التاريخ:٢٠٢٥/١٢/٢٢
الرقم: ص٢/٢٠١٦/٢٠٢٥

رابطة الجامعيين / محافظة الخليل
جامعة بوليتكنك فلسطين
لجنة العطاءات المركزية
كراسة الشروط والمواصفات الفنية لعطاء
توريد اجهزة ومعدات كفاءة الطاقة والطاقة المتجددة
ضمن مشروع مزيد من فرص العمل ٢
والممول من مؤسسة التعاون الألماني GIZ

عطاء رقم: ص٢/٢٠١٦/٢٠٢٥

ثمن الكراسة مبلغ (100 يورو)

(مائة يورو)

استلام كراسة الشروط ابتداء من يوم الاثنين الموافق ٢٠٢٥/١٢/٢٢

تسليم الكراسة يوم الثلاثاء الموافق ٢٠٢٦/٠١/٠٦

مع أطيب أمنيات

مدير دائرة العطاءات والمشتريات

الأستاذ: "محمد رياض" سعدي أبوزينة

direc-purch@ppu.edu

المحتويات :

إعلان عن عطاء

توريد اجهزة ومعدات كفاءة الطاقة والطاقة المتجددة

ضمن مشروع مزيد من فرص العمل ٢

ممول من مؤسسة التعاون الألماني GIZ

الرقم: ٢٠٢٥/٢/2016

تعلن رابطة الجامعين/ جامعة بوليتكنك فلسطين عن طرح عطاء توريد اجهزة ومعدات كفاءة الطاقة والطاقة المتجددة ضمن مشروع مزيد من فرص العمل ٢ والممول من مؤسسة التعاون الألماني GIZ، ضمن الشروط والمواصفات الموضحة في كراسة وثائق العطاء، فعلى الشركات الراغبة بالدخول في العطاء إتباع الآتي: -

١. استلام الكراسة كاملةً من دائرة من العطاءات والمشتريات المركزية في مقر الجامعة/ ضاحية البلدية، **مقابل دفع مبلغ (100 يورو) مائة يورو غير مستردة تودع في حساب رابطة الجامعيين والجامعة رقم ٣٠٣٠٠ في البنك الإسلامي الفلسطيني اعتباراً من يوم الاثنين الموافق ٢٠٢٥/١٢/٢٢**
٢. إرفاق شيك بنكي أو كفاله بنكية بقيمة ٥٪ من قيمة العطاء وبظرف منفصل، على أن تكون الكفالة البنكية سارية المفعول لمدة لا تقل عن مئة وعشرين يوماً.
٣. تسليم كراسة العطاء مع كافة التفاصيل بالظرف المختوم **حتى الثانية عشرة ظهرا من يوم الثلاثاء الموافق ٢٠٢٦/٠١/٠٦ لدائرة العطاءات والمشتريات المركزية – رابطة الجامعيين.**
٤. الأسعار باليورو معفاة من ضريبة القيمة المضافة.
٥. الرجاء إرفاق صورة عن الفواتير الرسمية وشهادة خصم مصدر سارية المفعول مع العطاء.
٦. لجنة العطاءات غير ملزمة بقبول أقل الأسعار، وبدون إبداء الأسباب ويحق لها تجزئة العطاء.

لمزيد من الاستفسار يمكن الاتصال مع الدكتور مكاوي حريز على الرقم ٠٥٩٨٣١٢١١٨ خلال اوقات الدوام الرسمي.

ملاحظة: – أجور الإعلان على من يرسو عليه العطاء

مدير دائرة العطاءات والمشتريات

الأستاذ محمد رياض سعدي أبو زينة

الملاحظات العامة لعطاء

توريد اجهزة ومعدات كفاءة الطاقة والطاقة البديلة

الرقم: ص٢/٢٠٢٥/٢٠١٦

يرجى مراعاة الآتي :-

١. يجب أن يكون المتقدم للعطاء شركة متخصص في مجال التوريدات الكهربائية وانظمة الطاقة المتجددة.
٢. الأسعار **باليورو معفاة من** ضريبة القيمة المضافة.
٣. الأسعار شاملة التوريد والتركيب والتجهيز والتشغيل.
٤. يجب ان تكون جميع الأجهزة والمعدات مطابقة للمواصفات الأوروبية.
٥. تحديد مدة الكفالة لجميع الاجهزة والمعدات.
٦. ارفاق الكتالوجات الخاصة بالأجهزة والمعدات.
٧. صيانة مجانية وخدمات الدعم الفني لمدة سنة مجانا.
٨. خاص بالبند رقم (٦) يشمل لسعر التدريب على استخدام هذه التجهيزات داخل مقر الشركة ومحطات الطاقة الشمسية.
٩. الرجاء إرفاق شهادة خصم مصدر سارية المفعول مع العطاء
١٠. تلتزم الشركة بالتوريد حسب ما يتم الاتفاق عليه في الاتفاقية الموقعة بين الطرفين.
١١. لجنة العطاءات غير ملزمة بقبول أقل الأسعار، وبدون إبداء الأسباب.
١٢. يكون السعر وفقاً للشروط الواردة في كراسة العطاء.
١٣. الإعلان بالجريدة وكراسة الشروط الفنية للعطاء والاتفاقية وحدة واحدة وتقرآن معاً.
١٤. للجنة العطاءات الحق في زيادة او إنقاص بعض الكميات
١٥. للجنة العطاءات الحق في تجزئة العطاء
١٦. أجور الإعلان على من يرسو عليه العطاء.

تعهد وإقرار

أنا الموقع اسمي أدناه / قرأت الشروط واطلعت على المواصفات والبنود والتزمت بها التزاماً كاملاً وألتزم بالأسعار المقدمة من قبلي لمدة (١٢٠) يوماً من اليوم الذي يلي فتح العطاء، وأتعهد بتقديم براءة ذمة "خصم مصدر" من ضريبة الدخل سارية المفعول ومرفقة بالفاتورة الرسمية كما تعتبر هذه الثبوتيات أساسا لدفع المستحقات اللازمة للمورد، كما أتعهد بتوريد وتركيب وتشغيل الأجهزة المطلوبة لجامعة بوليتكنك فلسطين، وبناءاً على ذلك تمت المصادقة والتوقيع.

السادة / الشركة:_____

رقم المشغل المرخص:_____

العنوان:_____

رقم الهاتف:_____

رقم الفاكس:_____

الايميل : _____

التوقيع والخاتم

تعليمات للمشاركين بعطاء

توريد اجهزة ومعدات كفاءة الطاقة والطاقة المتجددة

الرقم: ص٢/٢٠٢٥/٢٠١٦

حضرات السادة : شركة_____ المحترمين

للمشاركة في العطاء ما يلي:-

١. تعتبر مقدمة كراسة الشروط والمواصفات وإعلان الجريدة جزءا لا يتجزأ وتقران معا.
٢. يجب على صاحب العطاء التوقيع على وثائق العطاء كما يجب ختم العرض وكافة مرفقاته بخاتم صاحب العطاء.
٣. لايعتمد أي تعديل في الكراسة بسبب ما يدونه المتقدم من اشتراطات، ما لم تقبل بها لجنة العطاءات المركزية.
٤. يجب على الشركة أن يضع أسعاره رقماً وكتابة على النموذج ويرفض أي عرض يحدث فيه المتقدم تشويشاً في أسعاره ، واللجنة غير مسؤولة عن أية أخطاء قد يرتكبها المتقدم في وضع الأسعار.
٥. مدة صلاحية الأسعار (١٢٠) يوماً من ثاني يوم من فتح العطاء على الأقل.
٦. على كل مناقص أن يرفق بالعطاء – لصالح رابطة الجامعين– تأمينا للدخول في العطاء كفالة بنكية أو شيك مصدق من قبل البنوك المحلية بقيمة ٥٪ خمسة بالمائة من قيمة عرضه ولا ينظر في العروض الغير معززة بتلك التأمينات.
٧. في حالة تأخير المورد عن الاعمال المحالة عليه تحسب غرامات التأخير بنسبة 1.5%، عن كل يوم تأخير، ومصادرة قيمة التأمين المرفق بالعطاء وقيده إيرادا للرابطة.
٨. لاحقا لبند رقم (٧) تقوم لجنة العطاءات المركزية بتنفيذ العطاء مباشرةً بالأسعار والشروط والطريقة المناسبة، من السوق المحلي مضافاً إليه (15%) من ذلك الفرق كنفقات إدارية.
٩. عدم وجود أي تحفظات لها علاقة بسعر صرف العملات الأجنبية ويجب أن تكون الأسعار ثابتة حتى إتمام الالتزامات الفنية للمناقص في البند وصرف المستحقات وسيتم استبعاد أي عرض يوجد به تحفظات مرتبطة بأسعار صرف العملات الأجنبية.
١٠. يقدم العرض على النموذج أدناه ولا يحق إدخال أية تعديلات على وثائق العطاء. وإذا رغب الشركة تقديم ملاحظات أو عرض بديل عليه تقديم ذلك بمذكرة خاصة منفصلة شريطة تقديم العرض الأصلي كما هو، ولرابطة الجامعيين حق النظر بالمذكرة أو رفضها.
١١. تكون المحاسبة وصرف جميع المستحقات للمناقص حسب الاتفاقية الموقعة بين الطرفين.

١٢. لا يجوز تحميل بند على بند آخر ولرابطة الجامعيين الخيار في إلغاء أي بند وتبقى أسعار البنود الأخرى ملزمة للمتزايد.

١٣. تعتبر الشروط العامة والفنية المطبقة في النظام العام للمشتريات جزاءا مكملا لهذه الشروط في عطاءات رابطة الجامعيين.

١٤. يجوز للمناقص سحب عرضه بمذكرة موقعة منه وتودع في صندوق العطاءات قبل الموعد المحدد لفتح العطاء.

١٥. لا يجوز لصاحب العطاء التعديل أو المحو أو الطمس في قائمة الأسعار وأي تصحيح يجريه صاحب العرض عليها يجب إعادة كتابته رقماً وكتابة والتوقيع عليه وختمه.

١٦. إذا بلغت فئات الأسعار التي جرى عليها التعديل أو المحو أو الطمس أكثر من ١٠٪ من قائمة الأسعار جاز للجنة العطاءات والمشتريات المركزية استبعاد العرض.

١٧. يعتبر العرض المقدم من الشركة ملزماً له.

١٨. آخر موعد لتسليم العروض حتى الساعة الثانية عشرة ظهرا من يوم الثلاثاء الموافق ٢٠٢٦/٠١/٠٦.

جدول المواصفات واسعار الأجهزة ومعدات كفاءة الطاقة والطاقة المتجددة :-

All bidders must ensure that the **costs and technical specifications** for all items submitted within this tender **include the full installation and assembly**. This includes, but is not limited to:

- Electrical and data **cabling**
- **Cabinetry** and workbench installations
- **Panels**, control boards, mounting systems, and related hardware
- Any **structural, mechanical, or technical work** required to complete the setup
- Provision of all **auxiliary materials**, components, and accessories needed for operation

First : Energy Efficiency and Renewable Energy Equipment's:

ITEM (1): IOT-Based Smart Energy Monitoring Kits Including KNX Control System:

no	Items	Description	Qty	Cost	Total Cost (EUR)	Delivery Period
1	IoT-Based Smart Energy Monitoring including KNX Control System	Supply, install, connect, test, program, and commission the KNX Smart Control System, including all cables and accessories. The system will be installed in the Wadi Al-Hariya Building Campus. The system comprises actuators, couplers, power supplies, sensors, PVC conduits, a cable junction box, labelling, software connection, and accessories to operate the system according to the specification drawings and the engineer's instructions.	1			
		Supply and install a KNX On/Off switching actuator 8 channels, 10A each channel, DIN rail mounted, with manual mode, each of these relays shall be displayed on the front. The item includes all the needed connections and accessories.	5			

		Supply and install the KNX Keypad 8-PB. The item includes all needed connections and accessories.	3			
		-Supply and install a KNX power supply of 640 mA. The item includes all the needed connections and accessories, including a power supply. -Supply and install a KNX bus coupler. The item includes all the needed connections and accessories. - Supply and installation of a KNX IP main controller with a 3D graphical interface for the building, including a logic controller and an astronomical timer-based time controller. The unit includes a Cat 6a SFTP cable and all necessary components.	L.S			
		electrical Supply and installation of a digital energy meter (Power Meter) supporting protocol, to Modbus RTU/TCP communication be integrated with the energy management and measuring and monitoring control system for electrical loads. The unit includes all required wiring and accessories, including current necessary network transformers (CTs) and the .connections	4			
		Programming and commissioning of the system, including integration with the VRF system, and supplying all required components for connecting the system to the KNX (air-conditioning interface device)	20			
		Supply and install a KNX Presence sensor 4-section with a lux meter. The item includes all the needed connections and accessories.	35			
*	Total (EUR)					

ITEM (2): Variable Frequency Drive (VFD) Demo Panels, HMI & Controller With Kit Measuring:

no	Items	Description	Qty	Cost	Total Cost (EUR)	Delivery Period
2	2.1 Variable Frequency Drive VFD Demo Case with Load Simulator and Measurement Kit	Supply and install a Variable Frequency Drive (VFD) Demonstration Panel (1–10 HP range), complete with a motor load simulator or equivalent mechanical load and a full electrical measurement kit. The system shall include a VFD unit capable of real-time speed and setpoint control, along with monitoring of power and energy parameters (kW, PF, THD, kWh). The demo panel must include integrated logic and safety features, emergency stop, overload protection, Modbus communication capability, and an industrial-grade, demonstration-ready cabinet. The system shall support training and testing of motor control, load behavior simulation, and energy-saving performance.	**1**			
	2.2 Workstation PC and Curved Monitor	The workstation Processor: Intel® Core™ Ultra 7 265 (up to 5.3 GHz with Intel® Turbo Boost Technology, 30 MB L3 cache, 20 cores, 20 threads) - Graphics: Integrated: Intel® Graphics /Discrete: NVIDIA RTX™ 2000 Ada Generation - Memory: 128 GB DDR5-5600 MT/s - Hard drive: 1 TB PCIe® Gen4 M.2 SSD - Keyboard/mouse included - warranty 3 years Curved Monitor - size: 32" UHD 165Hz 1ms Curved Monitor - resolution: at least 3840x 2160 - response time: at least 1 meter/second - panel type: VA - built-in speakers: preferred including keyboard and mouse	1			
*	**Total (EUR)**					

ITEM (3): Power Factor Correction Solutions:

no	Items	Description	Qty	Cost	Total Cost (EUR)	Delivery Period
3	3.1 Power Factor Correction Solutions	The Power Factor Correction (PFC) system shall be designed to automatically compensate reactive power in electrical installations with predominantly inductive loads. The system shall maintain the overall power factor at not less than 0.98 lagging under normal operating conditions. It shall consist of a microprocessor-based power factor controller with a minimum of 6–12 switching steps, heavy-duty self-healing capacitors rated at a minimum of 380 V AC, and capacitor duty or static contactors suitable for frequent switching operations. To ensure compatibility with inverter-based loads such as VRF systems, the PFC system shall include detuned reactors or harmonic filters designed to limit harmonic amplification in compliance with IEEE 519, with a minimum detuning factor of 7% where harmonics are present. Current transformers shall be provided for accurate real-time measurement, and discharge units shall ensure safe capacitor de-energization after disconnection.	1			
	3.2 5kW Solar PV System	PV Modules: High-efficiency monocrystalline PV panels ≥625 W, Grade A module efficiency ≥23%, suitable for rooftop installation.	16			
		Supply and install **an inverter (5-6 kW) and a 5 kWh battery, with** 98.2% efficiency, fully compatible with the supplied battery brand. Supports grid-tied and backup modes. Includes a communication interface for central monitoring and remote access.	2			
		Support Structure of (5 kWp) for PV #1: Corrosion-resistant, high-strength mounting structure manufactured from galvanized steel or aluminium alloy, designed for rooftop installation and capable of withstanding wind loads up to 140 km/h. The structure shall be **fully bolted** **(no welding)** to allow easy installation, dismantling, and maintenance. It shall include a **Multifunctional one-axis solar PV Tracker**, enabling optimization of solar energy production. All bolts, nuts, and fasteners shall be corrosion-resistant and suitable for long-term outdoor use.	L.S			
		Support Structure of (5 kWp) for PV #2: Corrosion-resistant, high-strength mounting structure manufactured from galvanized steel or aluminum alloy, designed	L.s			

		for rooftop installation and capable of withstanding wind loads up to 140 km/h. The structure shall be fully bolted (no welding) to allow easy installation, dismantling, and maintenance. All bolts, nuts, and fasteners shall be corrosion-resistant and suitable for long-.term outdoor use				
		Protection System & Panels European-manufactured: Complete protection components including circuit breakers, RCD, SPD, ATS, grounding system, and bonding of steel structure to the main earthing box. Includes: DC Panel (IP65), AC Panel (IP65).	L.S			
		Mounting Accessories: Bolts, nuts, fasteners, cable ties, trays, conduits, and all required installation materials.	L.S			
		-The contractor shall supply, install, test, and commission a fully integrated hybrid PV solar system with battery storage. - All electrical protection panels, breakers, SPDs, RCDs, cables, and related components must be European-manufactured and comply with EN / IEC standards. -Central monitoring solution for PV, battery, and inverter performance. Includes all required communication modules, data logging units, and sensors. Remote monitoring via the internet is included.	L.S			
*	Total (EUR)					

ITEM (4): Static Var Generator (SVG) & Active Harmonic Filter (AHF) Series:

no	Items	Description	Qty	Cost	Total Cost (EUR)	Delivery Period
4	4.1 SVG & AHF	The SVG (Static Var Generator) 50 kVar and AHF (Active Harmonic Filter) 75 A shall include the following specifications: • Real-time response (<10 ms) • Reactive power compensation and voltage support • Harmonic filtering (SVG up to 13th harmonic / AHF up to 50th harmonic) • Supports unbalance correction • High efficiency and low operating noise • Compatible with RS485 / Modbus monitoring systems Both systems must be connected to the building's VRF air-conditioning systems to	1			

		enhance power factor performance and reduce harmonic distortion.				
	4.2 A dedicated engineering laptop	Laptop Specification : Processor: Intel Core i9 (13th generation or higher) or equivalent RAM: 16 GB Storage: 512 GB NVMe SSD Display: 15.6" Full HD or higher Ports: USB-A, USB-C, HDMI, and Ethernet (or USB-to-Ethernet adapter) Connectivity: Compatible with USB-to-RS485/RS232 converters Battery Life: 6+ hours of real-world battery life	1			
*	Total (EUR)					

ITEM (5): Photovoltaic (PV) & Storage System:

no	Items	Description	Qty	Cost	Total Cost (EUR)	Delivery Period
5	PV and Storage System	PV Modules: High-efficiency monocrystalline PV panels, module efficiency ≥23%, suitable for rooftop installation. Supply, install, test, and commission PV array modules, each with a capacity of not less than 625Wp. Total power not less than 40 kWp. Bifacial solar cells, Half-cell Mono-crystalline, Grade A Cells, with 12 Year Product Warranty and 25 Year Linear Power Warranty, with a certified specification certificate	65			
		Hybrid Inverters: Supply and install two (2) three-phase hybrid inverters low voltage, each with a capacity of 20 kW and an efficiency of 98.2%, fully compatible with the supplied battery brand. Supports grid-tied and backup modes. Includes a communication interface for central monitoring and remote access.	2			
		Supply, install, test, and commission the Battery bank. Low Voltage LFP Battery, LiFePO4, Total energy capacity per day 64 kWh, Warranty: 10 Years.	2			
		Support Structure: Corrosion-resistant, high-strength mounting structure using galvanized steel or aluminum alloy. Designed for rooftop installation with resistance to 140 km/h wind load and ≥23° tilt angle.	4			
		Protection System & Panels:Complete protection components, including: circuit	L.S			

		breakers, RCD, SPD, ATS, grounding system, and bonding of steel structure to the main earthing box. Includes: **DC Panel (IP65)**, **AC Panel (IP65)**.				
		Mounting Accessories Bolts, nuts, fasteners, cable ties, trays, conduits, and all required installation materials.	L.S			
		Monitoring System (Hardware + Software) - Central monitoring solution for PV, battery, and inverter performance. Includes all required communication modules, data logging units, and sensors. Remote monitoring via the internet is included Smart TV: - Size: 65 inches - Resolution: 4K Ultra HD (3840 × 2160) - Backlight Type: Direct-LED (DLED) - Contrast Ratio: Approximately 6000:1 - Brightness: Around 330 cd/㎡ - Response Time: 6.5 ms - Connectivity (Inputs & Outputs): HDMI, USB, Digital Audio Output, Network Port (RJ-45), Wi-Fi, and Bluetooth - System & Software: Operating System: Android TV - built-in Speakers: at least 2 speakers, each 8W	1			
		- The contractor shall supply, install, test, and commission a fully integrated hybrid PV solar system with battery storage. - DATA SHEETS AND CALCULATIONS MUST BE SUBMITTED for technical evaluation - All electrical protection panels, breakers, SPDs, RCDs, cables, and related components must be European-manufactured and comply with EN / IEC standards. The system shall support internet-based monitoring, data logging, and display visualization through a 50-inch screen.	L.S			
*	Total (EUR)					

Second: Energy Efficiency and Renewable Energy Test Equipment:

ITEM (6): Energy Efficiency & RE Test Equipment:

no	Items	Description	Qty	Cost	Total Cost (EUR)	Delivery Period
6	6.1 Testing Efficiency & Power Quality Analysis According to EN 50160	- Testing of single-phase and three-phase PV systems (including multi-string). - Measurement of TRMS for DC/AC. - Capability to measure DC and AC power. - AC energy consumption measurement. - Measurement of power factor for both single and three-phase systems. - Measurement of solar irradiance in W/m². - Temperature measurement in °C. - Measurement of voltage and current harmonics up to the 49th order. - Detection of voltage anomalies. - Flicker analysis in compliance with EN50160 standard. - Measurement of inrush currents with 10 ms resolution. - Detection of transient voltage spikes with 5 microsecond resolution. - Complete analysis of mains quality according to EN50160. - Graphical and numerical display of measured quantities. - Ability to recall all recorded values on-screen. - Touchscreen with color display. - Portable battery-powered operation with built-in rechargeable battery and charger. - Testing of single-phase and three-phase PV systems (including multi-string). - Measurement of TRMS for DC/AC current. - Capability to measure DC and AC power. - AC energy consumption	1			

	measurement. - Measurement of power factor for both single and three-phase systems. - Detection of voltage anomalies. - Include all terminals, cables, and wires required to enable full system functionality				
6.2 PV Analyzer (I-V Curve Tracer) Installation inspection equipment according to IEC 62446	- Test PV panel performance, degradation, and IV curves - Ability to test both single-phase and three-phase PV installations. - Capability to measure the efficiency of both AC and DC sides of the system. - Full I-V curve tracing capability up to 1500 V. - Measurement of Voc and Isc up to 1500 V and 40 A, respectively. - Ability to store a database of thousands of PV modules for quick reference. - Capability to automatically start and measure multiple PV strings in sequence. - Real-time irradiance (W/m²) and temperature (°C) measurement and display. - Use of a reference cell to accurately measure module surface irradiance. - Temperature sensors for both module surface and environmental conditions. - Remote irradiance and temperature sensors with USB and RF data transmission to the main unit. - Clamp meters included for full AC/DC measurement of voltage, current, power, and efficiency. - Measurement of Active (P), Reactive (Q), and Apparent (S) Power and Energy. - Ability to provide immediate test results on-screen. - DC output measurement of voltage, current, and power for modules or strings. - Capability to perform PV module resistance and insulation measurement. - Built-in device to measure the inclination angle of PV panels. - Functionality to compare measured values with standard test conditions (STC). - Internal memory to save all measured data securely. - Ability to recall and display historical test results on screen.	1			

	- USB connectivity for PC interface with onboard analysis software. - Logging and recording of measured parameters over time duration for performance evaluation. - Time-based logging of test parameters. - DC power and AC active power measurement. - DC efficiency correction based on temperature and irradiance. - Graphical and numerical I-V characteristic visualization. - Windows-compatible PC software interface. - Evaluation and automatic generation of test results. - All terminals, cables, wires, and accessories included for full functionality.				
6.3Digital Infrared Camera	- Identify heat losses, motor overheating, poor insulation - Light capacitive touch screen. - Integrated laser pointer. - Visual image camera for photo documentation. - Built-in flash LED for low light conditions. - 50Hz high resolution, even when inspecting moving objects. - Capability to use up to 3 independent measurement cursors. - Image resolution of 384 × 288 pixels. - Picture-in-Picture (PIP) fusion function to combine thermal and visual images. - microSD card memory storage. - USB connection for data transfer. - Temperature measurement range: -20 °C to +400 °C. - Thermal sensitivity: < 0.06 °C at 30 °C. - Spectral range: 8–14 µm, Zoom capability from 1× to 20×. - Thermal sensitivity <0.06 °C @ 30 °C (duplicate for emphasis on precision).	1			
6.4 Multimeter installation tester	- The contractor shall supply a multifunction electrical installation tester suitable for testing, commissioning, and safety verification of low-voltage electrical installations in accordance with IEC standards. - Measuring Display Resolution: 6000 counts - True RMS (TRMS) Measurement: Supported for AC, DC, and AC+DC	1			

	signals - AC TRMS Current: Measurement via external flexible transducer F3000U - DC, AC TRMS, AC+DC TRMS Current: Measurement via external clamp transducer - AC/DC Voltage: Up to 690 V AC/DC - Low Impedance Input (LoZ): For elimination of ghost voltages - Resistance Measurement & Continuity Test: With audible buzzer - Frequency Measurement - MAX / MIN / HOLD functions - RCD (Residual Current Device) Testing - RCD Tripping Time Tests: o 30 mA, 100 mA, 300 mA o Types AC and A - F-Type RCD Testing: Tripping time and tripping current - RCD Trip Current Measurement: Type A / AC, 30 mA - Automatic Test Sequences: x½, x1, x2, x5 at 0° and 180° - Earthing & Loop Measurements - Non-Trip Earth Resistance Measurement - Loop Impedance Measurement: o P–N, P–P, P–PE - Prospective Short-Circuit Current (PSC / Ik): Automatically calculated - Power Quality & Advanced Measurements - Voltage and Current Harmonics: Up to the 25th harmonic - Total Harmonic Distortion (THD%) - Leakage Current Measurement: With optional accessory HT96U - Electric Motor Starting Current (Inrush Current – INRUSH) - Phase & Installation Verification - Phase Sequence / Phase Rotation Test - indication in accordance with IEC 60364-6 - Display & Interface - Large backlit LCD - Clear graphical interface for test selection and results - Measurement Category: o CAT IV 600 V o CAT III 690 V - Compliant with relevant IEC installation and safety standards				
6.5 Multimeter to test electrical safety	- Mmultifunction electrical installation tester for testing, verification, and commissioning of low-voltage electrical	1			

	installations in accordance with IEC standards. - DC/AC True RMS voltage measurement up to 1000 V (AC+DC). DC, AC TRMS, and AC+DC TRMS current measurement by means of an external clamp transducer. - AC TRMS current measurement by means of an external flexible transducer F3000U. - Leakage current measurement using an optional clamp meter. - Electric motor starting current (INRUSH) measurement. Insulation resistance testing with test voltages of 50 V, 100 V, 250 V, 500 V, and 1000 V DC, in accordance with IEC/EN 61557-2. Measurement of Dielectric Absorption Ratio (DAR) and Polarization Index (PI). - Continuity testing of protective conductors with 200 mA test current, in accordance with IEC/EN 61557-4. - Voltage and current harmonic analysis up to the 25th harmonic and THD (%) calculation. - Low Impedance (LoZ) input. - Frequency measurement. - Phase sequence testing. - Resistance measurement and continuity test with an audible buzzer. - Automatic OK / NOT OK result indication in accordance with IEC/EN 60364-6.				
6.6 Battery Analyzer	- A portable, high-precision battery analyzer designed for advanced diagnostics and lifecycle monitoring of PV energy storage systems. The instrument is suitable for lithium-ion and lead-acid batteries used in hybrid, off-grid, and grid-connected PV installations and allows in-service testing without system shutdown. - The analyzer measures battery DC voltage, internal resistance/impedance, and temperature, enabling accurate assessment of battery health, aging, and degradation trends over time. It supports automatic test sequences and pass/fail evaluation based on configurable thresholds, reducing inspection time and ensuring consistent results. - The device features a large backlit color	1			

	display with graphical visualization of test results and historical trends. Measurement data is stored in internal memory and supports long-term data logging, trend analysis, and lifecycle performance evaluation under real PV charging and discharging conditions. - The analyzer provides PC connectivity via USB and/or wireless interface for report generation, data export, and preventive maintenance documentation. Designed for field and rooftop PV environments, the instrument offers rugged construction, a high electrical safety rating, and compliance with international standards for DC systems. - Supplied with DC test leads, temperature probe, data management software, user documentation, and calibration certificate, the analyzer is suitable for PV system commissioning, periodic inspection, fault diagnosis, and long-term battery performance monitoring.				
٦,٧ PV checker	- PV string and PV field insulation resistance testing without service interruption, with selectable test voltages of 250 V, 500 V, and 1000 V DC. Quick IVCK test for measurement of open-circuit voltage (Voc) and short-circuit current (Isc) on PV modules and PV strings, with measurement capability up to 1000 V / 15 A. Measurement of DC-side efficiency of the photovoltaic field. - Support for operation using a remote measurement unit (SOLAR-02) with USB and RF wireless communication. Measurement of solar irradiation (front-side) using a reference cell. Temperature measurement of PV cells and ambient environment. - Measurement of AC/DC in single-phase and three-phase systems. Measurement of electrical power and energy, including Active Power (P) only. Capability to display up to five (5) parameters simultaneously. - Integrated data recording with selectable integration periods ranging from 5 seconds to 60 minutes. Summary table display of main electrical parameters. I-V measurement range up to 1000 V /	1			

	15 A, limited to Voc and Isc measurements.				
6.8 A dedicated engineering laptop	**Laptop Specifications:** • Processor: Intel Core i9 (13th generation or higher) or equivalent • RAM: 16 GB • Storage: 512 GB NVMe SSD • Display: 15.6" Full HD or higher • Ports: USB-A, USB-C, HDMI, and Ethernet (or USB-to-Ethernet adapter) • Connectivity: Compatible with USB-to-RS485/RS232 converters • Battery Life: 6+ hours of real-world battery life	4			
6.9 Display Screen	**65-inch** Smart TV Size: 65 inches Resolution: 4K Ultra HD (3840 × 2160) Backlight Type: Direct-LED (DLED) Contrast Ratio: Approximately 6000:1 Brightness: Around 330 cd/㎡ Response Time: 6.5 ms Connectivity (Inputs & Outputs): HDMI, USB, Digital Audio Output, Network Port (RJ-45), Wi-Fi, and Bluetooth System & Software: Operating System: Android TV Built-in Speakers: at least 2 speakers, ecah 8W	1			
6.10 Workstation PC and Screen	The workstation Processor: Intel® Core™ Ultra 7 265 (up to 5.3 GHz with Intel® Turbo Boost Technology, 30 MB L3 cache, 20 cores, 20 threads) - Graphics: Integrated: Intel® Graphics /Discrete: NVIDIA RTX™ 2000 Ada Generation - Memory: 128 GB DDR5-5600 MT/s - Hard drive: 1 TB PCIe® Gen4 M.2 SSD - Keyboard/mouse included - warranty 3 years Curved Monitor - size: 32" UHD 165Hz 1ms Curved Monitor - resolution: at least 3840x 2160 - response time: at least 1 meter/second	1			

		- panel type: VA - built-in speakers: preferred including keyboard and mouse				
	6.11 Printer	All-in-One Printer colored high-quality paper size: A4/A3 Print quality: up to 4800×1200 dpi Print speed: at least 20 ppm Connectivity: Wi-Fi, USB, Ethernet Functions: Print / Scan / Copy Memory: at least 64 MB	1			
	6.12 PV system for testing	**kW Hybrid PV System (HV Inverter + 10 Battery Storage)** The contractor shall supply, install, test, and commission a complete hybrid photovoltaic (PV) solar energy system with a total capacity of 10 kW. The system shall include high-efficiency monocrystalline PV modules rated at ≥625 Wp per module with a minimum efficiency of 23%, mounted on a corrosion-resistant support structure designed for rooftop installation and capable of withstanding wind speeds up to 140 km/h, with a tilt angle of not less than 23°. A 10 kW three-phase HV hybrid and a minimum conversion efficiency of 98.2% shall be provided, fully compatible with the supplied energy storage system. The storage unit shall consist of a 10 kWh lithium-ion battery, offering deep discharge capability and a cycle life of ≥6000 cycles. The scope shall include all required AC/DC solar cables compliant with European standards, including connectors, conduits, and cable management accessories, as well as complete protection assemblies consisting of AC and DC panels (IP65) with circuit breakers, RCD, SPD (Type I/II), and full grounding and bonding to the building's earthing network. The system must be equipped with online monitoring and data logging via an internet connection. All installation works, wiring, testing, commissioning, documentation, and handover shall be included in the contractor's responsibility. DATA SHEETS AND CALCULATIONS MUST BE	L.S			

		SUBMITTED for technical evaluation				
	٦,١٣Essential Electrical Safety for Equipment (6.1,6.2,6.7)	1- Insulated Electrical Gloves Electrically insulated gloves suitable for DC and AC work on PV systems, protecting against electric shock during testing and measurements. 2-Insulated Safety Helmet Electrical safety helmet to protect against accidental contact with live parts and overhead hazards during PV and electrical testing activities. 3-Insulating Rubber Mat Certified insulating mat used in front of electrical panels, inverters, and test points to reduce the risk of electric shock. 4-Insulated Hand Tools IEC-certified insulated tools for safe handling of live electrical components during inspection and commissioning.	2 for each point			
*	Total (EUR)					

جدول اسعار الاجهزة ومعدات كفاءة الطاقة والطاقة المتجددة:

no	Items	Total Cost (EUR)
1	IOT-Based Smart Energy Monitoring Kits Including KNX Control System	
2	Variable Frequency Drive (VFD) Demo Panels, HMI & Controller With Kit Measuring	
3	Power Factor Correction Solutions	
4	Static Var Generator (SVG) & Active Harmonic Filter (AHF) Series	
5	Photovoltaic (PV) & Storage System	
6	Energy Efficiency & RE Test Equipment	
*	Total (EUR)	

المجموع كتابة:_____

خاص بالشركة:-

اسم الشركة:_____

رقم المشغل المرخص:_____

العنوان:_____

رقم الهاتف:_____ رقم جوال:_____ رقم الفاكس:_____

الايميل : _____

التوقيع والختم الرسمي