# *ANNEX II + III:* TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

**Contract title: Supply of PV system - 250 kW for KCV p 1 /…**

**Publication reference:** **KCV-RESCUE/JN-08/2021**

**Columns 1-2 should be completed by the contracting authority**

**Columns 3-4 should be completed by the tenderer**

**Column 5 is reserved for the evaluation committee**

Annex III - the contractor's technical offer

The tenderers are requested to complete the template on the next pages:

* Column 2 is completed by the contracting authority shows the required specifications (not to be modified by the tenderer),
* Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words ‘compliant’ or ‘yes’ are not sufficient)
* Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offeredspecifications.

| **1.**  **Item number** | **2.**  **Specifications required** | **3.**  **Specifications offered** | **4.**  **Notes, remarks,  ref to documentation** | **5.**  **Evaluation committee’s notes** |
| --- | --- | --- | --- | --- |
| **1** | **System 1 - PV system at the KCV parking 150 kW** |  |  |  |
| **1.1** | Photovoltaic inverters with the total power of 50 kW, delivery with mounting with following characteristics:  Umppt=480-800 V , Umax\_dc=1000V,  Min. 3 DC MPPT inputs, Imaxdc=108A (36 A per MPPT input), Iksdc=55A per MPPT input, Pnom\_AC=50000W, Pmax\_AC=55000W, 50Hz, Imax\_AC=80A, THDI ≤ 3 %, ambient temperature -25 °C to +60 °C,  Rated efficiency min. 98%,  Junction boxes with DC switch disconnectors on both poles, Overvoltage protection Type 2 for DC and AC subsystem,  Includes all the necessary equipment for inverter operation  **Quantity: 3 pcs** |  |  |  |
| **1.2** | Network analyser, delivery and mounting, with the following characteristics:  2 digital outputs, 2 relay outputs, aux. supply 48-240 ±15 % V AC/DC, Voltage range 50 – 400 V (L-N), frequency 50-60 Hz, embedded RJ45, Rated operational voltage 10 – 500 V AC, max. 7 W operational losses, operational temperature -5 - +55°C, Active energy class 0,5 acc. to IEC 61557-12, Reactive energy class 0,5 acc. to IEC 62053-22, Voltage class 0,2 acc. to IEC 61557-12, Current class 0,2 acc. to IEC 61557-12.  Must be compatible with the Inverter inputs.  **Quantity: 1 pcs** |  |  |  |
| **1.3** | Photovoltaic panels power 410 Wp, delivery with mounting with following characteristics:  Nominal power 410 Wp per panel  Efficiency at STC min. 21,30 %  STC parameters: voltage at max. power min. 31,58 V, current at max. power min. 12,99 A, open circuit voltage min. 37,60 V, short circuit current min. 13,72 A  Voltage temperature coefficient ‑0,285%/°C, Power temperature coefficient ‑0,36%/°C,  Max. system voltage 1000 V,  MC4 connector or equivalent plug type connector  **Quantity: 380 pcs** |  |  |  |
| **1.4** | Fixed supporting structure for 380 PV panels delivery and mounting with following characteristics:  Aluminium profile for panel reception, standard Adapted for the use in PV systems for PV panels supporting and for reception of standard clamps and end point elements for panel  For mounting on trapezoidal sheet roof cover  Includes necessary clamps and end point elements for PV panels  The inclination of the panels follows the inclination parking space structure  Steel profile for subconstruction, standard  Supporting structure is for ground mounting for parking space that must accomodate parked cars. The supporting strucutre must be specifically designed for parking space, with the necessary supporting pillars, cross-elements and top surface to accomodate the designated PV panel power. This includes the appropriate ground binding (founding) of the substructure pillars to ensure the appropriate load capacity. The parking space cover will be trapezoidal sheet roof cover.  The structure needs to accomodate the inverters and distribution cabinets.  **Quantity: 1 set** |  |  |  |
| **1.5** | Delivery and connection of DC cabling for PV panel and inverter connection with the following characteristics:  Fine wire cable (IEC 60228 Class 5)  Double insulation, cross-section min. 4 mm2, for outdoor mouting, UV resistant (HD 605/A1), acid resistant (EN 60811-2-1), temperature resistant in range -40..+90°C, rated voltage 1000/1500 V AC/DC, test voltage 6500 VAC, min. bending radius 4 x outer diameter  **Quantity: 3000 m** |  |  |  |
| **1.6** | Male and female connectors for PV panel connection and string connection to the inverter with the following characteristics:  Voltage min. 1000 V, current capacity min. 20 A, standard contact resistance <1 mΩ, operating temperature -40°C ... 105°C, IP67,  Disconnection force >30 N.  For cables of 4 mm2 cross-section  Including the connectors installation on cables.  1 set is 1 male and 1 female connector.  **Quantity: 120 set** |  |  |  |
| **1.7** | Delivery and mounting of supply line AC cables with PVC or XLPE isolation and shield with the following characteristics:  min. 5x35 mm2 coper conductor cable, PVC insulation with shield,  Operational voltage 600/1000V, test voltage 4kV, maximum operational temperature 70 ºC  **Quantity: 100 m** |  |  |  |
| **1.8** | Delivery and mounting of supply line AC cables with PVC or XLPE isolation and shield with the following characteristics:  min. 1x95 mm2 coper conductor cable, PVC insulation with shield,  Operational voltage 600/1000V, test voltage 4kV, maximum operational temperature 70 ºC  This includes the laying of the cable in cable trenches and excavation of cable trenches where necessary.  **Quantity: 800 m** |  |  |  |
| **1.9** | Perforated closed cable ducts with UV and mechanical protection for outdoor and indoor mounting, including fixing elements  min. width 200 mm, depth 60 mm  **Quantity: 200 m** |  |  |  |
| **1.10** | Meteorological (weather) station with advanced sensor set:  1 ambient temp sensor (min. range -40 ºC - 80 ºC), 1 panel temp sensor (min. range -40 ºC - 80 ºC), 1 attached solar irradiance sensor (min. range 0 – 1450 W/m2), 1 detached solar irradiance sensor for plane of array, 1 wind speed sensor (min. range 0-67 m/s), 1 wind direction sensor (min. range 360º), polymeric enclosure  Communication RS-485 wired, Modbus RTU, Power supply 10-30 VDC, 50 mA, EMC compliant  Including communication cable min. 70 m  **Quantity: 1 pcs** |  |  |  |
| **1.11** | Distribution cabinets with the necessary protective and switching equipment. The equipment will include the main switching device (main circuit breaker) with the current capacity appropriate to the inverter power output per PV system, protective device for inverter connection, monitoring equipment and other devices essential for PV system operation.  The distribution cabinet must accommodate network analyzer for energy limitation purposes.  **Quantity: 1 pcs** |  |  |  |
| **1.12** | Equipment for grounding of PV panel supporting structure with mounting with the following characteristics:  Connection to the existing building grounding system, earthing FeZn strips min. 25x3 mm2,  earthing square FeZn clamps min. 2,5 mm,  appropriate protection of supporting structure aluminium elements.  **Quantity: 1 set** |  |  |  |
| **1.13** | Preparation of the ground site for steel supporting structure mounting. Includes all of the necessary activities and preparation of the ground surface for mounting of supporting structure on the parking space with 380 PV panels.  **Quantity: 1 set** |  |  |  |
| **1.14** | Adaptation of the medium voltage facility in the transformer station for connection of the 150 kW PV power plant  **Quantity: 1 set** |  |  |  |
| **1.15** | Standard testing of installation including functional testing of PV panels wiring, string forming, inverter wiring.  Individual testing of protective devices settings.  Including the test report documentation.  **Quantity: 1 set** |  |  |  |
| **1.16** | The equipment delivery and installation for the integration of the PV systems components in the KVC smart BEMS system including the integration of system monitoring capabilities as well as control functionalities.  **Quantity: 1 set** |  |  |  |
| **1.17** | Preparation of As-built design documentation (Project of constructed object)  **Quantity: 1 set** |  |  |  |

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| **1.**  **Item number** | **2.**  **Specifications required** | **3.**  **Specifications offered** | **4.**  **Notes, remarks,  ref to documentation** | **5.**  **Evaluation committee’s notes** |
| **2** | **System 2 - PV system at the KCV Radiologija 50 kW** |  |  |  |
| **2.1** | Photovoltaic inverters with the total power of 50 kW, delivery with mounting with following characteristics:  Umppt=480-800 V , Umax\_dc=1000V,  Min. 3 DC MPPT inputs, Imaxdc=108A (36 A per MPPT input), Iksdc=55A per MPPT input, Pnom\_AC=50000W, Pmax\_AC=55000W, 50Hz, Imax\_AC=80A, THDI ≤ 3 %, ambient temperature -25 °C to +60 °C,  Rated efficiency min. 98%,  Junction boxes with DC switch disconnectors on both poles, Overvoltage protection Type 2 for DC and AC subsystem,  Includes all the necessary equipment for inverter operation  **Quantity: 1 pcs** |  |  |  |
| **2.2** | Network analyser, delivery and mounting, with the following characteristics:  2 digital outputs, 2 relay outputs, aux. supply 48-240 ±15 % V AC/DC, Voltage range 50 – 400 V (L-N), frequency 50-60 Hz, embedded RJ45, Rated operational voltage 10 – 500 V AC, max. 7 W operational losses, operational temperature -5 - +55°C, Active energy class 0,5 acc. to IEC 61557-12, Reactive energy class 0,5 acc. to IEC 62053-22, Voltage class 0,2 acc. to IEC 61557-12, Current class 0,2 acc. to IEC 61557-12.  Must be compatible with the Inverter inputs.  **Quantity: 1 pcs** |  |  |  |
| **2.3** | Photovoltaic panels power 375 Wp, delivery with mounting with following characteristics:  Nominal power 375 Wp per panel  Efficiency at STC min. 20,67 %  STC parameters: voltage at max. power min. 34,72 V, current at max. power min. 10,81 A, open circuit voltage min. 41,33 V, short circuit current min. 11,41 A  Voltage temperature coefficient ‑0,285%/°C, Power temperature coefficient ‑0,36%/°C,  Max. system voltage 1000 V,  MC4 connector or equivalent plug type connector  **Quantity: 140 pcs** |  |  |  |
| **2.4** | Fixed supporting structure for 140 PV panels, delivery and mounting with following characteristics:  Aluminium profile, standard  Adapted for the use in PV systems for PV panels supporting and for reception of standard clamps and end point elements for panel  Supporting structure is for flat roof mounting  Horizontal PV panel fixing  Includes necessary clamps and end point elements for PV panels  **Quantity: 1 set** |  |  |  |
| **2.5** | Delivery and connection of DC cabling for PV panel and inverter connection with the following characteristics:  Fine wire cable (IEC 60228 Class 5)  Double insulation, cross-section min. 4 mm2, for outdoor mouting, UV resistant (HD 605/A1), acid resistant (EN 60811-2-1), temperature resistant in range -40..+90°C, rated voltage 1000/1500 V AC/DC, test voltage 6500 VAC, min. bending radius 4 x outer diameter  **Quantity: 1.000 m** |  |  |  |
| **2.6** | Male and female connectors for PV panel connection and string connection to the inverter with the following characteristics:  Voltage min. 1000 V, current capacity min. 20 A, standard contact resistance <1 mΩ, operating temperature -40°C ... 105°C, IP67,  Disconnection force >30 N.  For cables of 4 mm2 cross-section  Including the connectors installation on cables.  1 set is 1 male and 1 female connector.  **Quantity: 50 set** |  |  |  |
| **2.7** | Delivery and mounting of supply line AC cables with PVC isolation and shield with the following characteristics:  min. 4x35 mm2 coper conductor cable, PVC insulation with shield,  Operational voltage 600/1000V, test voltage 4kV, maximum operational temperature 70 ºC  **Quantity: 50 m** |  |  |  |
| **2.8** | Delivery and mounting of supply line AC cables with PVC isolation and shield with the following characteristics:  min. 1x95 mm2 coper conductor cable, PVC insulation with shield,  Operational voltage 600/1000V, test voltage 4kV, maximum operational temperature 70 ºC  This includes the laying of the cable in cable trenches and excavation of cable trenches where necessary.  **Quantity: 400 m** |  |  |  |
| **2.9** | Perforated closed cable ducts with UV and mechanical protection for outdoor and indoor mounting, including fixing elements  min. width 200 mm, depth 60 mm  **Quantity: 100 m** |  |  |  |
| **2.10** | Meteorological (weather) station with advanced sensor set:  1 ambient temp sensor (min. range -40 ºC - 80 ºC), 1 panel temp sensor (min. range -40 ºC - 80 ºC), 1 attached solar irradiance sensor (min. range 0 – 1450 W/m2), 1 detached solar irradiance sensor for plane of array, 1 wind speed sensor (min. range 0-67 m/s), 1 wind direction sensor (min. range 360º), polymeric enclosure  Communication RS-485 wired, Modbus RTU, Power supply 10-30 VDC, 50 mA, EMC compliant  Including communication cable min. 70 m  **Quantity: 1 pcs** |  |  |  |
| **2.11** | Distribution cabinets with the necessary protective and switching equipment. The equipment will include the main switching device (main circuit breaker) with the current capacity appropriate to the inverter power output per PV system, protective device for inverter connection, monitoring equipment and other devices essential for PV system operation.  The distribution cabinet must accommodate network analyzer for energy limitation purposes.  **Quantity: 1 pcs** |  |  |  |
| **2.12** | Equipment for grounding of PV panel supporting structure with mounting with the following characteristics:  Connection to the existing building grounding system, earthing FeZn strips min. 25x3 mm2,  earthing square FeZn clamps min. 2,5 mm,  appropriate protection of supporting structure aluminium elements.  **Quantity: 1 set** |  |  |  |
| **2.13** | Preparation of roof top site for supporting structure mounting. Includes all of the necessary repairs and improvement of roof top surface for mounting of supporting structure for 140 PV panels. Preparation of roof-top for cable ducts installation.  **Quantity: 1 set** |  |  |  |
| **2.14** | Adaptation of the existing electrical distribution infrastructure and preparation of the connection point for connection of the 50 kW PV power plant  **Quantity: 1 set** |  |  |  |
| **2.15** | Standard testing of installation including functional testing of PV panels wiring, string forming, inverter wiring.  Individual testing of protective devices settings.  Including the test report documentation.  **Quantity: 1 set** |  |  |  |
| **2.16** | The equipment delivery and installation for the integration of the PV systems components in the KVC smart BEMS system including the integration of system monitoring capabilities as well as control functionalities.  **Quantity: 1 set** |  |  |  |
| **2.17** | Preparation of As-built design documentation (Project of constructed object)  **Quantity: 1 set** |  |  |  |

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| **3.** | **System 3 - PV system at the KCV Urgentni centar 50 kW** |  |  |  |
| **3.1** | Photovoltaic inverters with the total power of 50 kW, delivery with mounting with following characteristics:  Umppt=480-800 V , Umax\_dc=1000V,  Min. 3 DC MPPT inputs, Imaxdc=108A (36 A per MPPT input), Iksdc=55A per MPPT input, Pnom\_AC=50000W, Pmax\_AC=55000W, 50Hz, Imax\_AC=80A, THDI ≤ 3 %, ambient temperature -25 °C to +60 °C,  Rated efficiency min. 98%,  Junction boxes with DC switch disconnectors on both poles, Overvoltage protection Type 2 for DC and AC subsystem,  Includes all the necessary equipment for inverter operation  **Quantity: 1 pcs** |  |  |  |
| **3.2** | Network analyser, delivery and mounting, with the following characteristics:  2 digital outputs, 2 relay outputs, aux. supply 48-240 ±15 % V AC/DC, Voltage range 50 – 400 V (L-N), frequency 50-60 Hz, embedded RJ45, Rated operational voltage 10 – 500 V AC, max. 7 W operational losses, operational temperature -5 - +55°C, Active energy class 0,5 acc. to IEC 61557-12, Reactive energy class 0,5 acc. to IEC 62053-22, Voltage class 0,2 acc. to IEC 61557-12, Current class 0,2 acc. to IEC 61557-12.  Must be compatible with the Inverter inputs.  **Quantity: 1 pcs** |  |  |  |
| **3.3** | Photovoltaic panels power 375 Wp, delivery with mounting with following characteristics:  Nominal power 375 Wp per panel  Efficiency at STC min. 20,67 %  STC parameters: voltage at max. power min. 34,72 V, current at max. power min. 10,81 A, open circuit voltage min. 41,33 V, short circuit current min. 11,41 A  Voltage temperature coefficient ‑0,285%/°C, Power temperature coefficient ‑0,36%/°C,  Max. system voltage 1000 V,  MC4 connector or equivalent plug type connector  **Quantity: 140 pcs** |  |  |  |
| **3.4** | Fixed supporting structure for 140 PV panels, delivery and mounting with following characteristics:  Aluminium profile, standard  Adapted for the use in PV systems for PV panels supporting and for reception of standard clamps and end point elements for panel  Supporting structure is for flat roof mounting  Horizontal PV panel fixing  Includes necessary clamps and end point elements for PV panels  **Quantity: 1 set** |  |  |  |
| **3.5** | Delivery and connection of DC cabling for PV panel and inverter connection with the following characteristics:  Fine wire cable (IEC 60228 Class 5)  Double insulation, cross-section min. 4 mm2, for outdoor mouting, UV resistant (HD 605/A1), acid resistant (EN 60811-2-1), temperature resistant in range -40..+90°C, rated voltage 1000/1500 V AC/DC, test voltage 6500 VAC, min. bending radius 4 x outer diameter  **Quantity: 1.000 m** |  |  |  |
| **3.6** | Male and female connectors for PV panel connection and string connection to the inverter with the following characteristics:  Voltage min. 1000 V, current capacity min. 20 A, standard contact resistance <1 mΩ, operating temperature -40°C ... 105°C, IP67,  Disconnection force >30 N.  For cables of 4 mm2 cross-section  Including the connectors installation on cables.  1 set is 1 male and 1 female connector.  **Quantity: 50 set** |  |  |  |
| **3.7** | Delivery and mounting of supply line AC cables with PVC isolation and shield with the following characteristics:  min. 4x35 mm2 coper conductor cable, PVC insulation with shield,  Operational voltage 600/1000V, test voltage 4kV, maximum operational temperature 70 ºC  **Quantity: 50 m** |  |  |  |
| **3.8** | Delivery and mounting of supply line AC cables with PVC isolation and shield with the following characteristics:  min. 1x95 mm2 coper conductor cable, PVC insulation with shield,  Operational voltage 600/1000V, test voltage 4kV, maximum operational temperature 70 ºC  This includes the laying of the cable in cable trenches and excavation of cable trenches where necessary.  **Quantity: 400 m** |  |  |  |
| **3.9** | Perforated closed cable ducts with UV and mechanical protection for outdoor and indoor mounting, including fixing elements  min. width 200 mm, depth 60 mm  **Quantity: 100 m** |  |  |  |
| **3.10** | Meteorological (weather) station with advanced sensor set:  1 ambient temp sensor (min. range -40 ºC - 80 ºC), 1 panel temp sensor (min. range -40 ºC - 80 ºC), 1 attached solar irradiance sensor (min. range 0 – 1450 W/m2), 1 detached solar irradiance sensor for plane of array, 1 wind speed sensor (min. range 0-67 m/s), 1 wind direction sensor (min. range 360º), polymeric enclosure  Communication RS-485 wired, Modbus RTU, Power supply 10-30 VDC, 50 mA, EMC compliant  Including communication cable min. 70 m  **Quantity: 1 pcs** |  |  |  |
| **3.11** | Distribution cabinets with the necessary protective and switching equipment. The equipment will include the main switching device (main circuit breaker) with the current capacity appropriate to the inverter power output per PV system, protective device for inverter connection, monitoring equipment and other devices essential for PV system operation.  The distribution cabinet must accommodate network analyzer for energy limitation purposes.  **Quantity: 1 pcs** |  |  |  |
| **3.12** | Equipment for grounding of PV panel supporting structure with mounting with the following characteristics:  Connection to the existing building grounding system, earthing FeZn strips min. 25x3 mm2,  earthing square FeZn clamps min. 2,5 mm,  appropriate protection of supporting structure aluminium elements.  **Quantity: 1 set** |  |  |  |
| **3.13** | Preparation of roof top site for supporting structure mounting. Includes all of the necessary repairs and improvement of roof top surface for mounting of 140 PV panels. Preparation of roof-top for cable ducts installation.  **Quantity: 1 set** |  |  |  |
| **3.14** | Adaptation of the existing electrical distribution infrastructure and preparation of the connection point for connection of the 50 kW PV power plant  **Quantity: 1 set** |  |  |  |
| **3.15** | Standard testing of installation including functional testing of PV panels wiring, string forming, inverter wiring.  Individual testing of protective devices settings.  Including the test report documentation.  **Quantity: 1 set** |  |  |  |
| **3.16** | The equipment delivery and installation for the integration of the PV systems components in the KVC smart BEMS system including the integration of system monitoring capabilities as well as control functionalities.  **Quantity: 1 set** |  |  |  |
| **3.17** | Preparation of As-built design documentation (Project of constructed object)  **Quantity: 1 set** |  |  |  |

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| **All items** | The construction of the PV power plant must be in full accordance with the Requirements for design and connection of small power plant issued by the relevant DNO (EPS Distribution, ED Novi Sad) |  |  |  |
| **All items** | The Contractor is obligated to provide all the necessary documentation and to perform all necessary activities to ensure the obtainment of the exploitation permit. |  |  |  |

Name and first name: <…………………………………………………………………>

Duly authorised to sign this tender on behalf of:

**<**……………………………………………………………………………………**>**

Place and date: <…………………………………………………………….………….>

Stamp of the firm/company: