-based for 3-phase PV systems to be offered with efficiency at max power no less than 97% (EURO-ETA / Euro-efficiency).
- The inverter shall be provided with integrated fuses and AC & DC switches and breakers.
- Temperature operating range: -20 °C to 60 °C.
- Harmonic distortion is less than 3%.
- Protection degree is IP65 or higher (outdoor).
- The contractor must provide tampering preventive measures, and/or canopy when necessary, to protect the inverter units.
- TUV and CE compliant.
- Warranty after installation should be at least 10 years. Certificate must be provided.
- All inverters must be the same size for each location.

4. PV/AC Cables & Conduits

Must use PV pipes for all conduits, except where cables lay on the ground, then metal conduits or cable tries must be used. The minimum specifications of the PV and AC cables are:

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- PV cables shall comply with TUV standards.
- Operation temperature for PV cables should be up to +80°C
- PV cables shall be UV resistant, flame retardant, and with low smoke characteristics.
- PV and AC cables shall comply with local and international standards and the responsible Electricity Distribution Company requirements.
- AC cables shall be insulated, sheathed copper cables drawn from the PV yard up to the connection points and shall be rated at minimum of 600Vac.
- All external cables must be installed inside an outdoor use PVC pipe with UV resistance or galvanized cable tray.
- All cables shall be marked properly by a high quality weather-proof labeling system so cables can be easily identified.
- Factory warranty shall be not less than 5 years. Certificate required.

5. AC Distribution Boxes

- The distribution boxes shall be made of hot coated or galvanized steel; dust and vermin proof, IP65 rating or better.
- The terminals and bus bars shall be appropriately sized; the boxes shall have suitable cable entry with suitable glands arrangement for both input and output cables.
- Suitable markings on the bus bars shall be provided to identify the bus bars.
- The distribution box shall be grounded and for this purpose a suitable ground terminal is to be arranged.
- The distribution box shall be wall-mounted and of the front door opening type.

6. Data Logging & Monitoring System

The data logging and monitoring system must have the following specifications:

- Data logging and essential hardware and software supported with a wireless mobile internet connection. The school's existing internet connection should not be used for PV system monitoring purposes.
- Internet connection subscription costs must be included in the proposal and be valid for three years.
- The monitoring software must be set up in such a way that both individual inverter performance as well whole PV system performance can be seen.

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- One indoor 32 inch smart LED monitoring screen to be placed in a visible place and readable from a distance of 10 meters.

B. Lighting Redesigning and Retrofitting

The lighting redesign/replacement shall consist of the following:

- Replace the existing lighting fixtures with adequate LED lighting;
- Install new LED lighting fixtures where necessary.

The goal is to ensure that all school zones are supplied with adequate lighting that is suitable for their respective uses while using energy-efficient lighting technology.

Fixtures and lamps quantities and distribution are to be determined by the Contractor and approved by the Client before installation.

Any wiring or installation work required is the responsibility of the Contractor and is to be done according to local codes.

The Bidder shall specify the name of the manufacturer the Bidder intends to use for the supply of each equipment material/light fitting etc. Manufacturer names shall be particularly specified for any item. Manufacturers selected by the Bidder shall have established agents in Jordan.

Minimum technical specifications include:

- Lighting source: LED
  - 1200 mm T8 LED tube (two T8 LED tubes in each lighting fixture).
  - Must be compatible with conventional ballast fluorescent lamp fixtures so that no modification to the existing fixtures is required.
  - If a special starter is required to bypass the ballast, then this starter must be included in the offer.
- Achieve the following light intensity (lux) at the height of one meter:
  - For classrooms, office space: between 300 and 500 lux under no ambient light.
  - For libraries, laboratories, and workshops: between 500 and 750 lux under no ambient light.
  - For hallways, corridors, and storage rooms between 50 and 100 lux under no ambient light.
- Color temperature: 6500 K at minimum

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- Color rendering index (CRI) > 80
- Mac Adam: 3-4
- Lifetime: 50,000 hours L70
- Overtime performance (indoor): L70B50
- Minimum efficacy: 100 Lumen /Watt
- Flickering > 400 Hz
- Total harmonic distortion (THD) < 15%
- Compliance with at least one of the following standards: International Electrotechnical Commission (I.E.C.), British Standard Specification (B.S.), or other approved national standards.
- 5 year factory warranty

The following table must be filled and included in the technical proposal.

Requirements Section (Requested Items)			Offered Items Section (To be filled by bidder)	
Item Type	Technical specification	Required values	Offered Technical Specification	Catalogue and data sheet (annex number)
LED Tube "T8"	Quantity			
	Manufacturer			
	Manufacturer agent in Jordan	Yes / No		
	Power (W)			
	Rated Voltage (V)			
	Frequency (Hz)			
	Efficacy (lm/W)			
	Color rendering index (CRI)			
	Lifetime (hours)			
	Color temperature (K)			
	Beam Angle (degrees)			
	Length (mm)			
	Data sheet availability	Yes / No		
	Power factor			
	Total Harmonic Distortion (THD)			
	Mac Adam			
	Flickering (Hz)			
	Warranty			

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C. Window Maintenance

The Contractor shall conduct general maintenance of all windows at the school. This shall include, but not limited to, checking and repairing (when needed):

- Weatherstripping and caulking to reduce air and water infiltration;
- Air and water leakages;
- All hardware (locks, opening/closing mechanisms, etc.);
- Oiling for proper opening/closing mechanism and smooth operation;
- If broken, replace window pane in a way that matches the existing panes;
- Clean any sand, dirt or dust from window hinges, sills, and tracks.

7.2. Bait Yafa School for Girls

The following describes the specifications of the required interventions.

A. A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 50kW and close to the minimum PV capacity of 60 kWp.

Please see the requirements indicated under section 7.1 for PV system specifications. In addition one spare inverter shall be provided.

B. Classrooms

The following interventions are to be implemented in each of the classrooms:

1. Install one two-ton inverter air conditioning (AC) unit;
2. Install two ceiling fans;
3. Retrofit lighting using LED technology;
4. Install motion sensors for the lighting system;
5. Install window/door sensors to manage AC control;
6. Perform window maintenance.

Please refer to the relevant specifications described below for each item.

C. Administrative Offices

The following interventions are to be implemented in each of the administrative offices:

1. Install one two-ton inverter AC unit;
2. Install one ceiling fan;
3. Retrofit lighting using LED technology;

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4. Install motion sensors for the lighting system;
5. Install window/door sensors to manage AC control;
6. Perform window maintenance.

Please refer to the relevant specifications described below for each item.

Specifications

Two-Ton Inverter AC Unit

The below specifications are dictated in the national Jordanian building codes as well as ASHRAE standards. The Contractor shall procure, install, test, and operate AC energy-saving, inverter type split units of a known and high-quality manufacturing brand (air cooled, direct expansion, split AC unit - wall type). The Contractor shall build a new electricity network for the AC systems. All AC units shall be electrified from a new electric network all the way from the main electric distribution panel. Also, each floor shall have a new sub panel and each room a dedicated breaker. Such electrical works shall also include the installation of a new 500 A main distribution panel that is supplied from a transformer dedicated to the school. Cabling from the transformer to this new main distribution panel has been conducted by the utility company (120mm copper lines, 6 phase lines, 1 neutral line); however, the Contractor shall install appropriate two main breakers that can be connected to 120mm cables in the new main distribution panel. Upon implementation, the Contractor shall submit engineering designs, layouts, and drawings of the proposed electricity network (including but not limited to wiring, circuit breakers, protection fuses etc.) to the Client for approval prior to commencing works. Must use PVC pipes instead of conduits for wiring. All electricity network components shall comply with Jordanian codes and standards. Additionally, the Contractor shall install a complete grounding system that is in accordance with Jordanian codes and standards. The contractor must provide tampering preventive measures to protect the AC units.

تقديم وتركيب وفحص وموازنة وتشغيل وحدات تكييف (تبريد وتدفئة) من النوع المنفصل الموفر للطاقة Inverter ماركة معروفة من أجود الأنواع.

تكون الوحدات شاملة للأجزاء التالية:

- قفص حماية معدني مطلي بطلاء حراري لحماية الوحدات الداخلية.
- وحدة المكثف condensing unit والمحتوية على الضواغط Rotary type compressors والصمامات اللازمة بما فيها صمامات الأمان والحماية والملفات النحاسية standard coils والمروحة وإدارة الطاقة والتحكم

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بالإضافة لكافة العناصر الكهربائية اللازمة لحماية وتنظيم الوحدة وبغلاف خارجي من النوع الثقيل heavy gauge والمعالج ضد عوامل الطقس لتركب فوق سطح المبنى أو على الجدار الخارجي.

- القواعد المصنوعة من زوايا الحديد وذات أبعاد مناسبة لتركيب الوحدات الخارجية عليها وتكون أبعاد الزوايا (50*50*5 ملم) ومدهونة بدهان حراري Powder coating مع تركيب موانع اهتزاز والسعر يشمل ايضا الحمالات وقواعد التعليق المناسبة لأجزاء الوحدة الداخلية.
- تمديدات شبكة المواسير النحاسية للوصل بين أجزاء الوحدة الداخلية والخارجية مع العزل لهذه المواسير من النوع الأسطواني المسبق الصب مع تغليف العازل بالشريط اللاصق وبصورة حلزونية وعلى كامل المواسير ولغاية وحدة معالجة الهواء air handler والحفر في الجدران والأسقف إن تطلب الأمر ذلك وإعادة وإصلاح الوضع كما كان عليه وتثبيت المواسير جيداً.
- وحدة معالجة الهواء air handler من النوع الذي يعلق على الجدار ذات ديكور أنيق Decorative type بحسب إرشادات وموافقة المهندس المسؤول والمحتوية على ملفات التبريد (Standard Coils)، والمروحة الطاردة المركزية ومصرف للماء المتكاثف drain pan بالإضافة إلى صمامات الأمان والحماية والمكثفات الكهربائية وفلتر قابل للتنظيف على إن لا يزيد مستوى الضجيج للوحدة عن 45 ديسبل عند السرعة المتوسطة.
- شبكة تمديدات مواسير التصريف للماء المتكاثف لكل وحدة أو لكل مجموعة وحدات إلى أقرب نقطة تصريف خارج المبنى من مواسير (16 CPVC-PN) بالأقطار المناسبة إبتداء من 20 ملم ولغاية 32 ملم وحسب طبيعة وعدد الوحدات المربوطة مع بعضها البعض.
- سليفات UPVC لأماكن اختراق المواسير للجدران والعقدات للتوصيل بين أجزاء الوحدة الداخلية والخارجية بالأقطار المناسبة على أن لا تقل عن 75 ملم.
- وحدة التحكم control unit:
    - Programmable controller
    - Auto restart function
    - Sleep mode control
    - Wireless remote control
    - Thermostat
    - Low ambient kit and control
    - Summer inside temperature 23°C
    - Winter inside temperature 20°C
    - Summer ambient operating temperature 50°C
    - Winter ambient temperature 0°C
- التوصيلات الكهربائية بين أجزاء الوحدة الداخلية والخارجية بحيث تكون جميع خطوط التغذية الكهربائية لوحدات التبريد وملحقاتها حسب قدرة الوحدات ومتناسبة فنياً.
- الغاز المستخدم .R32
- تتم جميع هذه الأعمال تحت إشراف المهندس المسؤول بحسب المواصفات العالمية (ASHRAE CODE).

Ceiling Fans

توريد وتركيب وفحص وتشغيل مروحة سقفية قياس 56 انش من أجود الأنواع ماركة عالمية مشهورة (KDK,PANASONIC) أو ما يعادلها بالجودة مع مفتاح التحكم الخاص بها والسعر يشمل التوصيل من نقطة التغذية الخاصة بها بما تتضمنه من مواسير وأسلاك وعلب وكل ما يلزم من مواد وأعمال حسب المخططات والمواصفات وتعليمات المهندس المشرف.

Lighting Retrofit

Please see the requirements indicated under section 7.1 for Lighting specifications. And fill out the table in the section.

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Motion Sensors

The purpose of the using the lighting sensors is to:

- Switch off the light sources when the room is not occupied.
- Switch off the lighting automatically as soon as there is sufficient natural light.
- Adapt the lighting to the requirements of the occupant via a pushbutton switch (turn off bypass).

The lighting sensors must:

- Be ultrasound sensors that combine 360° passive infrared and ultrasonic technologies in order to prevent unwanted switch-offs and incorporate a continuously operating light level measurement cell.
- Be flush-mounted and be at least IP20 and IK04 in areas with false ceilings. In other areas, they must be flush or surface-mounted on the wall.
- Have four detection sensitivity settings (low, medium, high, very high).
- Be connected to pushbuttons and generally operate in "manual on/auto off" mode (manual switch on; automatic switch-off as soon as the room is no longer occupied)..
- Have a consumption that does not exceed 0.8W when on standby.
- Must have an adjustable turn-off delay setting of at least 5 minutes.
- Be configured using a two-way mobile configurator, which can interrogate the sensor remotely and change, memorize, and copy the settings (light level threshold, time delay, operating mode, and detection sensitivity) *(optional)*.

These motion sensors must be equipped with controllers if several circuits are connected to a single motion sensor. The controllers must be installed in an electrical enclosure or in the false ceiling and must have inputs for control by a conventional pushbutton.

Window/Door Sensors

In order to increase energy efficiency, window/door sensors are required to communicate the status of a window/door (open or closed) and to take action by turning on/off the AC.

- Sensors must be installed on all windows/doors within each room.
- Sensors must be compatible with different types of windows/doors.
- Time-to-take action shall be adjusted from 1 minute up to 1 hour.
- Each room can contain up to 8 sensors to control the AC unit.

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- Sensors must be powered by solar cells in addition to batteries.
- Operating temperature: -20°C to +60°C.

Window Maintenance

Please see the requirements indicated under section 7.1 for Window Maintenance specifications.

7.3. Madaba Technical School for Boys

Required intervention: On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 32kW and close to the minimum PV capacity of 48 kWp.

Please refer to the specifications of the PV system components indicated under section 7.1 for PV system components; however please refer below for specifications of the hybrid inverter, the battery storage system, and the AVR & PFC solution required for Madaba Technical School.

Hybrid inverter:

- The inverter must be battery ready i.e. compatible with a high voltage battery storage system (i.e. installed on the high voltage DC side of the inverter). This inverter is commercially known as a hybrid inverter.
- The inverter must also be connected with a power plant controller for dynamic reactive power support.
- The inverter must have dynamic reactive power support capability.
- The inverter shall comply with the responsible electricity distribution company regulations and standards.
- The inverter should be designed to operate the PV array near its Maximum Power Point (MPP).
- The inverter should be transformerless-based for 3-phase PV systems to be offered with efficiency at max power no less than 97% (EURO-ETA / Euro-efficiency).
- The inverter shall be provided with integrated fuses and AC & DC switches and breakers.
- Temperature operating range: -20 °C to 60 °C.
- Harmonic distortion is less than 3%.
- Protection degree is IP65 or higher (outdoor).

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- The contractor must provide tampering preventive measures, and/or canopy when necessary, to protect the inverter units.
- TUV and CE compliant.
- DC/AC ratio must not be larger than 1.5.
- All inverters must be the same size.
- One spare inverter must be provided.
- In the design, one string must include DC optimizers.
- Warranty after installation should be at least 5 years. Certificate must be provided.

Battery:

The battery storage system must have a capacity of 5 kWh, nominal voltage of 600 V, and be manufactured with lithium iron phosphate (LFP) cells. It must be compatible with the hybrid inverter to be installed (certificate must be provided). The battery must be able to display the state of charge (SOC) status. Minimum 2 years warranty.

PFC & AVR:

The PFC and AVR units must be compatible with one another and function in an integrated manner. The PFC must prevent the system power factor from falling below 0.9. The AVR must maintain a voltage within ±6% of the nominal system voltage at the point of common coupling. Any data required to design this system is the responsibility of the contractor. The solution must have a minimum 3 years warranty.

AVR:

The AVR should comply with the following requirements, at minimum:

- Must be autotransformer or power electronic-based depending on the design and device placement to meet design objective.
- The AVR must have a factory acceptance test specifically for the equipment purchased for the purpose of this project.
- The device must be built in compliance with relevant European Directives.

Lighting Retrofit

Please see the requirements indicated under section 7.1 for Lighting specifications. And fill out the table in the section.

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Window Maintenance

Please see the requirements indicated under section 7.1 for Window Maintenance specifications.

AC units and Fans

Please see the requirements indicated under section 7.2 for AC units and fans specifications. A new electrical network will have to be built as specified in section 7.2, but without a new main distribution panel, unless need due to site specific connection requirements.

8. Testing and Commissioning

8.1. The Contractor shall submit two original hard copies and two soft copies including but not limited to and as applicable: permits, as-built engineering and 3D drawings, 2D layouts, simulations, calculations, drawings, layouts, datasheets, certifications, manufacturing warranties, instruction, installation, operation, and maintenance manuals and checklists, quality assurance/quality control plan, and health and safety plan.

8.2. The contractor shall place warning signs at key areas near equipment as necessary.

8.3. The Contractor shall clean up the project site and remove any temporary structures, equipment or dirt, and construction debris prior to the commissioning/operation date in accordance with appropriate waste disposal practices and applicable laws. Any location of works shall be returned to its original state at all times.

8.4. The final commissioning/operation date will be performed after the following:

- Completion of all the above mentioned work.
- Completion of all project documentation.
- Testing of the offered interventions, which shall be witnessed and approved by school and Ministry personnel.

8.5. PV system final commissioning will be performed by the Contractor at its own expense and will be witnessed and approved by NERC/RSS and responsible electricity distribution company personnel. If there is a need for any additional tests or testing equipment required by NERC/RSS or the responsible electricity

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distribution company, the Contractor must provide the requirements on its own expense.

8.6. PV system commissioning procedures shall be carried out according to the standard protocol "IEC 62446 standard".

9. Training

9.1. The proposal should include a training plan for select school and Ministry employees and technical staff. The training must focus on the operation and maintenance of the offered interventions. User/operation manuals shall be provided as part of the training.

9.2. For the purpose of the installed PV systems specifically, the proposal should include on-site and off-site training for selected Ministry of Education employees and technical staff. Training must focus on but not limited to the following:

- Photovoltaic theory
- System operation
- Troubleshooting
- System configuration
- Data acquisition and monitoring system management
- Relevant software
- Preventive and routine maintenance
- Performing the washing and cleaning tasks of the PV modules and structures

9.3. The training has to meet the following requirements:

- It shall be conducted theoretically and practically.
- It shall be offered by an experienced instructor.
- It must be completed before the final acceptance of the project.

10. Monitoring and Cleaning

The Contractor is responsible for monitoring the installed PV system energy yield and performance ratio (PR) against expected performance as simulated on PVsyst using

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market practice data and installed irradiance sensor. The Contractor shall conduct a system energy yield and performance ratio check after the first, second, and third years of system operation from the operation date in order to verify system performance values. The Contractor shall, at its own expense, repair or modify the installed PV system upon failure of achieving the proposed values within the maintenance period. See response times in sections 11 and 12 below.

The Bidder shall include a detailed cleaning mechanism for the PV system that includes a cleaning schedule (with at least one cleaning per month) and an approximation of the amount of water that will be consumed in the cleaning process. The Bidder shall provide PV system cleaning services for 3 years following the acceptance date and shall include the price for the necessary cleaning tools in the BOQ and must ensure that the cleaning tools are in good condition following the 3-year maintenance, monitoring, and cleaning period. The Bidder shall also include the price for a dedicated water tanks, easy press water pump and pressure cleaner (that may be adjusted to 35 bar (500 psi) at the nozzle), any necessary pluming and electric wiring to use for PV system cleaning in the BOQ.

11. Maintenance

11.1. The contractor must submit a maintenance bond of 5% of the Contract sum once the project is completed and before acceptance from the client. This guarantee should be:

11.1.1. Issued by a licensed local bank, approved by the Client.

11.1.2. Issued in the name of GJU. The guarantor will pay this amount on the first demand by the client.

11.1.3. Valid for not less than 3 years from the project completion and acceptance from the client.

11.2. Maintenance services shall include PV system cleaning as indicated in the previous section.

11.3. The Bidder shall include a detailed maintenance plan including a maintenance checklist and technical support.

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11.4. If any system component for any of the interventions requires replacement during the warranty period, the Contractor must supply replacements at the Contractor's own expense.

11.5. The Bidder shall include clear troubleshooting methodology and contact information that the Client/Beneficiary can use in case of emergencies.

11.6. The Bidder must show their commitment to the following response periods and must specify them in the proposal. The response time may not be more than 24 hours, and corrective action within 48 hours.

- Response time for problem solving.
- Response time for support.
- Response time for failure of the system components or any other related components (corrective action).
- Response time for failed equipment or any other component replacements (corrective action).

12. Energy Yield Performance Bonds

12.1. The contractor must submit an energy yield performance bond not less than 10% of the Contract sum once the project is completed and before acceptance from the client. This guarantee should be:

12.1.1. Issued by a licensed local bank, approved by the Client.

12.1.2. Issued in the name of GJU. The guarantor will pay this amount on the first demand by the client.

12.1.3. Valid for not less than 3 years from the project completion and acceptance from the client.

12.2. The Contractor is responsible for monitoring the installed PV system energy yield and performance ratio (PR) against expected performance as simulated on PVsyst using market practice data and installed irradiance sensor.

12.3. The Contractor shall conduct a system energy yield and performance ratio check after the first, second, and third years of system operation from the operation date in order to verify system performance values.

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12.4. If the energy yield is less than what is expected and stated in the contract, the client has the right to apply performance liquidated damages, and to calculate the cost and damages which shall be borne by the contractor. The contractor is still obligated to carry on all the necessary steps and actions to rectify the problems to achieve the contract performance.

13. Method of Payment

The method of payment within the Contract shall be according to the following terms:

- 10% of Contract price upon comprehensive design submitted by the Bidder and acceptance by Client.
- The remainder of the Contract balance will be settled upon final completion of all works after the maintenance bond and performance bond have been entered.

14. Contract Period and Penalties

14.1. 3 months for design, installation, and testing from the commencement date of works until the operation date.

14.2. There will be a penalty for every unjustified delay. There will be a delay liquidated damage (DLD) equal to 150 Euro/day for every unjustified delay. The maximum period of delay for this Contract will not be more than 1 month. After that, the Client has the right to take any action in accordance with the conditions of this Contract.

14.3. 3 years for maintenance, monitoring, and cleaning (when applicable) from the acceptance date.

14.4. 3 years of system warranty from the acceptance date.

14.5. Lighting system spare parts shall be provided as part of the Contract in the amount of 5% of installed components.

14.6. Sensor spare parts shall be provided as part of the Contract in the amount of 5% of installed components.

14.7. If any components of the provided interventions require replacement during the warranty period, then the Contractor must replace those at the Contractor's own expense.

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Annex 1: Compliance Sheets for Jrainah Technical School

Category	Subcategory	Yes/No
Terms & Conditions	The Bidder commits to collect necessary information about the nature of the site, its infrastructure, and any relevant data required to successfully design the interventions.	
	The proposal includes the full design, installation, training, maintenance, and monitoring and cleaning (when applicable).	
	The Bidder guarantees that all proposed interventions are compatible with the existing infrastructure at installation locations.	
	Proposal includes a BOQ along with description, specifications, country of origin, manufacturer of equipment, materials, tools, operation, training, maintenance, etc.	
	The BOQ includes all auxiliary items (equipment, infrastructure, components, etc.) that are required for the system to function as expected.	
	The Bidder commits to cover any fees required by the designated electricity distribution company, EMRC, or any other entity, and obtain all permits required to execute the works.	
	The BOQ includes all fees/permits required by the designated distribution company or any other entity.	
	The Bidder commits to coordinating with the Ministry of Education's designated directorate throughout the implementation of the works.	
Bidder Qualifications	Bidder has enough experience and certified technical staff to perform works.	
	Name, experience, certificates and CVs of the engineering staff that will supervise the installation and support is included.	
	The Bidder nominates a qualified project manager.	
	The Bidder includes a bank certificate confirming its financial capability to carry out the Contract and approve the cash flow required for the bank guarantees.	
	The Bidder demonstrates that during the last three years, the aggregate annual weighted average of turnover was at least equal to the tender price.	
	The Bidder is licensed to complete the required works by the appropriate authorities in Jordan.	

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Category	Subcategory	Yes/No
Tender Format	The Bid(s) contains all components and documents indicated in section 4.	
Tender Bonds	The bid includes a tender bond not less than 3% of the Contract sum. This guarantee is: • Issued by a licensed local bank, approved by the Client; • Issued in the name of GJU; • Valid for not less than 90 days from the opening date of the proposals, and be renewable for future periods necessary. If the successful Bidder fails to provide a performance bond and sign the Contract within 14 days of being requested by the Client to do so, the full amount of the tender bond will become payable to the Client as compensation for failure to do such.	
Proposal Submission	Two copies of the technical and financial proposals are provided.	
	Separate financial proposals are submitted for bids on different lots.	
	An electronic copy on a CD containing all submittals was provided.	
PV System	The Bidder commits to involving a Ministry of Education representative before commencing works to inspect the current condition of the rooftop insulation.	
	The Bidder commits to perform the necessary structural studies to confirm that the school rooftops can withstand the weight of the installed PV system.	
	The Bidder agrees to bear full responsibility for any structural issues or damages that may arise in the future as a result of installing the PV system.	
	PV module specifications and warranty as indicated in the scope of work.	
	PV mounting structure specifications and warranty as indicated in the scope of work.	
	On-grid inverters' specifications and warranty as indicated in the scope of work, all used inverters same size.	
	DC and AC cables & conduits specifications and warranty as indicated in the scope of work.	
	AC Distribution Boxes specifications and warranty as indicated in the scope of work.	
	Data logging & monitoring system specifications and warranty as indicated in the scope of work. The BOQ includes the cost for a wireless mobile internet connection subscription valid for three years to use for PV system monitoring purposes. The monitoring software is set up in such a way that both individual inverter performance as well whole PV system performance can be seen.	
	Shade analysis, PVsyst simulation results and tabulated energy yield for the lifetime for the project are provided.	

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Category	Subcategory	Yes/No
Lighting System	Lighting system design is done in a way that guarantees that all school zones are supplied with adequate lighting suitable for their respective uses while using energy-efficient lighting technology	
	The Bidder commits to obtaining the Client's approval on fixtures and lamps quantities and distribution before installation.	
	The Bidder commits to conducting all wiring or installation works required, to be done according to local codes.	
	The Bidder specifies the name of the manufacturer the Bidder intends to use for the supply of each equipment material/light fitting etc. Manufacturer names are particularly specified for any item. Also, manufacturers selected by the Bidder have established agents in Jordan.	
	Requirements, technical specifications, and warranty of the lighting system solutions are provided as indicated in the "Scope of Work."	
	The table in section 7.1 is filled and included in the technical proposal.	
	Lighting Spart parts are included	
Window Maintenance	The Bidder commits to conducting general maintenance of all windows. This shall include, but not limited to, checking and repairing (when needed): • Weatherstripping and caulking to reduce air and water infiltration; • Air and water leakages; • All hardware (locks, opening/closing mechanisms, etc.); • Oiling for proper opening/closing mechanism and smooth operation; • If broken, replace window pane in a way that matches the existing panes; • Clean any sand, dirt or dust from window hinges, sills, and tracks.	
Testing & Commissioning	Upon completion of works, the Bidder commits to submitting two original hard copies and two soft copies including but not limited to: permits, as-built engineering and 3D drawings, 2D layouts, simulations, calculations, drawings, layouts, datasheets, certifications, datasheets, instruction, installation, operation, maintenance manuals and checklists, quality assurance/quality control plan, and health and safety plan.	
	The Bidder commits to carrying out PV system commissioning procedures according to "IEC 62446 standard."	
	The Bidder commits to placing warning signs at key areas near equipment.	
	The Bidder commits to cleaning up the project site prior to commissioning.	
	The Bidder commits to providing additional tests or testing equipment at its own expense as deemed necessary by the electricity distribution company or NERC/RSS for the PV system.	

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Category	Subcategory	Yes/No
Training	The proposal includes a training plan containing all components and requirements as indicated in section 9.	
	Upon delivery of training, the successful Bidder commits to provide user/operation manuals as part of the training.	
Monitoring & Cleaning	The Bidder commits to monitoring the installed PV system energy yield and performance ratio against expected performance after the first, second, and third years from the operation date.	
	The successful Bidder commits to repair or modify the installed PV system at its own expense upon failure of achieving the proposed values within the maintenance period.	
	The Bidder provides a cleaning mechanism that includes a cleaning schedule and approximation of water consumption.	
	The Bidder commits to providing PV system cleaning services for 3 years following the acceptance date.	
	The Bidder has included the price for the necessary cleaning tools in the BOQ and commits to ensuring that the cleaning tools are in good condition following the 3-year maintenance, monitoring, and cleaning period.	
	The Bidder shall also include the price for a dedicated water tanks, water pump and pressure cleaner (that may be adjusted to 35 bar (500 psi) at the nozzle) to use for PV system cleaning in the BOQ.	
Maintenance	The Bidder provides a Maintenance Guarantee valid for 3 years.	
	The Bidder includes PV system cleaning as part of maintenance services.	
	The Bidder includes a detailed maintenance plan including a maintenance checklist and technical support.	
	The Bidder commits to replacing any system component for any of the interventions that requires replacement during the warranty period.	
	The Bidder includes a troubleshooting methodology and contact information for an emergency/response contact.	
	The Bidder specifies the response periods indicated in section 11.5.	
Method of Payment	The Bidder agrees to the method of payment indicated in section 13.	

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Category	Subcategory	Yes/No
Contract Period and Penalties	The Bidder commits to delivering the interventions (i.e. operation date) within 3 months from the commencement date of works.	
	The Bidder is aware of the delay liquidated damage (DLD) equal to 150 Euro/day for every unjustified delay.	
	The Bidder commits to 3 years for maintenance, monitoring, and cleaning from the acceptance date.	
	The Bidder commits to 3 years of system warranty and energy yield performance guarantee from the acceptance date.	
	The Bidder commits to providing lighting system spare parts as part of the Contract.	
	The Bidder commits to replace any components of the provided interventions that require replacement during the warranty period at its own expense.	

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Annex 2: Compliance Sheets for Bait Yafa School

Category	Subcategory	Yes/No
Terms & Conditions	The Bidder commits to collect necessary information about the nature of the site, its infrastructure, and any relevant data required to successfully design the interventions.	
	The proposal includes the full design, installation, training, maintenance, and monitoring and cleaning (when applicable).	
	The Bidder guarantees that all proposed interventions are compatible with the existing infrastructure at installation locations.	
	Proposal includes a BOQ along with description, specifications, country of origin, manufacturer of equipment, materials, tools, operation, training, maintenance, etc.	
	The BOQ includes all auxiliary items (equipment, infrastructure, components, etc.) that are required for the system to function as expected.	
	The Bidder commits to cover any fees required by the designated electricity distribution company, EMRC, or any other entity, and obtain all permits required to execute the works.	
	The BOQ includes all fees/permits required by the designated distribution company or any other entity.	
	The Bidder commits to coordinating with the Ministry of Education's designated directorate throughout the implementation of the works.	
Bidder Qualifications	Bidder has enough experience and certified technical staff to perform works.	
	Name, experience, certificates and CVs of the engineering staff that will supervise the installation and support is included.	
	The Bidder nominates a qualified project manager.	
	The Bidder includes a bank certificate confirming its financial capability to carry out the Contract and approve the cash flow required for the bank guarantees.	
	The Bidder demonstrates that during the last three years, the aggregate annual weighted average of turnover was at least equal to the tender price.	
	The Bidder is licensed to complete the required works by the appropriate authorities in Jordan.	

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Category	Subcategory	Yes/No
Tender Format	The Bid(s) contains all components and documents indicated in section 4.	
Tender Bonds	The bid includes a tender bond not less than 3% of the Contract sum. This guarantee is: • Issued by a licensed local bank, approved by the Client; • Issued in the name of GJU; • Valid for not less than 90 days from the opening date of the proposals, and be renewable for future periods necessary. If the successful Bidder fails to provide a performance bond and sign the Contract within 14 days of being requested by the Client to do so, the full amount of the tender bond will become payable to the Client as compensation for failure to do such.	
Proposal Submission	Two copies of the technical and financial proposals are provided.	
	Separate financial proposals are submitted for bids on different lots.	
	An electronic copy on a CD containing all submittals was provided.	
PV System	The Bidder commits to involving a Ministry of Education representative before commencing works to inspect the current condition of the rooftop insulation.	
	The Bidder commits to perform the necessary structural studies to confirm that the school rooftops can withstand the weight of the installed PV system.	
	The Bidder agrees to bear full responsibility for any structural issues or damages that may arise in the future as a result of installing the PV system.	
	PV module specifications and warranty as indicated in the scope of work.	
	PV mounting structure specifications and warranty as indicated in the scope of work.	
	On-Grid inverters' specifications and warranty as indicated in the scope of work, all used inverters same size, spare inverter provided.	
	DC and AC cables & conduits specifications and warranty as indicated in the scope of work.	
	AC Distribution Boxes specifications and warranty as indicated in the scope of work.	
	Data logging & monitoring system specifications and warranty as indicated in the scope of work. The BOQ includes the cost for a wireless mobile internet connection subscription valid for three years to use for PV system monitoring purposes. The monitoring software is set up in such a way that both individual inverter performance as well whole PV system performance can be seen.	
	Shade analysis, PVsyst simulation results and tabulated energy yield for the lifetime for the project are provided.	

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Category	Subcategory	Yes/No
Overall AC requirements	The proposal includes the required interventions for classrooms, offices, and computer labs. In each of the 26 classrooms: • Install one two-ton inverter AC unit; • Install two ceiling fans; • Retrofit lighting using LED technology; • Install motion sensors for the lighting system; • Install window/door sensors to manage AC control; • Perform window maintenance. In each of the administrative offices classrooms: • Install one two-ton inverter AC unit; • Install one ceiling fan; • Retrofit lighting using LED technology; • Install motion sensors for the lighting system; • Install window/door sensors to manage AC control; • Perform window maintenance.	
AC Units	The Bidder commits to constructing a new electricity network incl. the installation of a 500 A main distribution board that is supplied from a dedicated transformer for the school, two main breakers for 120mm cabling, new sub panel for each floor, dedicated breaker for each room, and a grounding system that is in accordance with Jordanian codes and standards..	
	Upon implementation, the Bidder commits to submit engineering designs, layouts, and drawings of the proposed electricity network (including but not limited to wiring, circuit breakers, protection fuses etc.) to the Client for approval prior to commencing works. All electricity network components shall comply with Jordanian codes and standards.	
	Requirements, technical specifications, and warranty of the AC units as indicated in the scope of work.	
Ceiling Fans	Requirements, technical specifications, and warranty of the ceiling fans as indicated in the scope of work.	

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Category	Subcategory
Lighting System	Lighting system design is done in a way that guarantees that all school zones are supplied with LED lighting.
	The Bidder commits to obtaining the Client's approval on fixtures and lamps quantities and distribution before installation.
	The Bidder commits to conducting all wiring or installation works required, to be done according to local codes.
	The Bidder specifies the name of the manufacturer the Bidder intends to use for the supply of each equipment material/light fitting etc. Manufacturer names are particularly specified for any item. Also, manufacturers selected by the Bidder have established agents in Jordan.
	Requirements, technical specifications, and warranty of the lighting system solutions are provided as indicated in the "Scope of Work."
	The table in section 7.2 - "Lighting Retrofit" is filled and included in the technical proposal.
Motion Sensors	Requirements, technical specifications, and warranty of the motion sensors as indicated in the scope of work, Including spare parts.
Window/Door Sensors	Requirements, technical specifications, and warranty of the window/door sensors as indicated in the scope of work, Including spare parts.
Window Maintenance	The Bidder commits to conducting general maintenance of all windows. This shall include, but not limited to, checking and repairing (when needed): • Weatherstripping and caulking to reduce air and water infiltration; • Air and water leakages; • All hardware (locks, opening/closing mechanisms, etc.); • Oiling for proper opening/closing mechanism and smooth operation; • If broken, replace window pane in a way that matches the existing panes; • Clean any sand, dirt or dust from window hinges, sills, and tracks.

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Category	Subcategory	Yes/No
Testing & Commissioning	Upon completion of works, the Bidder commits to submitting two original hard copies and two soft copies including but not limited to: permits, as-built engineering and 3D drawings, 2D layouts, simulations, calculations, drawings, layouts, datasheets, certifications, datasheets, instruction, installation, operation, maintenance manuals and checklists, quality assurance/quality control plan, and health and safety plan.	
	The Bidder commits to carrying out PV system commissioning procedures according to "IEC 62446 standard."	
	The Bidder commits to placing warning signs at key areas near equipment.	
	The Bidder commits to cleaning up the project site prior to commissioning.	
	The Bidder commits to providing additional tests or testing equipment at its own expense as deemed necessary by the electricity distribution company or NERC/RSS for the PV system.	
Training	The proposal includes a training plan containing all components and requirements as indicated in section 9.	
	Upon delivery of training, the successful Bidder commits to provide user/operation manuals as part of the training.	
Monitoring & Cleaning	The Bidder commits to monitoring the installed PV system energy yield and performance ratio against expected performance after the first, second, and third years from the operation date.	
	The successful Bidder commits to repair or modify the installed PV system at its own expense upon failure of achieving the proposed values within the maintenance period.	
	The Bidder provides a cleaning mechanism that includes a cleaning schedule and approximation of water consumption.	
	The Bidder commits to providing PV system cleaning services for 3 years following the acceptance date.	
	The Bidder has included the price for the necessary cleaning tools in the BOQ and commits to ensuring that the cleaning tools are in good condition following the 3-year maintenance, monitoring, and cleaning period.	
	The Bidder shall also include the price for a dedicated water tanks, water pump and pressure cleaner (that may be adjusted to 35 bar (500 psi) at the nozzle) to use for PV system cleaning in the BOQ.	

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Category	Subcategory	Yes/No
Maintenance	The Bidder provides a Maintenance Guarantee valid for 3 years.	
	The Bidder includes PV system cleaning as part of maintenance services.	
	The Bidder includes a detailed maintenance plan including a maintenance checklist and technical support.	
	The Bidder commits to replacing any system component for any of the interventions that requires replacement during the warranty period.	
	The Bidder includes a troubleshooting methodology and contact information for an emergency/response contact.	
	The Bidder specifies the response periods indicated in section 11.5.	
Method of Payment	The Bidder agrees to the method of payment indicated in section 13.	
Contract Period and Penalties	The Bidder commits to delivering the interventions (i.e. operation date) within 3 months from the commencement date of works.	
	The Bidder is aware of the delay liquidated damage (DLD) equal to 150 Euro/day for every unjustified delay.	
	The Bidder commits to 3 years for maintenance, monitoring, and cleaning from the acceptance date.	
	The Bidder commits to 3 years of system warranty and energy yield performance guarantee from the acceptance date.	
	The Bidder commits to providing lighting system spare parts as part of the Contract.	
	The Bidder commits to replace any components of the provided interventions that require replacement during the warranty period at its own expense.	

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Annex 3: Compliance Sheets for Madaba Technical School

Category	Subcategory	Yes/No
Terms & Conditions	The Bidder commits to collect necessary information about the nature of the site, its infrastructure, and any relevant data required to successfully design the interventions.	
	The proposal includes the full design, installation, training, maintenance, and monitoring and cleaning (when applicable).	
	The Bidder guarantees that all proposed interventions are compatible with the existing infrastructure at installation locations.	
	Proposal includes a BOQ along with description, specifications, country of origin, manufacturer of equipment, materials, tools, operation, training, maintenance, etc.	
	The BOQ includes all auxiliary items (equipment, infrastructure, components, etc.) that are required for the system to function as expected.	
	The Bidder commits to cover any fees required by the designated electricity distribution company, EMRC, or any other entity, and obtain all permits required to execute the works.	
	The BOQ includes all fees/permits required by the designated distribution company or any other entity.	
	The Bidder commits to coordinating with the Ministry of Education's designated directorate throughout the implementation of the works.	
Bidder Qualifications	Bidder has enough experience and certified technical staff to perform works.	
	Name, experience, certificates and CVs of the engineering staff that will supervise the installation and support is included.	
	The Bidder nominates a qualified project manager.	
	The Bidder includes a bank certificate confirming its financial capability to carry out the Contract and approve the cash flow required for the bank guarantees.	
	The Bidder demonstrates that during the last three years, the aggregate annual weighted average of turnover was at least equal to the tender price.	
	The Bidder is licensed to complete the required works by the appropriate authorities in Jordan.	

GJU
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Category	Subcategory	Yes/No
Tender Format	The Bid(s) contains all components and documents indicated in section 4.	
Tender Bonds	The bid includes a tender bond not less than 3% of the Contract sum. It is: • Issued by a licensed local bank, approved by the Client; issued in the name of GJU; valid for not less than 90 days from the opening date of the proposals, and be renewable for future periods necessary. If the successful Bidder fails to provide a performance bond and sign the Contract within 14 days of being requested by the Client to do so, the full amount of the tender bond will become payable to the Client as compensation for failure to do such.	
Proposal Submission	Two copies of the technical and financial proposals are provided.	
	Separate financial proposals are submitted for bids on different lots.	
	An electronic copy on CD containing all submittals was provided.	
PV System	The Bidder commits to involving a Ministry of Education representative before commencing works to inspect the current condition of the rooftop insulation.	
	The Bidder commits to perform the necessary structural studies to confirm that the school rooftops can withstand the weight of the installed PV system.	
	The Bidder agrees to bear full responsibility for any structural issues or damages that may arise in the future as a result of installing the PV system.	
	PV module specifications and warranty as indicated in the scope of work.	
	PV mounting structure specifications and warranty as indicated in the scope of work.	
	Hybrid inverters' specifications and warranty as indicated in the scope of work, all used inverters same size, and spare inverter will be provided.	
	Battery storage system specifications and warranty as indicated in the scope of work.	
	Automatic voltage regulator (AVR) power factor compensator (PFC) solution specifications and warranty as indicated in the scope of work.	
	DC and AC cables, conduits specifications and warranty as indicated in the scope of work.	
	AC Distribution boxes specifications and warranty as indicated in the scope of work.	
	Data logging & monitoring system specifications and warranty as indicated in the scope of work. The BOQ includes the cost for a wireless mobile internet connection subscription valid for three years to use for PV system monitoring purposes. The monitoring software is set up in such a way that both individual inverter performance as well whole PV system performance can be seen.	
	Shade analysis, PVsyst simulation results and tabulated energy yield for the lifetime for the project are provided.	

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Category	Subcategory	Yes/No
Overall AC requirements	The proposal includes the required interventions for classrooms, offices, and computer labs. In each of the 17 classrooms: • Install one two-ton inverter AC unit; • Install two ceiling fans; • Retrofit lighting using LED technology; • Install motion sensors for the lighting system; • Install window/door sensors to manage AC control; • Perform window maintenance. In each of the administrative offices classrooms: • Install one two-ton inverter AC unit; • Install one ceiling fan; • Retrofit lighting using LED technology; • Install motion sensors for the lighting system; • Install window/door sensors to manage AC control; • Perform window maintenance.	
AC Units	The Bidder commits to constructing a new electricity network incl. the installation of a dedicated breaker for each room, and a grounding system that is in accordance with Jordanian codes and standards..	
	Upon implementation, the Bidder commits to submit engineering designs, layouts, and drawings of the proposed electricity network (including but not limited to wiring, circuit breakers, protection fuses etc.) to the Client for approval prior to commencing works. All electricity network components shall comply with Jordanian codes and standards.	
	Requirements, technical specifications, and warranty of the AC units as indicated in the scope of work.	
Ceiling Fans	Requirements, technical specifications, and warranty of the ceiling fans as indicated in the scope of work.	

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Category	Subcategory	
Lighting System	Lighting system design is done in a way that guarantees that all school zones are supplied with adequate lighting suitable for their respective uses while using energy-efficient lighting technology	
	The Bidder commits to obtaining the Client's approval on fixtures and lamps quantities and distribution before installation.	
	The Bidder commits to conducting all wiring or installation works required, to be done according to local codes.	
	The Bidder specifies the name of the manufacturer the Bidder intends to use for the supply of each equipment material/light fitting etc. Manufacturer names are particularly specified for any item. Also, manufacturers selected by the Bidder have established agents in Jordan.	
	Requirements, technical specifications, and warranty of the lighting system solutions are provided as indicated in the "Scope of Work."	
	The table in section 7.1 is filled and included in the technical proposal.	
	Lighting Spart parts are included	
Window Maintenance	The Bidder commits to conducting general maintenance of all windows. This shall include, but not limited to, checking and repairing (when needed): • Weatherstripping and caulking to reduce air and water infiltration; • Air and water leakages; • All hardware (locks, opening/closing mechanisms, etc.); • Oiling for proper opening/closing mechanism and smooth operation; • If broken, replace window pane in a way that matches the existing panes; • Clean any sand, dirt or dust from window hinges, sills, and tracks.	
Testing & Commissioning	Upon completion of works, the Bidder commits to submitting two original hard copies and two soft copies including but not limited to: permits, as-built engineering and 3D drawings, 2D layouts, simulations, calculations, drawings, layouts, datasheets, certifications, datasheets, instruction, installation, operation, maintenance manuals and checklists, quality assurance/quality control plan, and health and safety plan.	
	The Bidder commits to carrying out PV system commissioning procedures according to "IEC 62446 standard."	
	The Bidder commits to placing warning signs at key areas near equipment.	
	The Bidder commits to cleaning up the project site prior to commissioning.	
	The Bidder commits to providing additional tests or testing equipment at its own expense as deemed necessary by the electricity distribution company or NERC/RSS for the PV system.	

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Category	Subcategory	
Training	The proposal includes a training plan containing all components and requirements as indicated in section 9.	
	Upon delivery of training, the successful Bidder commits to provide user/operation manuals as part of the training.	
Monitoring & Cleaning	The Bidder commits to monitoring the installed PV system energy yield and performance ratio against expected performance after the first, second, and third years from the operation date.	
	The successful Bidder commits to repair or modify the installed PV system at its own expense upon failure of achieving the proposed values within the maintenance period.	
	The Bidder provides a cleaning mechanism that includes a cleaning schedule and approximation of water consumption.	
	The Bidder commits to providing PV system cleaning services for 3 years following the acceptance date.	
	The Bidder has included the price for the necessary cleaning tools in the BOQ and commits to ensuring that the cleaning tools are in good condition following the 3-year maintenance, monitoring, and cleaning period.	
	The Bidder shall also include the price for a dedicated water tanks, water pump and pressure cleaner (that may be adjusted to 35 bar (500 psi) at the nozzle) to use for PV system cleaning in the BOQ.	

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Category	Subcategory	
Maintenance	The Bidder provides a Maintenance Guarantee valid for 3 years.	
	The Bidder includes PV system cleaning as part of maintenance services.	
	The Bidder includes a detailed maintenance plan including a maintenance checklist and technical support.	
	The Bidder commits to replacing any system component for any of the interventions that requires replacement during the warranty period.	
	The Bidder includes a troubleshooting methodology and contact information for an emergency/response contact.	
	The Bidder specifies the response periods indicated in section 11.5.	
Method of Payment	The Bidder agrees to the method of payment indicated in section 13.	
Contract Period and Penalties	The Bidder commits to delivering the interventions (i.e. operation date) within 3 months from the commencement date of works.	
	The Bidder is aware of the delay liquidated damage (DLD) equal to 150 Euro/day for every unjustified delay.	
	The Bidder commits to 3 years for maintenance, monitoring, and cleaning from the acceptance date.	
	The Bidder commits to 3 years of system warranty and energy yield performance guarantee from the acceptance date.	
	The Bidder commits to providing lighting system spare parts as part of the Contract.	
	The Bidder commits to replace any components of the provided interventions that require replacement during the warranty period at its own expense.	

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