

Tender Documents for:

Increasing Access and Planning of Efficient
Cooling Solutions in Jordan Project

*Efficient Cooling Solutions for Public Schools in
Jordan*

June 2022

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Definitions

Item	Description
Acceptance Date	The date that the interventions are officially accepted by the Client/Beneficiary through GJU's 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.
AC	Air conditioning system
Bid	The proposal submitted in response to the present tender.
Bidder	The party submitting a proposal in response to the present tender.
BOQ	Bill of quantities
Client/Beneficiary	German Jordanian University (GJU), with the Ministry of Education 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 of the Contract - successful bidder.
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.
Documents	The documents defined in the Contract and which form an integral part of the Contract.
EDCO	Electricity Distribution Company.
EMRC	Energy and Minerals Regulatory Commission.
GJU	The German Jordanian University; implementer of the Project.
Ministry	The Ministry of Education; also the "beneficiary."
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 commissioning from the responsible electricity distribution company.

Project	Increasing Access and Planning of Efficient Cooling Solutions in Jordan Project
PV	Photovoltaic system
USD	U.S. Dollar
Works	Any and all obligations and activities to be performed by the Contractor in order to comply with the conditions of the Contract, including all activities of engineering, procurement, installation/construction, testing, commissioning, operation, and maintenance.

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. ClimateWorks Foundation

ClimateWorks Foundation is a U.S.-based nonprofit organization founded in 2008. ClimateWorks Foundation's mission is to slow global warming by funding other organizations internationally to help find best practice solutions to cut down on carbon dioxide emissions. Since 2008, ClimateWorks has granted over \$1 billion to more than 500 grantees in over 40 countries.

1.3. Overview

The present project, funded by the ClimateWorks Foundation and implemented by GJU, aims at increasing access and planning of efficient cooling solutions in Jordan. This is through the uptake of efficient, low carbon cooling solutions as innovative pilots in public schools. To that end, this tender call is related to the installation of efficient cooling solutions at three public schools in Jordan: a) Qali'at High School for Girls, b) Shaikh Hussain High School for Girls, and c) Wadi Mousa High School for Boys.

1.3.1. Qali'at High School for Girls

Qali'at High School for Girls is located in the north of the Jordan Valley. The location on Google Maps and a satellite image of the school is shown in Figure 1. The school consists of four buildings with a total area of 1563.75 m². It contains a total of 14 classrooms and 3 laboratories. The building is typically operational during the government-mandated academic year, which runs from August 25 to June 20, encompassing 300 calendar days

and 205 workdays (excluding weekends and public holidays). On weekdays, the building is open from 7:40 a.m. to 2:00 p.m., while it is closed on weekends and holidays.



Figure 1: Location of Qali'at High School for Girls.

The school's current annual electricity consumption is approximately 14,940 kWh. The school has a 3-phase electricity meter and is served by Electric Distribution Company (EDCO). As this present tender includes the supply of interventions that would increase the electrical energy consumption, the school's expected annual energy consumption will approximately become 53,340 kWh.

The Project is looking to provide the following interventions at Qali'at High School:

A. On-grid photovoltaic (PV) system with a capacity of 25 kWp.

The PV system shall include:

1. PV modules
2. PV mounting structure
3. On-grid inverters
4. DC and AC cables & conduits
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 performance ratio.
8. Newly established AC and DC grounding systems according to distribution company requirements.
9. 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. Air conditioning (AC) system with a total capacity of 32 ton (2 ton per AC unit).
- C. Rooftop insulation
- D. Ceiling Fans - 16 units.

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

1.3.2. Shaikh Hussain High School for Girls

Shaikh Hussain High School for Girls is located in the north of the Jordan Valley. The location on Google Maps and a satellite image of the school is shown in Figure 2. The school consists of five buildings with a total area of 1989.28 m². It contains a total of 19 classrooms, 4 laboratories, 1 workshop, and 1 library. The building is typically operational during the government-mandated academic year, which runs from August 25 to June 20, encompassing 300 calendar days and 205 workdays (excluding weekends and public holidays). On weekdays, the building is open based on a two-shift system (mornings and evenings), while it is closed on weekends and holidays.

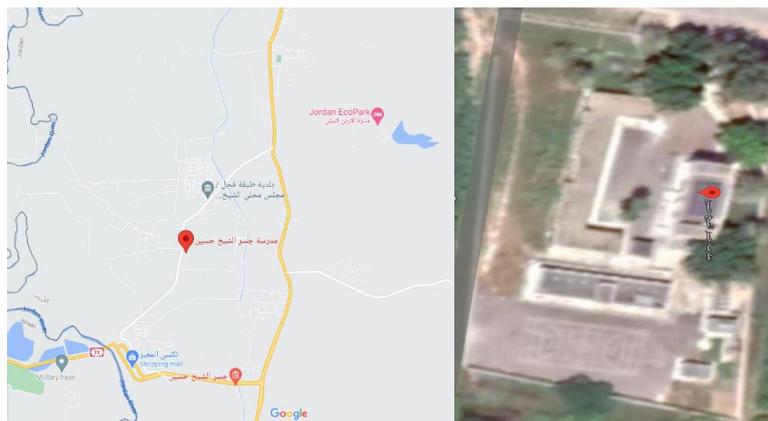


Figure 2: Location of Shaikh Hussain High School for Girls.

The school's current annual electricity consumption is approximately 17,511 kWh. The school has a 3-phase electricity meter and is served by EDCO. As this present tender includes the supply of interventions that would increase the electrical energy

consumption, the school's expected annual energy consumption will approximately become 65,511 kWh.

The Project is looking to provide the following interventions at Shaikh Hussain High School:

A. PV system with a capacity of 32 kWp.

The PV system shall include:

1. PV modules
2. PV mounting structure
3. On-grid inverters
4. DC and AC cables & conduits
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 performance ratio.
8. Newly established AC and DC grounding systems according to distribution company requirements.
9. 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. AC system with a total capacity of 40 ton (2 ton per AC unit).

C. Rooftop insulation

D. Ceiling Fans - 20 units.

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

1.3.3. Wadi Mousa High School for Boys

Wadi Mousa High School for Boys is located in the village of Wadi Mousa in Ma'an Governorate. The location on Google Maps and a satellite image of the school is shown in

Figure 3. The school consists of 1 building with a total area of 3035.8 m². It contains a total of 13 classrooms, 7 laboratories, 5 administrative staff rooms, and 1 library. The building is typically operational during the government-mandated academic year, which runs from August 25 to June 20, encompassing 300 calendar days and 205 workdays (excluding weekends and public holidays). On weekdays, the building is open from 7:00 a.m. to 2:00 p.m., while it is closed on weekends and holidays.



Figure 3: Location of Wadi Mousa High School for Boys.

The school's current annual electricity consumption is approximately 17,430 kWh. The school has a 3-phase electricity meter and is served by EDCO. As this present tender includes the supply of interventions that would increase the electrical energy consumption, the school's expected annual energy consumption will approximately become 42,930 kWh.

The Project is looking to provide the following interventions at Wadi Mousa High School for Boys:

A. PV system with a capacity of 16 kWp.

The PV system shall include:

1. PV modules
2. PV mounting structure
3. On-grid inverters
4. DC and AC cables & conduits
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 performance ratio.
8. Newly established AC and DC grounding systems according to distribution company requirements.
9. 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. AC system with a total capacity of 34 ton (2 ton per AC unit).
- C. Rooftop insulation.
- D. Ceiling Fans - 17 units.

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.
- 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, operation, maintenance, monitoring, and cleaning. Failure to submit any of these requirements will result in the disqualification of the Bidder.
- 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.
- 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 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.**
- 2.16.** 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.
- 2.17.** The awarded Contractor must coordinate with the Ministry of Education's designated directorate (إدارة الأبنية والمشاريع الدولية) throughout the implementation of the works.
- 2.18.** Bidders must complete, sign, and stamp the compliance sheets provided in the Annexes.

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 similar projects in the last 2 years with at least one project of similar scope and size that has been executed and is operational.

- 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 performance ratio of the PV system 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;

- Completed, signed, and stamped compliance sheets provided in the Annexes of this tender document;
- Financial proposal: prices of all components of the proposed solutions in the form of a BOQ. The BOQ shall be in USD, 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;
- 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.** An electronic copy on a CD must be submitted that includes all hardcopy documents and submittals.

7. Scope of Work

Efficient cooling solutions for Qali'at High School for Girls, Shaikh Hussain High School for Girls, and Wadi Mousa High School for Boys. 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. Qali'at High School for Girls

The following describes the specifications of the required interventions.

- A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 20kW and close to the minimum PV capacity of 25 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 fulfill the following (or be 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.
- 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.
- Aluminum alloy in compliance with Jordanian Standards (م ق ا \ 380-2 \ 2003).
- The connections must be “High Strength Bolts according to ISO 898-1 Standard Grade 8.8”.
- The anodizing coating of the aluminum profile shall be according to the British Standards (BS 1615) and level of (Grade AA15) 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.

4. PV/AC Cables & Conduits

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

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

A. Air Conditioning (AC) system with a total capacity of 32 ton (2 ton per 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 maintain 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 to the unit. 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. The Contractor shall install two appropriate main breakers: one connected to the existing electrical network and one connected to a new appropriate electric panel that supplies the new AC network. 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. PVC pipes must be used 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.

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:

- A. قفص حماية معدني مطلي بطلاء حراري لحماية الوحدات الخارجية.
- B. 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 بالإضافة لكافة العناصر الكهربائية اللازمة لحماية وتنظيم الوحدة وبغلاف خارجي من النوع الثقيل heavy gauge والمعالج ضد عوامل الطقس لتتركب فوق سطح المبنى أو على الجدار الخارجي.
- C. القواعد المصنوعة من زوايا الحديد وذات أبعاد مناسبة لتثبيت الوحدات الخارجية عليها وتكون أبعاد الزوايا (50*50*5 ملم) ومدهونة بدهان حراري Powder coating مع تركيب موانع اهتزاز والسعر يشمل أيضا الحملات وقواعد التعليق المناسبة لأجزاء الوحدة الداخلية.
- D. 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.
- E. 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.
- F. 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 ابتداء من 20 ملم ولغاية 32 ملم وحسب طبيعة وعدد الوحدات المربوطة مع بعضها البعض.

G. سليفات UPVC لأماكن اختراق المواسير للجدران والعقدات للتوصيل بين أجزاء الوحدة الداخلية والخارجية بالأقطار المناسبة على أن لا تقل عن 75 ملم.

H. 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

I. التوصيلات الكهربائية بين أجزاء الوحدة الداخلية والخارجية بحيث تكون جميع خطوط التغذية الكهربائية لوحدة التبريد وملحقاتها حسب قدرة الوحدات ومتناسبة فنياً.

J. الغاز المستخدم R32.

K. فحص من الجمعية العلمية الملكية على مواصفة T1 (2 ton at 35°C)

L. تتم جميع هذه الأعمال تحت إشراف المهندس المسؤول بحسب المواصفات العالمية (ASHRAE CODE).

B. Rooftop insulation.

ويتمثل النظام: (1) طبقة من البوليسترين المضغوط (2) مغطاة بطبقة من النايلون سماكة 250 ميكرون، ثم (3) طبقة ميلان من الخرسانة الخفيفة الرغوية (10سم و 4) طبقة 5سم من السكريد ثم (5) عازل مائي لحماية لسطح والحفاظ عليه.

أ- ألواح العزل الحراري (البوليسترين) (Extruded Polystyrene Boards)

- يتم تقديم الواح البوليسترين المضغوط المقفل المسام (Extruded) بسماكة 5سم. وكثافة لا تقل عن (32-35) كغم/م³ أو ما يماثلته طبقاً للمواصفات و بعد موافقة فريق الاشراف.
- يجري صف الواح البوليسترين بحيث تلتصق جيداً بعضها مع بعض (بطريقة التعشيق) وبالسقف. ثم تغطي بنايلون البولي إيثيلين سماكة 250 ميكرون بعد ذلك تنفذ مدة (صبه) الميلان والطبقات المانعة للرطوبة حسب المواصفات وحسب ما هو مذكور ادناه.
- يتم تنفيذ الأعمال بواسطة عمال وفنيين مهرة لهم خبرة ودراية يمثل هذه الأعمال.
- يجب على المقاول مراعاة تعليمات الشركة الصانعة للمواد العازلة بالنسبة للتخزين، وتنفيذ الأعمال، والحماية، وما شابه ذلك، ويتم تزويد فريق الاشراف بنسخة أصلية من مواصفات الشركة الصانعة ونشراتها الفنية.
- يجب أن تخزن المواد العازلة بطريقة تضمن عدم حدوث أي تلف (مهما كان نوعه) أو تحلل فيها وتحميها من الرطوبة.

ب- اعمال مدات (صبية) الميلان (Roofing Screeds)

تتكون أعمال صبة الميلان للسطح من طبقتين: (1) الخرسانة الرغوية (Foam concrete) بسماكة لا تقل عن 5 سم، (2) وتغطي طبقة اضافية 5سم من الخرسانة العادية (Topping) ذات سطح ناعم ومستوي ومصقول تمهيداً لاستقبال طبقة العزل المائي. وبحيث لا يقل الميل الكلي عن 1%، مع عمل تثمينه على المحيط مقطع 15x15 سم وتنفيذ الاعمال بالطريقة والمواصفات المبينة أدناه. ويتم الكيل هندسياً للمساحة الأفقية فقط.

تنفيذ أعمال مدات الميلان للأسطح:

- (1) تنظف السطوح المراد تغطيتها بمدة الميلان تنظيفاً جيداً من كل أثر للأوساخ العالقة، أو الغبار، أو الزيوت، أو الشحوم أو غيرها من المواد الضارة.
- (2) يلتزم المقاول بتنظيف سطح الخرسانة جيداً وقص أي زوائد من الحديد وتجهيز السطح حسب ما يلزم قبل بدء التنفيذ.
- (3) تحديد المناسيب والميول والسماكات المطلوبة لمدة الميلان بشكل دقيق.
- (4) تعمل ودعات عند الأطراف وعلى مسافات متساوية في الوسط بحيث لا تزيد المسافة بين الودعة والودعة عن أربعة أمتار، على أن يتم تحديد الميول والسماكات باستخدام هذه الودعات.
- (5) يتم صب الخرسانة فور خلطها، ويسوي سطحها باستخدام القدة المناسبة للغرض.

- (6) تعمل حواف الخرسانة العادية في مدات الميلان عند التقائها بالجدران مائلة بما لا يقل عن (45) درجة عن الأفقي وبارتفاع لا يقل عن (150) ملمتر، ويسوى سطح الحافة المائلة جيدة ويتم تنعيمه حسب الاصول
- (7) لا يجوز البدء باي طبقة قبل استلام مبدئي للطبقة أو الخطوة السابقة من قبل فريق الاشراف.

مواصفات الطبقات المطلوبة:

1) مدات الميلان من الخرسانة الرغوية:

- (1) يكون الركام الخفيف الوزن المستعمل في صناعة خرسانة الركام الخفيف مطابقا للمواصفات القياسية الاردنية (م ق أ / 979)
- (2) تكون الرغوة المستعملة في صناعة الخرسانة الرغوية مطابقة للمواصفات القياسية الأميركية رقم (ASTM-C 869).
- (3) تكون المواد الأخرى المستعملة في صناعة الخرسانة الرغوية كالأسمنت والماء والمضافات مطابقة لما ورد في هذا الخصوص في (كودة الخرسانة العادية والمسلحة) من كودات البناء الوطني الأردني.
- (4) لا تقل سماكة مدة الميلان من الخرسانة الرغوية عن (50) ملمتر عند نقطة السماكة الدنيا ولا يقل ميلها عن (1%) بالمائة، وبكثافة كلية 450 كغم/م³ (+ - 50 كغم / م³).
- (5) يتم صب مدة الميلان في الاحوال الجوية المعتدلة غير الماطرة.
- (6) يكون سطح مدة الميلان ناعما، وخاليا من النتوءات
- (7) يتم اصلاح وترميم جميع السطوح التي لحقها ضرر نتيجة العوامل الجوية أو غيرها وذلك قبل البدء بتنفيذ اعمال الطبقات المانعة للرطوبة.
- (8) يحظر البدء بعمليات تنفيذ الطبقات الأخرى (الخرسانة العادية) قبل مضي اربعة ايام على الانتهاء من ايناع طبقة الخرسانة الخفيفة.

2) الخرسانة العادية:

- (1) تغطي طبقة الخرسانة الرغوية بطبقة الخرسانة العادية و المكونة من الركام العادي والاسمنت البورتلاندي والماء، وحسب المواصفات المذكورة
- (2) لا تقل درجة الخرسانة العادية المستعملة عن (10) [لا تقل مقاومة كسرها بالضغط عن (10) نيوتن / ملمتر مربع] ولا يقل محتوى الاسمنت فيها عن (200) كيلو غراما للمتر المكعب الواحد.
- (3) لا تقل سماكة طبقة الخرسانة العادية المستخدمة لأعمال مدات الميلان على السقوف عن (50) ملمترا لجميع النقاط.
- (4) تم صب طبقة الخرسانة العادية في الأحوال الجوية المعتدلة غير الماطرة، والصالحة للقيام بتنفيذ هذه الأعمال دون اعاقه أو ضرر
- (5) يتم اصلاح وترميم جميع الأعمال التي لحقها ضرر نتيجة للعوامل الجوية او غيرها وذلك قبل البدء بتنفيذ اعمال الطبقات المانعة للرطوبة
- (6) يكون سطح مدة الميلان من الخرسانة العادية ناعما خاليا من النتوءات صالحا لتنفيذ اعمال الطبقات المانعة للرطوبة عليه.

3) العزل المائي:

- (1) ماده عازله مشابهه او أفضل من
Setseal B: Elastomeric acrylic cement modified waterproof coating
- (2) يتم وضع العازل المائي حسب تعليمات الشركة الصانعة.
- (3) يجب عمل فحص مائي قبل التسلي

ج. قواعد الكيل

- (1) تكال جميع الاعمال كيلا هندسيا بالمتر المربع لواقع الاعمال التي جرى تنفيذها في الموقع بعد حسم جميع الفراغات والفتحات والثغرات التي تزيد مساحتها عن (0.5) مترا مربعا وذلك طبقا للسماكات و المواصفات المحددة و المذكورة.
- (2) تكال اعمال مواد العزل السائبة كيلا هندسيا أما بالمتر المربع، او بالمتر المكعب، حسبما يرد في جدول الكميات، وذلك لواقع الاعمال التي جرى تنفيذها فعلا بعد حسم جميع الفراغات والفتحات التي تزيد مساحتها عن (0.5) مترا مربعا عندما يكون الكيل بالمتر المربع، أو يزيد حجمها عن (0.2) مترا مكعبا عندما يكون الكيل بالمتر المكعب.

C. Ceiling fans - 16 units.

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.

7.2. Shaikh Hussain High School for Girls

Below is a summary of the required interventions at this school. Please refer to the section above (section 7.1) for more details on the required specifications.

- B. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 26kW and close to the minimum PV capacity of 32 kWp.
- A. AC system with a total capacity of 40 ton (2 ton per AC unit).
- B. Rooftop insulation
- C. Ceiling Fans - 20 units.

7.3. Wadi Mousa High School for Boys

Below is a summary of the required interventions at this school. Please refer to the section above (section 7.1) for more details on the required specifications.

- A. On-grid photovoltaic (PV) system with ratings close to the minimum inverter size of 14kW and close to the minimum PV capacity of 16 kWp.
- B. AC system with a total capacity of 34 ton (2 ton per AC unit).
- C. Rooftop insulation
- D. Ceiling Fans - 17 units.

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, 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 GJU, 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 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 against expected performance as simulated on PVsyst using 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 dedicated water tanks, easy press water pump and pressure cleaner (that may be adjusted to 35 bar - 500 psi - at the nozzle), and any necessary plumbing 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.

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/Beneficiary. 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 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.

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 energy yield performance bond have been entered.

14. Contract Period and Penalties

- 14.1.** 4 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 equal to 200 USD/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.** 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.

Annex 1: Compliance Sheet for Qali’at High School for Girls

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 at the Bidder’s own expense.	
	The proposal includes the full design, installation, training, operation, maintenance, monitoring, and cleaning.	
	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, 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.	
Tender Format	The Bid contains all components and documents indicated in section 4.	

Category	Subcategory	Yes/No
Tender Bonds	<p>The bid includes a tender bond not less than 3% of the Contract sum. This guarantee is:</p> <ul style="list-style-type: none"> ● 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. <p>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.</p>	
Proposal Submission	Two copies of the technical and financial proposals are provided.	
	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 must have the 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.	
	The PV system includes an irradiance sensor connected to a data logger integrated with the inverter to calculate the performance ratio.	
Shade analysis, PVsyst simulation results and tabulated energy yield for the lifetime for the project are provided.		

Category	Subcategory	Yes/No
AC System	All AC units shall be electrified from a new electric network all the way from the main electric distribution panel to the unit. 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. The Contractor shall install two appropriate main breakers: one connected to the existing electrical network and one connected to the new AC network.	
	Requirements, technical specifications, and warranty of the AC units as indicated in the scope of work.	
	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.	
Rooftop Insulation	Requirements and technical specifications as indicated in the scope of work section.	
Ceiling Fans	Requirements and technical specifications as indicated in the scope of work section.	
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, datasheets, certifications, manufacturing warranties, instruction, installation, operation, and 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 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.	
Energy Yield Performance Bonds	If awarded, the Contractor must submit an energy yield performance bond not less than 10% of the Contract sum once the project is completed and before the acceptance from the Client/Beneficiary. It shall be valid for 3 years from project completion and acceptance from the Client.	
	If awarded, the Contractor shall monitor the installed PV system energy yield and performance ratio against expected values. If values are found lower, the Client has the right to apply performance liquidated damages.	
Method of Payment	The Bidder agrees to the method of payment indicated in section 13.	
Contract Period and Penalties	The Bidder commits to 4 months for the design, installation, testing, and training of the required interventions.	
	The Bidder is aware of the delay liquidated damage equal to 200 USD/day for every day of unjustified delay.	
	The Bidder commits to 3 years for maintenance, monitoring, and cleaning (when applicable) 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 replace any components of the provided interventions that require replacement during the warranty period at its own expense.	

Annex 2: Compliance Sheet for Shaikh Hussain High School for Girls

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 at the Bidder's own expense.	
	The proposal includes the full design, installation, training, operation, maintenance, monitoring, and cleaning.	
	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, 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.	
Tender Format	The Bid contains all components and documents indicated in section 4.	

Category	Subcategory	Yes/No
Tender Bonds	<p>The bid includes a tender bond not less than 3% of the Contract sum. This guarantee is:</p> <ul style="list-style-type: none"> ● 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. <p>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.</p>	
Proposal Submission	Two copies of the technical and financial proposals are provided.	
	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 must have the 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.	
	The PV system includes an irradiance sensor connected to a data logger integrated with the inverter to calculate the performance ratio.	
Shade analysis, PVsyst simulation results and tabulated energy yield for the lifetime for the project are provided.		

Category	Subcategory	Yes/No
AC System	All AC units shall be electrified from a new electric network all the way from the main electric distribution panel to the unit. 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. The Contractor shall install two appropriate main breakers: one connected to the existing electrical network and one connected to the new AC network.	
	Requirements, technical specifications, and warranty of the AC units as indicated in the scope of work.	
	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.	
Rooftop Insulation	Requirements and technical specifications as indicated in the scope of work section.	
Ceiling Fans	Requirements and technical specifications as indicated in the scope of work section.	
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, datasheets, certifications, manufacturing warranties, instruction, installation, operation, and 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 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.	
Energy Yield Performance Bonds	If awarded, the Contractor must submit an energy yield performance bond not less than 10% of the Contract sum once the project is completed and before the acceptance from the Client/Beneficiary. It shall be valid for 3 years from project completion and acceptance from the Client.	
	If awarded, the Contractor shall monitor the installed PV system energy yield and performance ratio against expected values. If values are found lower, the Client has the right to apply performance liquidated damages.	
Method of Payment	The Bidder agrees to the method of payment indicated in section 13.	
Contract Period and Penalties	The Bidder commits to 4 months for the design, installation, testing, and training of the required interventions.	
	The Bidder is aware of the delay liquidated damage equal to 200 USD/day for every day of unjustified delay.	
	The Bidder commits to 3 years for maintenance, monitoring, and cleaning (when applicable) 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 replace any components of the provided interventions that require replacement during the warranty period at its own expense.	

Annex 3: Compliance Sheet for Wadi Mousa High School for Boys

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 at the Bidder's own expense.	
	The proposal includes the full design, installation, training, operation, maintenance, monitoring, and cleaning.	
	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, 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.	
Tender Format	The Bid contains all components and documents indicated in section 4.	

Category	Subcategory	Yes/No
Tender Bonds	<p>The bid includes a tender bond not less than 3% of the Contract sum. This guarantee is:</p> <ul style="list-style-type: none"> • 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. <p>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.</p>	
	<p>Two copies of the technical and financial proposals are provided.</p>	
Proposal Submission	<p>An electronic copy on a CD containing all submittals was provided.</p>	
	<p>The Bidder commits to involving a Ministry of Education representative before commencing works to inspect the current condition of the rooftop insulation.</p>	
PV System	<p>The Bidder commits to perform the necessary structural studies to confirm that the school rooftops can withstand the weight of the installed PV system.</p>	
	<p>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.</p>	
	<p>PV module specifications and warranty as indicated in the scope of work.</p>	
	<p>PV mounting structure specifications and warranty as indicated in the scope of work.</p>	
	<p>On-grid inverters' specifications and warranty as indicated in the scope of work; all used inverters must have the same size.</p>	
	<p>DC and AC cables & conduits specifications and warranty as indicated in the scope of work.</p>	
	<p>AC distribution boxes specifications and warranty as indicated in the scope of work.</p>	
	<p>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.</p>	
	<p>The PV system includes an irradiance sensor connected to a data logger integrated with the inverter to calculate the performance ratio.</p>	
	<p>Shade analysis, PVsyst simulation results and tabulated energy yield for the lifetime for the project are provided.</p>	

Category	Subcategory	Yes/No
AC System	All AC units shall be electrified from a new electric network all the way from the main electric distribution panel to the unit. 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. The Contractor shall install two appropriate main breakers: one connected to the existing electrical network and one connected to the new AC network.	
	Requirements, technical specifications, and warranty of the AC units as indicated in the scope of work.	
	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.	
Rooftop Insulation	Requirements and technical specifications as indicated in the scope of work section.	
Ceiling Fans	Requirements and technical specifications as indicated in the scope of work section.	
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, datasheets, certifications, manufacturing warranties, instruction, installation, operation, and 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 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.	
Energy Yield Performance Bonds	If awarded, the Contractor must submit an energy yield performance bond not less than 10% of the Contract sum once the project is completed and before the acceptance from the Client/Beneficiary. It shall be valid for 3 years from project completion and acceptance from the Client.	
	If awarded, the Contractor shall monitor the installed PV system energy yield and performance ratio against expected values. If values are found lower, the Client has the right to apply performance liquidated damages.	
Method of Payment	The Bidder agrees to the method of payment indicated in section 13.	
Contract Period and Penalties	The Bidder commits to 4 months for the design, installation, testing, and training of the required interventions.	
	The Bidder is aware of the delay liquidated damage equal to 200 USD/day for every day of unjustified delay.	
	The Bidder commits to 3 years for maintenance, monitoring, and cleaning (when applicable) 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 replace any components of the provided interventions that require replacement during the warranty period at its own expense.	

