Request for Quotation RFQ-PTF-2020-001

Activity Title: “Solar 200 kW and BESS for Pamir Energy”.

Issuance Date: 01/14/2020

Deadline for Receipt of Questions: January 31, 2020 at 00:00, Arlington, USA local time

Closing Date and Time: February 17, 2020 at 00:00 Arlington, USA local time

Issuance of this RFQ does not constitute an award commitment on the Tetra Tech ES, Inc., nor does it commit to pay for any costs incurred in preparation or submission of comments/suggestions of a quotation. Quotations are submitted at the risk of the offerors. All preparation and submission costs are at the offeror’s expense.
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1. **INTRODUCTION**

The purpose of this RFQ is to award to a qualified contractor, who will be supported by the national utility Pamir Energy, for the engineering, procurement, delivery, installation and commissioning of a grid connected, ground mounted, Solar PV generation facility, with at least 200 kWac of LV output capacity, paired with a Battery Energy Storage System (BESS) of adequate capacity and design to provide an equalized or stabilized delivery to the grid of the energy instantly produced by the Solar PV generator in relation with the available solar resource and fulfilling the technical requirements and scope defined in Attachment A – Project Specifications.

2. **BIDDER’S QUALIFICATIONS**

Bidder and teamed or partnered entities, if applicable, must provide the following information and references in order to be qualified for the procurement process:

1. Bidder’s information, including official registered title, type of business, address, and contact person information.
2. A short description of the bidder and of past similar experience in providing projects or related services described in the Attachment A – Project Specifications.
3. Overall technical approach and design’s functional and operational description to provide the functionality and fulfill the specifications defined in Attachment A – Project Specification.
4. Certification that bidder is not owned or controlled in total or in part, directly or indirectly, by any entity of any government.
5. Certification by any subcontractor engaged by the bidder for this project that the subcontractor is not owned or controlled in total or in part, directly or indirectly, by any entity of any other government.
6. The bidder shall complete and sign the Representation and Certifications found in Attachments C to this document and include them with the bidder’s quotation. Quotations that do not include these certifications will not be considered.

3. **SOURCE, ORIGIN AND NATIONALITY RESTRICTIONS**

The USAID authorized geographic codes for this activity are 110 and 937. Bidders must be incorporated in, or being nationals of, the United States, the cooperating country (Tajikistan), the independent states from the former Soviet Union or a developing country. Source and Nationality contracting rules can be found in USAID regulation ADS 310, available here: [http://transition.usaid.gov/policy/ads/300/310.pdf](http://transition.usaid.gov/policy/ads/300/310.pdf). Foreign Policy Restricted countries are currently defined by the US Government (22 CFR 228) and include: Cuba, Iran, Libya, North Korea, and Syria.

4. **SUBMISSION OF QUOTATIONS**

All quotations are due on February 17, 2020 by no later than 00:00 local time in Arlington, Virginia, USA. Quotations must be submitted via e-mail at the address Jason.Heaney@tetratech.com in the following formats: Adobe Acrobat PDF and/or Microsoft Word and Excel.

All quotations must fully respond to the Technical Specifications enclosed as Attachment A and must include quotes in the format provided in the Attachment B - Table 1 – Budget. Quotations received after the above-stated due date and time will not be considered for this procurement.
5. QUESTIONS AND CLARIFICATIONS

All questions or clarifications regarding this RFQ must be in writing and submitted, in English, to Jason.Heaney@tetratech.com on or before on January 31, 2020 by no later than 00:00 local time in Arlington, Virginia, USA. Questions and requests for clarification, and the responses thereto, will be circulated to all RFQ recipients.

Only written answers from Tetra Tech will be considered official and carry weight in the RFQ process and subsequent evaluation. Any answers received outside the official channel, whether received verbally or in writing, from employees or representatives of Tetra Tech, or any other party, will not be considered official responses regarding this RFQ.

Interested bidders are encouraged to register their intention to submit a proposal. Note that the responses to questions, as well as any modification to this RFQ will only be sent to registered interested bidders.

6. QUOTATION PREPARATION INSTRUCTIONS

All Bidders must follow the instructions set forth herein in order to be qualified for the procurement process. If Bidder does not follow the instructions set forth herein, Bidder’s quotations may be eliminated from further consideration or the quotation may be downgraded and not receive full credit under the applicable evaluation criteria.

The suggested outline for the Quotation is stated below:

A. Organization’s Information

1. Bidder’s, teamed partners and appointees if applicable, organization’s information, including official registered title, type of business, list of offices if applicable, address, telephone, and website.
2. Bidder’s organization’s office or appointee/s in approved territories defined in point 3.
3. Bidder’s organization’s DUNS number, if proposed price is more than USD $30,000.
4. Authorized point of Contact with phone number(s) and email address

B. Company Technical Capability

Description of bidder’s experience, which shall include activities/projects carried out in alike environments which, at bidder’s criteria, are relevant to support his capacity to deliver the requested scope.

C. Company Past Performance

Bidders should provide a summary of relevant projects including the Title, Client, Date and a brief description of alike scope delivered. The qualifications section is limited to 5 of the most relevant assignments performed in the last 5 years, presented in the following table format, from which those in alike environments are preferred.
D. Detailed Budget

Bidder shall complete the Table 1 of the Attachment B “Detailed Budget” in order to allow Tetra Tech ES, Inc. to compare all quotes and make a competitive selection. The budget should be provided in Excel format with unlocked cells and shall not exceed the budget cap of 450,000 USD allocated for this project.

A price must be provided for each project component to be considered compliant with this request. Offers must show unit prices, quantities, and total price. All items, services, etc. must be clearly labeled and included in the total offered price. The quotations shall also include a budget narrative that explains the basis for the estimate of every cost element or line item if the item is not self-explanatory. Supporting information must be provided with enough detail to allow for a complete analysis of each cost element or line item. Tetra Tech reserves the right to request additional cost information if the evaluation committee has concerns of the reasonableness, realizability, or completeness of an Offeror’s proposed price.

Bidder shall provide unit pricing in USD. Prices quoted in this document shall be valid for a 30-day time period, include all taxes, duties and other costs and the VAT tax originated in Tajikistan.

E. Technical Approach

The bidder shall provide as minimum the following information:

- A description of the proposed system architecture, functionalities and how the required functionalities will be achieved in the project’s environment with the proposed system and justified calculations.
- A description of the functionalities that the proposed system can’t provide or would require non-standard works by the bidder or suppliers; if non-standard works are required, the functionality to be implemented and the associated works shall be briefly described, and the cost shall be listed as individual component in the quotation page or pages.
- Price Quotation can be presented in the form of a “list of materials”, comprehending the main components of the system, with a short description of the function of each component, the units required and value of the component or service. This listing shall include all non-standard works as an individual component; associated services, like installation, commissioning, training and other alike, are also considered main components and shall be listed individually.
- Small components, such as cables, connectors, and others alike, can be listed aggregated as “BoS” or “Various”.
- If any component of the proposed system, is based on a subscription or periodic fee, it should be clearly mentioned in the description of the component, together with the period duration.
- Description of the warranties and after warranty support services, reflecting their associated costs, shall be listed and consistent with the requirements defined in Attachment A.
- Bidder can add, in pages different from the above, any relevant information about the proposed system,
components, functionalities or operation modes and added value services envisioned.

F. Representations and Certifications

These documents can be found in Attachments C of this RFQ and must be submitted as part of the Quotations.

All Quotations must be submitted in English.

7. EVALUATION CRITERIA

Award will be made to the bidder representing the best value in consideration of technical approach, added value services proposed, past performance and qualifications and price factors. Prices must be reasonable and will be considered in the evaluation. Bidders are encouraged to provide a discount to their standard commercial rates.

Tetra Tech reserves the right to conduct discussions with selected bidder(s) in order to identify the best value offer. Award of any resulting Subcontract Agreement shall be made by Tetra Tech on a best value basis. Tetra Tech reserves the right to request a test assessment from bidders to assess their qualifications.

Quotations will be scored on a 100-point scale. Available points for each evaluation factor are given below. Bidders must address each evaluation factor.

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Technical Approach, Design and Added Value Services</td>
<td>50%</td>
</tr>
<tr>
<td>II. Past Performance</td>
<td>40%</td>
</tr>
<tr>
<td>III. Price Quotation</td>
<td>10%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

Bidder should submit a Detailed Budget reflecting the cost of completing the scope. Bidders shall use and complete the Attachment B – Detailed Budget.

8. TERMS OF PAYMENT

The validity of the award will be contingent to the presentation by the awardee of a contract’s performance liquid warranty, within the next 10 working days after formal award notification, for an amount equivalent to the 40% of the capital cost of the main components, those being, panels, inverters, BESS, mounting structure and HV transformer, which will released after the successful commissioning of the plant.

Alternatively, bidder can propose a recursive liquid warranty or equivalent instrument following the below schedule,

<table>
<thead>
<tr>
<th>#</th>
<th>Milestone</th>
<th>% MCC*</th>
<th>Release at Milestone Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Project award</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Mobilization on Site</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Completion of DC Section to Inverter input, inclusive of panels, grounding, lightning, lighting and cold testing.</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>Completion of AC/LV Section to HV Transformer, inclusive of</td>
<td>15</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Completion of HV Section to Recloser, inclusive of telecom, software and testing.</th>
<th>10</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Completion of Hot Testing, Commissioning and performance warranty</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Training, Snagging and Remedial</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>11</td>
<td>OM Supervision, Hand Over &amp; As Built</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>12</td>
<td>Continuous Operation Test (28 days)</td>
<td>30</td>
<td>28 Days</td>
</tr>
</tbody>
</table>

(*) MCC: Main Components Capital Cost.

In the event bidder opts for the recurrent liquid warranty schedule, before the signature of the contract, awardee will be required to present bank letter or equivalent proof of enough liquid capacity to attend the cash flow requirements for the execution of the project and/or availability of the Total Project Cost for the duration of the project complete implementation.

Payment terms for the awarded contract are net forty-five (45) days upon satisfactory completion and acceptance of milestones and deliverables by Tetra Tech ES Inc or his appointees; milestones which are listed in Attachment A – Project Specifications. Payment shall be made by Tetra Tech ES, Inc. (Arlington, VA, USA) via bank wire transfer.

At commissioning, the awardee will be required to present a plant’s energy performance liquid warranty equivalent to the 96% of the calculated energy production at project’s simple CoE (Cost of Energy) relative to the site environmental conditions and manufacturer’s warranted equipment degradation.

For those calculations a theoretical gross revenue of 0.35 cents of US Dollar per kWh after step-up, and a project lifetime of 30 years shall be used, for the BESS equipment replacement costs the latest estimated projections of Lazard and/or BNEF (Bloomberg New Energy) can be used.

The energy performance warranty shall cover a period not shorter than half of the calculated payback of the system, valued at project’s simple CoE (Cost of Energy). This plant’s performance warranty can be renewed on a yearly basis. As indication, the yearly amount is not expected to be lower than 45,000 USD, while bidder has to propose and justify his own calculation which may not relate to the expected amount; bidder’s calculation shall be in excel with formulas, including assumptions justifications and data origins.

9. DUNS NUMBER AND SAM.GOV REGISTRATION

If the proposed price is above $30,000, the successful bidder will be required to furnish a DUNS number and proof of SAM.gov registration within 24-48 hours of notice of award. Is strongly recommended that bidders start his registration in SAM.gov at their earliest convenience. Information regarding obtaining a DUNS number may be found here: https://fedgov.dnb.com/webform

10. NEGOTIATIONS

It is anticipated that a subcontract will be awarded solely on the basis of the original offers received. However, Tetra Tech reserves the right to conduct discussions, negotiations and/or request clarifications prior to awarding a subcontract. Furthermore, Tetra Tech reserves the right to conduct a competitive range and to limit the number of offerors in the competitive range to permit an efficient evaluation environment among the most highly-rated proposals. Highest-rated offerors, as determined by the
evaluation committee, may be asked to submit their best prices during a competitive range.

11. MULTIPLE AWARD/NO AWARD

Tetra Tech ES, Inc. reserves the right to issue multiple awards. Tetra Tech ES, Inc. also reserves the right to issue no awards.
ATTACHMENT A – PROJECT SPECIFICATIONS

TECHNICAL SPECIFICATION

SCOPE OF WORK: Engineer, procure, deliver, install and commission, excluding those works and services provided by Pamir Energy, a 10 kV grid connected, ground mounted, Solar PV generation system with at least 200 kWac generation capacity, paired with a Battery Energy Storage System (BESS) of adequate capacity to provide an equalized or stabilized output of the energy instantly produced by the Solar PV generator in relation with the available solar resource, and capable of providing added value services to extent proposed by bidder’s design.

PERIOD OF PERFORMANCE: March to June 2020

PLACE OF PERFORMANCE: Site near Murghab; center of Murghab District in the Pamir Mountains of Gorno-Badakhshan Autonomous Region, Tajikistan.

Background

Tetra Tech ES, Inc., is the implementing contractor for the U.S. Agency for International Development (USAID) funded program “Power the Future” (PtF), which is intended to provide technical support, improve access to electricity, advise on transactional and regulatory improvements and deliver capacity building across the broader energy sectors of various Central Asian republics.

Within these supporting activities, and given the particular conditions of the Murghab area, to improve energy access, grid stability and power availability, PtF is procuring for Pamir Energy, the national electric utility, a grid connected, ground mounted, solar pv generation system paired with an energy storage system (BESS) to effectively compensate any sudden drop in the energy produced by solar system and, eventually provide other additional power delivery improvements or added values.

The combined system of solar pv generator and BESS will have the required components to be suited for being remotely managed from the Pamir Energy hydro power plant, located about 500 m south-south-west of the allocated solar site, to which a fiber optic data link is being provided along the dedicated interconnection feeder.

The complete system, solar pv and BESS, will be built on an already allocated and conditioned site and connected to the local grid by a step-up transformer and a dedicated 10 kV feeder.

To support this pilot project, Pamir Energy is providing the land plot, supply, installation and connections works of the dedicated interconnection feeder, installation of the fiber optic cables, perform the site groundworks and civil works, obtain all permitting and customs clearances, perform the in-country freight to site as well as supply and install some site civil construction elements, all of which are detailed below.

Presently Pamir Energy has already performed some of the required civil works on the site and the interconnection erection, details of which and present status are detailed below.

About Pamir Energy

Pamir Energy’s mission is to bring light and warmth to each household of in Viloyati Mukhtori Kuhistoni Badakhshan (VMKB, also referred to as GBAO), the mountainous region of in the eastern part of Tajikistan that is home to over 227,000 people.

Since it was established in 2002 as the first Public Private Partnership (PPP) in Central Asia, Pamir Energy has restored 11 hydropower plants that had become damaged or dilapidated in past and increased generation capacity from 23MW to 44MW.
Over the last 17 years, Pamir Energy has increased access to clean, reliable and affordable electricity from 13% to 96% of the population of VMKB. Plans are currently underway to electrify the remaining 4%.

Since 2002, in cooperation with the Government of Tajikistan, Pamir Energy has attracted USD 110 million in investment from international partners to rehabilitate infrastructure and expand the network so that communities in neighbouring northern Afghanistan can also access electricity. In 2019, Pamir Energy in partnership with the Government of Tajikistan attracted an additional USD 90 million from its partners to increase its power generating capacity and reach further bringing total investment in the energy sector of VMKB to USD 200 million.

Pamir Energy has been recognized as one of the top PPPs globally by the United Nations Economic Council for Europe in both 2009 and 2016 and won the prestigious Ashden Sustainable Energy Award in 2017.

Pamir Energy is a subsidiary of the Aga Khan Development Network and is operating under a 25-year concession agreement with the Government of the Republic of Tajikistan.

**Grid conditions**

The region’s isolated grid, which serves the township of Murghab and Kanakurgan village, has a 10 kV distribution network operating at 50 Hz, with low voltage of 400 V for three phase and 230 V for single phase. The distribution network has 3 main radial circuits, east and west, with one looped serving Murghab which are presently powered by an utility’s owned and operated river-run single hydro power plant, having 2 x 750 kW turbines or generation units, providing 2 x 750 kW (1,500 kW) of maximum capacity during the summer season, which is reduced to 1 x 750 kW along the winter season, effectively curtailing the demand to the available generation. The hydro plant is located in an approximate position which is equidistant between the two served cities.

The power output and operation of the hydro plant’s generation units is managed with a proprietary AGC and generators are capable of remaining connected in a frequency range between 40 and 60 Hz, while the normal operation frequency range is 48.5 to 51.5. The actual load curtailment rate is 10 kW per each 0.1 Hz below 48.5 Hz.
Environment & Weather

The township of Murghab is the center of Murghob District in the Pamir Mountains of the Gorno-Badakhshan Autonomous Region of Tajikistan. With a population of 4,000, Murghab is about the only significant township in the eastern half of Gorno-Badakhshan, being the highest township in Tajikistan at 3,650 m above sea level and experiences relevant below 0 conditions in winter, which may reach -40°C, both are likely to affect the operation ranges of the equipment, which bidders shall account for in their proposed designs and equipment selection and reminded of the derating implications from altitude combined with the repercussions from temperature levels.

Average values of weather relevant information can be found at
https://www.woeurope.eu/weather/maps/city

Plant’s allocated site

The allocated site is approximately 6 km east of Murghab township, and 3.5 km south of the airstrip by road, equivalent to 1.5 km in straight line. The distance from the hydro power plant, which provides most of the area’s power, is about 600 m in a straight south-south-west direction.

The UTM W84 coordinates of the allocated plot are 414355.00 m E and 4225826.00 m N in zone 43 S, equivalent to 38.176383° decimal Latitude and 74.022331° decimal Longitude.

The site area can be reached by paved road from Murghab and Kanakurgan, followed by a transit of about 900 m over drivable sand tracks to the plant’s allocated plot.
Site’s soil conditions

On visual inspection of the groundworks already performed, the soil is mainly composed of low-density clay, limestone and granitic origin sands, with profusion of medium to coarse gravel (ISO 14688) or pebbles of piedmont origin, both on surface and underground.

The high participation of clay provides little absorption of rainwater, which will tend to form shallow ponds and will wash down towards the southern part of the site and general area.

The ground resistance measurements performed indicate a ground resistivity in excess of 200 Oh. Bidder designs shall account for this circumstance and provide adequate components to achieve adequate grounding resistance. This grounding improvements shall also be accounted for in the lightning protection system.

Works already performed on site by Pamir Energy

Within the scope of his support to the project, Pamir Energy has completed the following works on the site:

• Obtaining of rights for the site, building permits and power plant operation license.
• Site preparation, with clearance, leveling, backfilling and compacting, leaving the site ready to accept the system’s installation.
• Site fencing has been completed on all 4 sides of the site.
• Fence gates have been delivered and installed.
• Transformer pad, executed in reinforced concrete, is completed and ready to accept the installation of the transformer inclusive of cabling ducts and routes.
• Equipment enclosure to host inverters, BESS, AC protections and telecom components, has been completed, inclusive of incoming and outgoing cable ducts, and internal cable pits.
• Trenches for AC and DC to and from their anticipated positions to the equipment enclosure and to the transformer pad.
• Interconnection feeder poles including the plant’s interconnection pole.
Works to be executed by Pamir Energy once this project is awarded

Once this project is awarded and, as by the EPC schedule to be provided by the awardee, Pamir Energy will perform the following works,

- Trenching, pulling and installation of the grounding system and lightning grounding system.
- Pulling and installation of the lighting and surveillance system.
- Cable pulling, terminations and installation of DC, AC, grounding, lightning and lighting.
- Walling of the BEES section within the enclosure cabinet if required by bidder’s design.
- Termination and connection of the HV cables, on transformer, outgoing switchgear.
- Installation and HV connection cabling to recloser at interconnection pole.
- Installation of HV interconnection components (to be supplied by bidder).
- Supply, installation and termination of the HV cabling from HV transformer to poles.
- Closing and compacting of trenches and sealing of ducts.
- Installation of the fiber optics cable from the site to the hydro power plant.
- Site cleaning and final conditioning.
- Maintenance, operation and landscape.

Scope of services and support to be provided by Pamir Energy

Once the project is awarded and, as by the procurement and EPC schedule to be provided by the awardee, Pamir Energy will provide the following services,

- Clearance of customs and duties, inclusive of all costs and customs transit.
- Transport means and costs from customs to the site.
- Unloading and positioning of the equipment on site.
- Facilitation and support in local procurement of machinery and labor.
- 20 Tm tractor with hydraulics for ramming head (excluding ramming head).
- Support for obtention of local logistics, welfare and regional suppliers.
- Labor support on all installation works.
- Appointment and availability of the selected personnel to be trained.

Scope of equipment and services to be provided by bidder.

The awarded bidder will, in compliance with IEC and European applicable standards, procure, deliver and execute the engineering, procurement logistics, installation, testing, commissioning and create the applicable OM schedule and program of,

- Solar panels with an aggregated capacity enough for the solar system to deliver a minimum of 200 kW at inverter AC output at site’s yearly average radiation, manufactured by an entity which, within the last two years, has provided their own manufactured and branded panels to at least to five different projects, each in excess of 1 MWp and, build with non-recursive project finance from, at least, five different non-governmental commercial banks and being the project’s financial structure and technical details disclosed and verifiable by an unrelated third party. Bidders are encouraged to evaluate feasibility of emerging panel
types like PERC and Bi-Facial.

- DC Combiners as required by the design proposed by the bidder.
- DC Protections as required by the design proposed by the bidder.
- Mounting structure or racking system, fix orientation and tilt, adequate for the size and number of panels to be provided and suitable for the environmental and soil conditions of the site, with the adequate tilt and row spacing for optimal energy performance along the year.
- Inverter or inverters, adequate for the installed capacity of the solar panels and the site conditions, minimizing clipping and power conversion losses and, to be fully monitored and actively managed, if needed, from remote with the adequate software and/or interface. Depending on the design proposed by bidder, inverters ramp up rate may be required to be programmable.
- AC Combiner as required by the design proposed by the bidder.
- AC Protections as required by the design proposed by the bidder.
- AC switchgear and bus adequate for the connection to the HV transformer.
- Auxiliary power source and system to operate motorized switchgears, enclosure’s temperature control system, telecoms and remote management systems, weather station, reclosers and site surveillance system in case of grid failure, at least, for 48 hours.
- Equipment enclosure’s temperature control system, if required by selected components to be hosted.
- DC, AC, HV, cables and grounding wires as required by the design proposed by the bidder.
- Grounding network and components as required by design and to meet IEC safety and protections standards according to the site’s ground resistance (> 200 Oh).
- Complete BESS of adequate capacity to, at minimum, be able to automatically compensate the instantaneous drop of output from the solar system during his daytime hours of operation and be fully monitored and actively managed, if needed, from remote with the adequate software and/or interface, which shall be included. The instantaneous solar variability rate is estimated at ≥ 80% in 15 seconds. The EMS of the BESS shall be able to operate within programmed ramp rates. For indication purposes, the minimum capacity expected for the BESS is 150 kW for 15 minutes, while bidder shall calculate and propose a BESS capacity based on his design and, such capacity may not relate to the previous indication. Bidder is welcomed to propose a BESS capable of providing additional grid services, like grid balancing and/or other ancillary services. The calculated operation and duty cycle of the BESS for generation variability compensation and other proposed services shall be included in bidder’s proposal.
- Onan type transformer, pad mounted, with tap off load, complete in enclosure with LV and HV switchgears and ready to connect, from 400 V to 10 kV, of adequate capacity for the proposed LV capacity as by the proposed design and operation of solar pv generator and BESS.
- The following HV interconnection components:
  1) Disconnector of 10 kV - outdoor installation, remote control (rod) with grounding knives on one side (2 pieces).
  2) Voltage transformer 10 / 0.1 kV, three pieces (for each phase 1 piece) or 3-phase (1 piece), cast, for outdoor installation.
  3) Current transformer, with transformation ratio 4 Secondary current 5 A. 3 pieces (1 piece for each phase). Two current secondary windings in each current transformer - for protection and for accounting. Accuracy classes - respectively windings 1 and 0.5.
  4) Vacuum circuit breaker 600A (recloser) for remote wired command in the conditions of Murghab -50 +60 C. Outdoor on mast installation.
5) Protections - Standard set of protections for current, voltage and frequency transformer, which will feed the reclosers and metering units.

6) Surge arresters 12.5 kV. Three pieces (1 piece for each phase), polymer. For protection of meter and reclosers to be installed on pole before transformer and reclosers.

7) Glass or resin Insulators - in the last 4 poles for pole mounted equipment, rated for 10 kV.

8) Conductor - Bare AL 50 with steel drive core. 100 m.

9) Grounding conductor for the first 4 poles - connected to the Solar/BESS grounding. Flat CU or Steel cable 5mm thick, 25 mm wide, length 50 m.

- Weather station adequate for solar plants, complete with tilted and horizontal pyranometers, hygrometer, barometer, anemometer, wind direction gauge, air temperature, shadow temperature and panel temperature sensors; equipped with real-time telecommunications link and data storage capabilities.

- Dust accumulation sensor, connectable to the communications data hub for adequate data presentation in the remote monitoring and management system.

- Complete Lightning protection system, adequate to protect the system and his components, according to applicable IEC standards.

- Surveillance system comprehending IR cameras with remote recording and LED flood lighting system activated by motion sensors and siren, to be activated with the siren only during daytime and together with the flood lighting during night time.

- Fiber optics cable from solar plant to hydro plant, and encoder/decoder data hub and interface, both on plant’s site and Hydro plant.

- All software which may be required by any equipment and/or component for his local and/or remote operation shall be inclusive of supply, installation, programming and operation.

- Training of Pamir’s Energy selected personnel on the installation, operation and maintenance of the solar generator and the BESS.

- Installation, testing and commissioning of all the equipment and components supplied.

**Minimum technical and quality requirements of the main equipment and components to be provided, installed and commissioned by the bidder.**

All equipment and components must be in accordance with applicable IEC or IEEE standards and all values will be in metric system.

<table>
<thead>
<tr>
<th>Equipment / Component</th>
<th>Minimum technical and/or quality requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar panels or modules</td>
<td>Generation warranty ≥ 80% at year 25. LID/PID immune. ≥ 320 Wp per unit. 3 By Pass diodes, if applicable to the panel’s technology. Efficiency ≥ 18.5%. NOCT ≤ 44 Deg C. Bidders are encouraged to evaluate feasibility of emerging panel types like PERC and Bi-Facial. Certification of compliance with all applicable IEC and CE standards and regulations, manufactured by an entity which, within the last two years, has provided their own manufactured and branded panels to at least to five different projects, each in excess of 1 MWp and build with non-recursive project finance from, at least, five different non-governmental commercial banks and being the project’s financial structure and technical details disclosed and verifiable by an unrelated third party.</td>
</tr>
<tr>
<td>Inverter/s</td>
<td>Utility scale string type. Recognized and reputed manufacturer. Euro efficiency</td>
</tr>
</tbody>
</table>
25% Warranty extension > 15 years shall be included. Complete DC protections with disconnector and surge arresters. Programmable ranges of frequency, power factor, under/over frequency, voltage and ground fault. Programmable ramping rate. Nominal AC voltage / AC voltage range: 400 V / 304 V to 477 V. AC grid frequency / range: 50 Hz / 44 Hz to 55 Hz. Rated grid frequency 50 Hz. Power factor at rated power / displacement power factor, adjustable from 0.6 to 1. Harmonic (THD) < 3%. Ground fault monitoring / grid monitoring / DC reverse polarity protection. AC short-circuit current capability. All-pole-sensitive residual-current monitoring unit. Monitored surge arrester (type II) AC / DC. Protection class (according to IEC 62109-1) / overvoltage category (as per IEC 62109-1) I / AC: III; DC: II I / AC: III; DC: II. Programmable Ride Through response to frequency and voltage. Reactive power generation capable. Grid forming capable. Modbus and/or TCP/IP communications. Certificates and approvals IEC/EN 62109-1/-2, IEC 62116, IEC 61727 as minimum.

<p>| Mounting structure or racking system | All HDG elements in ≥ 90 microns coating, cut to measure and drilled in factory before HDG treatment. All AL elements in 6005T5 or above corrosion resistance. All steel in stainless steel 316L or above. All contact points between HDG and AL isolated with nylon, neoprene or equivalent insulator. All nuts, bolts and screws in STS 316L or above. All nuts and bolts with self-locking. Panel clamp locking screws with anti-theft heads or equivalent. Foundations adequate for site conditions, in HDG, either standard 6 m pile-in, or precast slabs. Two main supporting piles /pillars /poles /beams in HDG are recommended. Main beams /arms in HDG. Purlins or upper structure in AL. Panel clamps in AL. Warranty &gt; 15 years. |
| Battery Energy Storage System | Technology to be Lithium-Ion based and delivered to site ready to use. Recognized and reputed manufacturer. Capacity shall be adequate for the solar output equalization and any other value adding services envisioned by bidder, while able to reach sunset with ≥ 75% of charge. Discharge and recharge rates shall be of adequate value for the required basic functionality as by the calculated operations cycles and other value adding services envisioned by bidder. Usable energy ≥ 80% of nameplate after degradation. Warrantied cycles ≥ 10,000 with DOD ≥ 80%. For reference purposes, the anticipated minimum capacity is 150 kW for 15 minutes, while bidder’s dimensioning may be unrelated to this reference. TCP/IP and/or Modbus communications for remote monitoring and active management enabled. Inverter/s, if applicable, will meet, at minimum, the same requirements as those defined for the solar inverters. Remote programmable and editable EMS functionality to assure operation of output equalization as described herein and other value adding services. Any additional grid and/or power balancing capacities and/or ancillary services that bidder may optionally propose will be positively scored towards the proposal evaluation. |
| Cabinet Climate Control Equipment | Given the site conditions, especially during winter, Bidder shall include a climate/temperature control system within the components to be installed in the inverter’s enclosure to assure key components operate within acceptable temperature ranges. The climate control units shall be operated automatically as by the component’s temperature requirements; this operation can be commanded either from the key components themselves or by the climate control units by means of the adequate sensors. |
| HV Transformer | 400 V to 10 kV step up, Onan type, outdoors pad mounted, with de-energized... |</p>
<table>
<thead>
<tr>
<th>Weather Station</th>
<th>From reputed manufacturer, complete with tilted and horizontal calibrated pyranometers, hygrometer, barometer, anemometer, wind direction gauge, air temperature, shadow temperature and panel temperature sensors; equipped with real-time telecommunications link and data storage capability. The weather station shall remain operational in the event of grid failure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabling</td>
<td>Cables shall be adequate for application according to IEC standards. All cables shall be certified UV resistant and outdoor rated, halogen free and PCV or XLPE sleeved, as per type. Cores can be solid or stranded but stranded is highly recommended for workability in site conditions. DC cables must be single core and routed so that arching is not possible. AC/LV can be single core or multicore, but single core is highly recommended for workability in site conditions. HV cables shall be AL single core stranded. Colors must be IEC standard (DC: +Red, -Black/Blue; LV: L1,Brown, L2,Black, L3,Grey, N,Blue; Ground: Yellow-Green striped; HV: Black with terminations taped in the required phase color). DC max losses, from string ends to inverter: 0.2%. AC max losses, from inverter to transformer: 2.0%. All cables will be tagged with reference numbers.</td>
</tr>
<tr>
<td>Cable Terminations</td>
<td>All terminations must be pre-insulated type, for mechanically crimped-on installation and rust proof. DC connectors must be MC4 type IP67 unless current limit is exceeded by system design. For AL cables terminations must also be bimetal.</td>
</tr>
<tr>
<td>Cable Routing</td>
<td>DC cables shall be run on the mounting structure until either reaching the DC Combiners or if being pulled underground to reach the coupling point, all cables, DC, AC/LV, HV and fiber optics shall be ducted. DC/AC/LV Cables can also be run on 10 cm elevated HDG over-ground covered trays, shallow ground-leveled pre-cast trenches and open HDG or mesh trays inside the equipment enclosure.</td>
</tr>
</tbody>
</table>

**Minimum drawings, designs and other documents to be provided by the bidder.**

Detailed georeferenced data of the existing works and components on site will be provided to the awardee. Drawings and designs by awardee will be in metric system, georeferenced to site real-world coordinates using UTM W84 datum and layered by group of related components according to the construction and installation sequence and, delivered in A0 pdf format and A4 pdf subsections of the construction’s relevant areas, for field usage. These documents will not be considered delivered or completed until formal acceptance by Tetra Tech.

- The complete EPC program or “EPC Master Plan”, in MS Project, including complete task breakdown, dependencies, task ownership and required resources, from award to hand over; this will also be used as the coordinated project tracking tool.
- Concept of design and components.
- Generation and operation simulations with bankable software and datasets.
- Plant SLD’s ready for construction.
- Site trenches by type, with detail and cross sections.
- Grounding system, with details and cross sections.
- Lightning protection system, with details and cross sections.
- Lighting and surveillance system, with details and cross sections.
- All Cables routes, with details and cross sections.
- Mounting system, with details and coordinates for each pile or foundation and cross sections.
- Panels layout and strings routings.
- Panels installation and fixing, with details.
- Strings identification and grouping.
- DC Combiners and protections.
- DC Routes from Combiners to Inverters, if applicable by design.
- Inverters DC In.
- Inverters mounting, with details and cross sections.
- Inverters AC Out.
- AC protections.
- AC routes from inverters to AC Combiners, if applicable by design.
- Switchgears panels and cable routings.
- Connections to LV, with details.
- HV cables routings, with details and cross sections.
- Connections to HV, with details.
- General layout of site.
- Site inspection and snagging list.
- Cold testing procedures, including reference values.
- Hot testing procedures, including reference values.
- “As Built” Manual, including all the above final documents, warranties of components, delivery notes, changes of orders and other relevant documents.
- Software manuals.
- OM Schedule with procedures and remedial incrustations.

The aggregation of the above listed plans and drawings or “Engineering Package”, is considered a deliverable or milestone, subject to a deadline.

Complete list or “Procurement Package”, with full contact details of all suppliers, intermediaries, agents, freighters, contractors and any other party employed by awardee or related to the implementation of the project, for which an adequate confidentiality agreement will be provided by Tetra Tech. This list is considered a deliverable or milestone and subject to a deadline.

As procurement is performed by awardee, proof of order placement and payment to suppliers or service providers, as well as updated delivery schedule shall be submitted to Tetra Tech for filing and project tracking. Adequate confidentiality agreement will be provided by Tetra Tech.

**Project Milestones.**

The below list shows the relevant project milestones and deliverables, as well as the expected deadline for their
delivery. The deadlines will be revised with the awardee once the EPC Master Plan has been provided.

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Deadline</th>
<th>TPC %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EPC Master Plan</td>
<td>Mar 9</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Procurement Package</td>
<td>Mar 16</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Engineering Package</td>
<td>Mar 23</td>
<td></td>
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<tr>
<td>4</td>
<td>Procurement Contracting Completion</td>
<td>Mar 30</td>
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<td>5</td>
<td>Mobilization on Site</td>
<td>Apr 6</td>
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<tr>
<td>6</td>
<td>Completion of DC Section to Inverter input, inclusive of panels,</td>
<td>Apr 24</td>
<td>15</td>
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<td>grounding, lightning, lighting and cold testing.</td>
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<tr>
<td>7</td>
<td>Completion of AC/LV Section to HV Transfo, inclusive of weather</td>
<td>Apr 27</td>
<td>15</td>
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<td>station, auxiliary power, BESS system and cold testing.</td>
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<tr>
<td>8</td>
<td>Completion of HV Section to Recloser, inclusive of telecom,</td>
<td>May 1</td>
<td>10</td>
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<td>software and testing.</td>
<td></td>
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<td>9</td>
<td>Completion of Hot Testing &amp; Commissioning</td>
<td>May 22</td>
<td>20</td>
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<tr>
<td>10</td>
<td>Training, Snagging and Remedial</td>
<td>May 29</td>
<td>0</td>
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<tr>
<td>11</td>
<td>OM Supervision, Hand Over &amp; As Built</td>
<td>Jun 8</td>
<td>10</td>
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<tr>
<td>12</td>
<td>Continuous Operation Test (28 days)</td>
<td>Jun 19</td>
<td>30</td>
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ATTACHMENT B – DETAILED BUDGET

PROPOSED DETAILED BUDGET

The proposal shall include the below described TABLE 1, where the bidder shall reflect the total amounts equivalent to the percentages defined in TABLE 1 by adding 1 column to the defined format.

TABLE 1- Overall Budget.

<table>
<thead>
<tr>
<th>Equipment/Component</th>
<th>Unit</th>
<th>Qty</th>
<th>Value</th>
<th>Total Value</th>
<th>% of Total</th>
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<tbody>
<tr>
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<tr>
<td><strong>Total</strong></td>
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</table>

Prices quoted must be valid for 30 days, and account for ALL remuneration, per diem, travel, communications, report reproduction and other out-of-pocket expenses, taxes and other costs, but including the VAT tax that may be originated in Tajikistan. On this basis Tetra Tech will issue a Fixed-Price contract, and payment shall be based upon acceptance of deliverables described in the Attachment A.
ATTACHMENT C- REPRESENTATIONS AND CERTIFICATIONS

Bidder Representations and Certifications

1. **Organizational Conflict of Interest Representation**
   The bidder represents, to the best of its knowledge and belief, that this award: does [ ] or does not [ ] involve an organizational conflict of interest.

   *Please see FAR 52.209-8 for further explanation.*

2. **Data Universal Numbering System (DUNS) Number** (required if cost proposal is more than USD $30,000)

   
   (please use one box per number or dash)

3. **Source and Nationality of Goods and Commodities**
   (i) This is to certify that the Bidder is:
   a. an individual who is a citizen or legal resident of ________________________________.
   b. a corporation of partnership organized under the laws of ________________________________.
   c. a controlled foreign corporation of which more than 50% of the total combined voting power of all classes of stock is owned by United States shareholders; or
   d. a joint venture or incorporated association consisting entirely of individuals, partnerships or corporations. If so, please describe separately the citizenship or legal status of the individuals, the legal status of the partnership or corporations, and the percentage (%) of voting power of the corporations.

   (ii) This is to certify that the **Source** (the country from which a commodity is to be shipped from) of the Equipment to be supplied under this Order is:

   
   name of country or countries

   By signing below, the Bidder certifies that the representations and certifications made, and information provided herein, are accurate, current and complete.

   Signature: _____________________________ Date: ___________________________

   Name of and title of authorized signature: