



INVITATION TO TENDER
FOR THE PROCUREMENT OF AN
ENGINEERING PROCUREMENT AND CONSTRUCTION (EPC) CONTRACT
FOR
5 ROOFTOP SOLAR PV SYSTEMS WITH BATTERY ENERGY STORAGE
TECHNOLOGY AND ACCESSORIES
FOR THE RESEMBID SUSTAINABLE ENERGY PROJECT (SEP) TITLED,
“TRANSITIONING TOWARDS GREEN ENERGY IN THE TURKS AND CAICOS
ISLANDS”



THE GOVERNMENT OF TURKS AND CAICOS ISLANDS
Ministry of Home Affairs, Transportation, Broadcasting, Energy and Utilities and
Telecommunications Commission (MOHAT)

TENDER REFERENCE NUMBER: RES - 33/TCI-04

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SECTION 1: PROJECT BACKGROUND

The Turks and Caicos Islands (TCI) is one of the most vulnerable member states of CARICOM. An archipelago of 40 low-lying islands and cays, TCI's geographic location, and small economy make it highly susceptible to climate change impacts such as the increased frequency of hurricanes and sea-level rise (SLR). These climate change impacts pose a significant risk to the local economy, critical infrastructure, and livelihoods of TCI islanders.

The high exposure and vulnerability to the local energy sector are evident following an active 2017 Atlantic Hurricane Season. Hurricane Irma (a Category 5 hurricane) ripped off roofs, caused significant flooding throughout communities, and destroyed utility poles resulting in mass power outages. Compounding the damage already felt, just days later, TCI would be struck by a second major hurricane, Hurricane Maria (Category 3), with winds up to 125 miles per hour (mph). To address the damage caused to the local energy utility system, local utility company, FortisTCI, would be forced to import much-needed capacity from their international parent companies in Canada, the United States and across The Caribbean. It would then take the team 60 days after Irma to restore power to the country; however, many residents remained without power due to the damage caused to their homes and the inability to connect power safely. Currently, electricity is generated primarily through diesel (84MW); however, there is a national consensus (across the public and private sectors) to expand renewable energy in the most environmentally friendly manner.

In addition to hurricane impacts, strengthening TCI's energy sector is critical to the country's overall national development plan and the diversification of its economy. The country's National Development Plan (2020) outlines national challenges, vision statements, and ten strategic goals, including creating a more sustainable future, investing in human capital, supporting quality infrastructure and services, and creating a knowledge based competitive economy. The high cost of electricity, inadequate electrical generation to support future development, and poor infrastructure were all identified as significant challenges that warranted urgent action. With the tourism sector accounting for 36.6% of total GDP (2017), the electricity sector must maintain and improve its reliability, resilience, cost-effectiveness, and environmental sustainability to drive new economic activity while further enhancing the lives of TCI Islanders.

Demonstrating leadership towards green energy, FortisTCI installed 1 MW of distributed roof-top solar on commercial buildings through its Utility Owned Renewable Energy Program (UORE). An additional 1MW of ground-mounted solar is also set to be constructed. While this is a step in the right direction, accelerating the sustainable energy transition will require TCI to undertake a deeper investment in capacity building, the development of modern legislative and regulatory frameworks, and catalytic pilot projects.

The overall objective of this project is to contribute to the acceleration of a reliable, resilient, and environmentally sustainable energy sector in TCI (Renewable energy penetration rate). It will also strengthen capacity for sustainable energy transition in TCI through investment in capacity building; development of modern legislative and regulatory frameworks; catalytic pilot projects.

To support the improvement and transformation of TCI's energy sector, The Turks and Caicos Islands developed its Resilient National Energy Transition Strategy (R-NETS), which offers a comprehensive evaluation of the energy sector and identifies short, medium, and long-term needs for the development of a green energy network. In 2019, the TCIG/RESEMBID SEP Cabinet adopted the R-NETS, led by TCIG/RESEMBID SEP, Fortis TCI, and Rocky Mountain Institute (RMI) and identified an optimal pathway to reach at least 33% renewable energy penetration by 2040 with the installation of "microgrid-capable" renewables at critical public facilities. The R-NETS also recommended the pursuit of efficiency, the acceleration of legislation to support TCIG/RESEMBID SEP and FortisTCI programs, and additional utility-scale and pilot battery storage projects.

Following the R-NETS, in 2020, in partnerships with the Clinton Climate Initiative (CCI) and RMI, a Solar Land and Rooftop Assessment of 31 critical facilities were completed to assess their solar PV potential for roof-top or ground-mounted systems. The team identified 17 sites as suitable locations for ground-

mount solar PV, totaling 67.6 MW in capacity, while high-opportunity sites for roof-top solar showed potential for 7.9 MW.

Building on these existing national strategies, this proposed project will progress the TCIG/RESEMBID SEP national goals to take proactive steps to diversify the local economy and heighten public systems to support future development and climate resiliency in a post-COVID-19 era. Like other tourism-dependent islands throughout the region, the global health pandemic severely impacted TCI's tourism industry. Much-needed revenue generated directly and indirectly from the tourism sector was lost and had a trickle-down impact on the local labour market. This proposal will provide much-needed investment into enhancing public infrastructure and offer tangible outputs to improve capacity to develop resilience to climate change.

SECTION 2: PROJECT SUMMARY

PROJECT SPECIFIC OBJECTIVES

The specific objective of this project is to strengthen the capacity of the TCI for a sustainable energy transition. It is against this impact statement to create long-term and meaningful change within the energy sector and across public systems that the following set of outcomes and actions are proposed.

Component 1: Catalytic pilot energy projects implemented.

Output 1a: Solar PV Microgrids

At the end of the project, a solar roof-top feasibility, and structural assessments of five (5) essential government critical facilities (including 4 clinics and the Wellness Centre in Grand Turk) for solar PV and energy efficiency upgrades will be conducted. The necessary data to support the project will be collected and analyzed, including a capacity needs assessment (CNA). Catalytic pilot energy projects will be implemented to reduce TCI's dependency on imported fossil fuel. Additionally, energy audits will be conducted to assist in designing Solar PV systems and Battery Energy Storage Systems (BESS) for the critical facilities identified.

Output 1b. Solar Streetlights

One hundred and forty (140) hurricane-resilient solar streetlights installed on; North Caicos (25), Middle Caicos (15), South Caicos (20), Grand Turk (30), Salt Cay (10), and Providenciales (40) will be installed.

Component 2: Applicable laws and regulations, policies related to the national energy transition strategy critically reviewed and Energy efficiency market transitions are strengthened.

A comprehensive review of existing energy legal and regulatory frameworks, including the Electricity Ordinance, Customs Ordinance, Physical Development Ordinance, Development Manual, Building Code, Energy Policy, and housing policies will be conducted and proposed amendments will be made to existing applicable laws, regulations, and policies in TCI. A financial and investment analysis of RE and EE technologies will also be conducted.

A strategy for the market transition towards efficient energy-consuming products and appliances will be developed in accordance with the criteria of CARICOM Regional Organization for Standards and Quality (CROSQ). A draft report on the recommendations (regulations, defining procedures and infrastructure needs, and outline procedures for market surveillance) will be prepared by the project. A report on financial and investment analysis of RE will also be prepared under this component of the project.

Component 3: Increased national conversations, interests, and knowledge awareness surrounding sustainable energy and TCI's green energy transition.

A Communications and Visibility plan, and a Community Outreach, Awareness, and Communication Strategy will be prepared and implemented, including but not limited to the development of EUD

website. The design and distribution of flyers, brochures, posters, billboards, press releases, radio & TV interviews, town hall/public meetings will be populated on the UED website periodically.

Component 4: Improved institutional capacity building for energy transition and economic Diversification.

At the end of the project the local capacity of TCI residents to participate in the transition towards green energy will be enhanced. A cadre of local experts on RE and EE will be established to support TCIs green energy transition.

SECTION 3: INTRODUCTION

This Invitation to Tender (ITT) relates to the TCI RESEMBID Sustainable Energy Project (SEP) (Grant Contract No. 22-SB2334) entitled "Transitioning Towards Green Energy in the Turks and Caicos Islands/RES-33/TCI".

We are pleased to inform you that you are invited to take part in the simplified procedure for the above EPC contract. The complete tender dossier includes:

- A. TENDER FORM
 - Declaration of honour on exclusion and selection criteria Form a.14
- B. FORMS regarding selection criteria:
 - Financial capacity Form 4.4
 - Technical and professional capacity Form 4.6.5
- C. TECHNICAL OFFER:
 - Legal Entity File FORM 4.3
 - Overview of the tenderer's staff Form 4.6.1.2
 - Plant Form 4.6.2
 - Work plan and programme Form 4.6.
 - Technical Specifications
- D. ADMINISTRATIVE COMPLIANCE AND EVALUATION GRID
 - Administrative compliance grid
 - Evaluation grid
- E. CONTRACT FORM
- F. SPECIAL CONDITIONS
- G. FINANCIAL OFFER
 - Annex IV: budget breakdown (model financial offer)
 - Annex V: model performance guarantee
 - Bank account notification form

For full information about procurement procedures please consult the practical guide and its annexes, which can be downloaded from the following web page:

<https://wikis.ec.europa.eu/display/ExactExternalWiki/ePRAG>.

We look forward to receiving your tender and the accompanying tender guarantee, which must be submitted no later than the submission deadline mentioned in the Contract Notice.

By submitting a tender, you accept to receive notification of the outcome of the procedure by electronic means. Such notification shall be deemed to have been received by you on the date upon which the contracting authority sends it to the electronic address you referred to in your offer.

If you decide not to submit a tender, we would be grateful if you could inform us in writing, stating the reasons for your decision.



SECTION 4: DEFINITIONS FOR THE TECHNICAL SPECIFICATIONS

All defined terms shall have the meaning prescribed to them in the Agreement, or as defined below:

Term	Definition
AHJ	Authority Having Jurisdiction (e.g., Planning Department)
Applicable Standards	Governmental and industry standards and requirements to which the Work shall comply
Array	May describe the entire PV System or a portion of it, representative of all equipment necessary to facilitate PV power generation and delivery of electricity including but not limited to Modules, Racking, Combiner Boxes, and wiring.
Combiner Boxes	DC Combiner Box includes UL listed enclosure, bus work and OCPD required to combine multiple dc source circuits onto a single, larger, set of conductors
Commission	Energy and Utilities Commissioner
CT	Current transformer
TCI BC	TCI Building Code
DAS	Data acquisition system
Design Life	25 years
DWG	Electronic data file format for AutoCAD drawings developed by Autodesk, Inc.
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPC	Engineer, procure, and construct
FTCI	Fortis TCI
Geotechnical Report	The Contractor-supplied subsurface investigation in sufficient detail to identify all required design-related parameters related to the soil and subsurface conditions.
HVAC	Heating, ventilation and air conditioning
Hz	Hertz
kV	Kilovolts
IBC	2018 International Building Code
IEEE	Institute of Electrical and Electronics Engineers
IFC	Instructions for Construction
kW	Kilowatts
kWh	Kilowatt hours
LOTO	Lock-out, tag-out

LV	Low voltage, defined as less than 1,000 volts
MET Station	Meteorological station, consisting of multiple sensors to record environmental conditions
Mounting Structure, Racking	A mechanical assembly of racking members used to support the PV modules and string wiring,
MPPT	Maximum power point tracking
MV	Medium Voltage, defined as between 1,000 V and 35kV
NEC	2020 National Electrical Code
NFPA	National Fire Protection Association
OCPD	Overcurrent Protection Device
O&M	Operations and Maintenance
PDF	Portable document format, an electronic data file format developed by Adobe Systems Inc.

Term	Definition
POI, Point of Interconnection	The Point of Interconnection is the location at which the Project's power System is interconnected with the Utility's Facilities. The Point of Interconnection is the physical termination point between the Contractor and the Utility's Facilities. Unless otherwise indicated, the Point of Interconnection is the low voltage terminals provided by the Utility.
PPE	Personal protective equipment
PV	Photovoltaic
Qualified Person	A person licensed by the Government Electrical Inspectorate to perform installations
STC	Standard test conditions (1000 W/m ² , 25°C module temperature and AM1.5 spectrum)
String	Circuit of PV Modules connected in series
Test, Testing	Any visual, mechanical, electrical or functional inspection or examination required to confirm Project Equipment and/or systems have been installed in accordance with this Agreement, Good Industry Practices, Applicable Laws, Applicable Standards and manufacturer recommendations.
Wp	DC capacity measured as the sum of the nameplate rating of each PV Module

<p>60% Design Documents</p>	<p>Design Documents intended to represent a reasonably complete design package. Many of the design submittals may be preliminary or conceptual in nature, without having all exact details defined. 60% of Design Documents shall be provided as a single comprehensive submittal. To the extent possible, all PDFs shall be combined into a single file. 60% Design Documents shall include (at minimum):</p> <p>Design Basis:</p> <ul style="list-style-type: none"> - Design criteria for each engineering discipline - Contractor’s equipment and system designation methods - List of systems and system designations <p>Electrical Package:</p> <ul style="list-style-type: none"> - Schematics and single line drawings detailing: array and DC Collection System Circuits, LV ac collection system, Site lighting, auxiliary and backup power, MET stations, DAS and communications systems, grounding design Wiring details including: specifications for all conductor types, conduit, protective devices and relays; ampacity calculations for all directly buried conductors; voltage drop calculations for all conductor runs; trench details, combiner box wiring details, minimum bend radii, conductor termination details, conduit fittings, etc. - Equipment pad layout design including conduit entry - Supporting documentation for all components (transformers, modules, CB’s, etc.) including specification of all requirements for all components, manufacturer’s datasheets, installation manuals, operations and maintenance manuals <p>Structural Package:</p> <ul style="list-style-type: none"> - Elevations depicting mounting configurations for all equipment - Foundation designs for all equipment pads and Mounting Structures, etc. - Corrosion analysis <p>Civil Package:</p> <ul style="list-style-type: none"> - Detailed Site layout with topographic detail, grading plan, final top of pile elevations to establish PV table height, internal roads, storm water management plan, etc. in accordance with the Geotechnical Report and Flood Risk Assessment for each site.
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Battery Energy System Definitions:

Term	Definition
Actual Capacity (Ah)	Real capacity in Ah of battery, typically lower than Nominal Capacity due to ageing
Actual Capacity (kWh)	Real capacity in kWh of battery, typically lower than Nominal Capacity due to ageing
Battery System	Parallel connection of several packs or strings, forming the battery
Block	A series connection of several cells
C-Rate	The rate at which a battery is charged or discharged
Capacity	The amount of energy a fully charged battery can deliver at a specific discharge current, expressed in Ah
Cell	Smallest subpart of an electrochemical BESS system, where chemical energy is converted into electrical energy
Cycle	A cycle consisting of four controlled phases, with a charge and discharge cycle separated by pauses in which there is no active power in or out of the battery
Cycle Lifetime	The estimated maximum number of possible cycles when a battery is cycled with equal charge/discharge cycles
Depth of Discharge	The amount of energy discharged from a battery during a cycle, expressed as a percentage of nominal energy capacity
Efficiency	The delivered energy of the BESS divided by the energy received
End of Life	The point in time when the performance of the BESS has degraded to the point of no longer being usable in the intended application
Energy Capacity	Total amount of energy in Wh that a fully charged battery can deliver at a specific level of discharge power
Expected Lifetime	The design lifetime of the system based upon the intended use profile during normal operation
Maximum Continuous Power	Maximum amount of power available from the BESS in continuous operation
Maximum Peak Power	Maximum amount of power available from the BESS over a short period of time, such time is specified with the maximum peak power value
Module	Several cells or blocks
Nominal Capacity	Initial capacity as stated by the manufacturer
Nominal Frequency	Frequency at the PCC
Normal Environmental Conditions	The environmental conditions under which the BESS will function as designed. Specified by the installer/designer

Pack	Several modules
Ramp Rate	Rate of change of BESS power, expressed in kW/s or %/s
Response Time	Time required for the BESS to respond to a command or event
Round-Trip Efficiency	Efficiency of the BESS over a single cycle where the initial and final SoC are the same, with a specified DoD
Self-Discharge Rate	The percentage of energy lost in the BESS while sitting idle
Specific Gravity	The ratio of the weight of a solution (sulfuric acid in this case) to the weight of an equal volume of water at a specified temperature
Stack	Series connection of FLOW battery cells
State of Charge	The percentage of charge in the BESS relative to the defined "100% SoC"
State of Energy	The percentage of available energy in the BESS relative to the actual energy capacity
State of Health	Actual capacity of the BESS as a percentage of the initial rated capacity
String	Several modules
System Efficiency	The useful energy output at the PCC divided by the energy inputs to the battery. Includes all parasitic and ancillary loads necessary for the BESS to function.

Abbreviations

<i>Abbreviation</i>	<i>Description</i>
AC	alternating current
AGM	absorbed glass mat
BMS	battery management system
CAPEX	capital expenditures
DC	direct current
DCE	duty cycle eccentricity
DoD	depth of discharge
EMS	energy management system
EoL	end of life
EPC	engineering, procurement, and construction
BESS	battery energy storage system

FAT	factory acceptance test
HAZMAT	hazardous materials
HV	high voltage
HVAC	heating, ventilation and air conditioning
LCC	life cycle costs
LCOE	levelized cost of energy
LCOS	levelized cost of storage
LV	low voltage
MV	medium voltage
PCC	point of common coupling
PMS	power management system
PPE	personal protective equipment
PV	photovoltaic
RTE	round trip efficiency
SAT	site acceptance test
SCADA	supervisory control and data acquisition
SDS	safety data sheet
SoC	state of charge
SoE	state of energy
SoH	state of health
VRLA	valve-regulated lead-acid

SECTION 5: INDUSTRY STANDARDS AND CODES

5.1 Government and jurisdictional codes and requirements

Contractor shall engineer and construct the Project in compliance with all applicable local building codes and requirements adopted by the applicable agencies having jurisdiction.

5.2 Industry codes and standards

Additional industry codes and standards include, but are not limited to, the following:

- ASCE 7-22 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures



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- TCI Building Code (TCI BC)
- 2018 International Building Code (IBC)
- 2018 International Fire Code (IFC)
- “Solar Under Storm: Designing Hurricane-Resilient PV Systems”, Rocky Mountain Institute, Best Practices
- IEC - International Electrotechnical Commission
 - EC 61215 Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
 - IEC 61646 Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
 - IEC 61730 Photovoltaic (PV) module safety qualification
 - IEC 61730-2 Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing
 - IEC TS 62548 – Photovoltaic (PV) arrays - Design requirements
 - IEC 60364-5-52, Selection and erection of electrical equipment – Wiring systems
 - IEC 60536 Classification of electrical and electronic equipment with regard to protection against electric shock
 - IEC 61140 Protection against electric shock - Common aspects for installation and equipment
 - IEC 61000-6-2:2005 - Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
 - IEC 61000-6-4:2006 - Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
 - IEC 62109 Parts 1 and 2 - Safety of power converters for use in photovoltaic power systems
 - IEC 60269-6 Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems
 - IEC 62930 Electric cables for Photovoltaic systems
 - IEC 60296 Mineral Insulating oils for transformers & switchgear
 - IEC 60099, Surge Arrestors -
 - Part 4: Metal-oxide surge arresters without gaps for AC systems
 - Part 5: Selection and application recommendations
 - Part 6: Surge arresters containing both series and parallel gapped structures - Rated 52 kV and less
 - IEC 61850 (Communication networks and systems in substations).
 - IEC 60870-5-104 (Telecontrol equipment and systems - Part 5-104: Transmission protocols
 - IEC 60529 Degrees of Protection Provided by Enclosures (IP Code)
 - IEC 60896 Stationary Lead-Acid Batteries
 - IEC 62485-1 Safety requirements for secondary batteries and battery installations
 - IEC 61427-2 Secondary cells and batteries for renewable energy storage – General Requirements and Methods of Test – Part 2: On-grid Applications
 - IEC 62109 Safety of power converters for use in photovoltaic power systems
 - IEC 62257 Recommendations for renewable energy and hybrid systems for rural electrification
 - IEC 62446 Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance
 - IEC 62485 Safety requirements for secondary batteries and battery installations

- IEC 62619:2017 Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications.
- IEC 62620:2014 Secondary cells and batteries containing alkaline or other non-acid electrolytes - large format secondary lithium cells and batteries for use in industrial applications
- IEEE - Institute of Electrical and Electronic Engineers
 - IEEE 693 - Recommended Practice for Seismic Design of Substations
 - IEEE C-2 2017 National Electrical Safety Code
 - IEEE 450 Recommended Practice for Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations
 - IEEE 484 Recommended Practice for Installation Design and Installation of Large Lead Storage Batteries for Generating Stations and Substations
 - IEEE 485 Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations
 - IEEE 519 IEEE Recommended Practice and Requirements for Harmonic Control in Electric Power Systems
 - IEEE 537 Recommended Practice for Installation and Maintenance of Lead-Acid Batteries for Photovoltaic Systems
 - IEEE 1187 Recommended Practice for Installation of Valve Regulated Lead Acid Batteries
 - IEEE 1188 Recommended Practice for Maintenance and Testing of Valve Regulated Lead Acid Batteries
 - IEEE 1189 Recommended Practice Guidelines for Sizing Valve Regulated Lead Acid Batteries
 - IEEE 1375-1998 Guide for the Protection of Stationary Battery Systems
 - IEEE 1491-2021 Guide for the Selection and Use of Battery Monitoring Equipment in Stationary Applications
 - IEEE 1547 Frequency and Voltage Ride Through and the Bulk Power System
 - IEEE 1635/ASHRAE 21 Guide for the Ventilation and Thermal Management of Batteries for Stationary Applications
 - IEEE 1657-2009 Recommended Practice for Personnel Qualifications for Installation and Maintenance of Stationary Batteries
- NFPA – National Fire Protection Association
 - NFPA 70 – 2020 National Electric Code
 - NFPA 855 – Standard for the Installation of Energy Storage Systems
 - NFPA 3 – Recommended Practice for Commissioning of Fire Protection and Life Safety Systems
- NETA - International Electrical Testing Association
 - ATS - Acceptance Testing Specifications
 - ETT - Standard for Certification of Electrical Testing Personnel
- UL - Underwriters Laboratories
 - UL 2703: Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
 - UL 9540: Standard for Safety of Energy Storage Systems and Equipment
 - UL 1973: Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
 - UL 489 Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures

- UL 810A Standard for Electrochemical Capacitors
- UL 1642 Standard for Lithium Batteries
- UL 1741 Standard for Inverters, Converters, Controllers, and Interconnection System Equipment for Use with Distributed Energy Resources
- British Standards (BS)
 - BS 6266:2011 "Fire protection for electronic equipment installations"
 - BS 7273-4:2015 "Code of Practice for the operation of fire protection measures - Part 4: Actuation of release mechanisms for doors"
 - BS 7671:2008+A3:2015 "Requirements for Electrical Installations. IET Wiring Regulations"
 - BS EN 15004-1:2008 "Fixed firefighting systems. Design, Installation and Maintenance"
 - BS EN 50110-1:2013 "Operation of electrical installations. General requirements."
 - BS EN 50272-1:2010 "Safety requirements for secondary batteries and battery installations"
 - BS EN 60896-22:2004 "Stationary lead-acid batteries. Valve regulated types. Requirements"
 - BS EN 62281:2013 "Safety of primary and secondary lithium cells and batteries during transport"
 - BS EN 62305 "Protection against Lightning"
 - BS EN 62623:2017 "Secondary cells and batteries containing alkaline or other non-acid electrolytes. Vented nickel-cadmium prismatic rechargeable single cells"
- Other Standards
- AASHTO - Association of State Highway and Transportation Officials
- ACI - American Concrete Institute
 - ACI 318-05 - Building Code Requirements for Reinforced Concrete
 - ACI 301 - Specifications for Structural Concrete
- AEIC - Association of Edison Illuminating Companies
 - AEIC CS8 - Specification for Extruded Dielectric, Shielded Power Cables Rated 5 through 46kV.
- AISC - American Institute of Steel Construction
- AISI - American Iron and Steel Institute
- ANSI C12.1-2008 Code for Electricity Metering
- ASTM - American Society for Testing and Materials
- UN 38.3 "Transportation Testing for Lithium Batteries"
- UN 1760
- UN 3260
- 2018 International Fire Code (IFC)
- 2066/66/EC
- 2013/56/EU Amendment
- Structures
- NETA - International Electrical Testing Association
- ATS - Acceptance Testing Specifications
- ETT - Standard for Certification of Electrical Testing Personnel

SECTION 6: DESIGN DETAILS

Supplemental information necessary as the basis for the preliminary System design may be found in the information provided by CONTRACTING AUTHORITY in tender dossier. This information is provided for the purposes of preliminary design alone and shall not be relied upon for final detailed design.

6.1 General Project Information

6.1.1 Project Sites:

- Blue Hills Clinic, Providenciales
- Bottle Creek Clinic, North Caicos
- Middle Caicos Clinic, Middle Caicos
- South Caicos Clinic, South Caicos
- The Wellness Center, Grand Turk

6.1.2 Project Attributes:

Location No. 1	Blue Hills Clinic
PV Array DC (Est)	3.6kW
BESS Capacity	14kWh
PCS Inverter (min.)	5kW
Roof type	Corrugated Metal Wood Frame
Roof 1 slope (Est)	12deg
Roof 2 slope (Est)	23deg
Service type	120/240V 1PH
Service size	125A
Generator Mfg./Model	FG Wilson P50-1
Generator size	45kW
ATS	Yes

Location No. 2	Battle Creek Clinic
PV Array DC (Est)	16.2kW
BESS Capacity	28kWh
PCS Inverter (min.)	15kW
Roof type	Standing Seam Metal Wood Frame
Roof slope (Est)	10deg
Service type	120/208V 3PH
Service size	400A
Generator Mfg./Model	FG Wilson P65-5
Generator size	60kW
ATS	Yes

Location No. 3	Middle Caicos Clinic
PV Array DC (Est)	4kW
BESS Capacity	14kWh
PCS Inverter (min.)	5kW
Roof type	Corrugated Metal Wood Frame
Roof slope (Est)	10deg
Service type	120/240V 1PH
Service size	400A
Generator Mfg./Model	AKSA APD 22MA-6
Generator size	19.2KVA
ATS	Yes

Location No. 4	South Caicos Clinic
PV Array DC (Est)	14.9kW
BESS Capacity	70kWh
PCS Inverter (min.)	15kW
Roof type	Standing Seam Metal Wood Frame
Roof slope (Est)	10deg
Service type	120/208V 3PH
Service size	400A
Generator Mfg./Model	FG Wilson P110E
Generator size	100kW
ATS	Yes

Location No. 5	Wellness Center Grand Turk
PV Array DC (Est)	43.2kW
BESS Capacity	42kWh
PCS Inverter (min.)	30kW
Roof type	Standing Seam Metal Wood Frame
Roof 1 slope (Est)	10deg
Roof 2 slope (Est)	0deg
Service type	120/208V 3PH
Service size	400A
Generator Mfg./Model	CAT 3406
Generator size	275kW
ATS	Yes



SECTION 7: GENERAL REQUIREMENTS

This section provides an explanation and lists an overview of the requirements of the Technical Specifications. The intent of this section is to illustrate that the Contractor is responsible for all activities to complete the Project.

7.1 Scope of Work

- 7.1.1 The contractor shall construct the Project in accordance with the Technical Specifications provided in this tender document and the tender dossier.
- 7.1.2 Contractor's Scope of Work is to procure, permit, construct, interconnect, commission, startup, and test a turnkey PV System and BESS microgrid which is built to the capacity as indicated in Section 5 and meets commissioning and testing requirements identified by CONTRACTING AUTHORITY.
- 7.1.3 The contractor shall design all aspects of the Project to meet the minimum Design Life.
- 7.1.4 It is the Contractor's sole responsibility to ensure that all aspects of Project design and construction comply with all local code requirements and all industry codes and standards. This includes, but is not limited to, the list specified in Section 5.
- 7.1.5 Contractor shall provide a complete and functional Project up to the POI.
- 7.1.6 The contractor shall perform, supply or cause to be supplied all equipment, materials, labor, services, supervision, testing devices, drawings, calculations, specifications, manuals required for the Project.
- 7.1.7 Contractor shall provide all project documentation in printed and electronic formats at the conclusion of project along with a complete Operations and Maintenance Manual. Contractor to provide training to CONTRACTING AUTHORITY personnel including selected Community College and High School students in TCI in the operations and maintenance of the solar and energy storage facilities.
 - 7.1.7.1 Procurement of all Equipment, materials, and services, including but not limited to:
 - Procurement of all major equipment, including PV racking and modules, batteries, and inverters
 - Procurement of all materials, including but not limited to, hardware and fasteners, conduits and raceways, conductors, junction boxes, bonding and grounding equipment.
 - Obtaining all datasheets, relevant technical notes, installation, operations and maintenance manuals for all Project Equipment
 - Factory Acceptance Testing (FAT) documents from manufacturers for PV modules, inverters, and batteries
 - 7.1.7.2 Inspection, testing, and commissioning activities including, but not limited to:
 - Commissioning as specified by CONTRACTING AUTHORITY
 - Acceptance testing as specified by CONTRACTING AUTHORITY
 - Energy performance testing as specified by CONTRACTING AUTHORITY
- 7.1.8 Contractor shall be responsible for disposal of all waste material from the Work.

7.2 Safety

- 7.2.1 Contractor shall provide safety supervision to maintain safe working conditions.
- 7.2.2 Contractor shall perform daily safety briefings and inform all workers of relevant hazards involved in the Work.
- 7.2.3 Contractor shall develop lock-out-tag-out (LOTO) procedures for performing the Work and operation of the Project.

7.2.4 Fire Safety

- 7.2.4.1 The Contractor will design and install a smoke detection system that is appropriate to the chemistry and design of the battery installation.
- 7.2.4.2 In addition to the smoke detection system, portable fire extinguisher(s) shall be supplied and installed at the means of egress.
- 7.2.4.3 The type of extinguisher(s) shall be appropriate for the chemistry, and sufficient to extinguish small, localized fires without creating additional hazards to emergency and maintenance personnel (for example, water on a lithium battery will produce excessive amounts of hydrogen). Multiple types of fire extinguishers may be necessary.

7.2.5 Signage

- 7.2.5.1 Doors into rooms or buildings containing stationary battery systems shall be provided with approved signs.
- 7.2.5.2 The signs shall state, at a minimum, the type of battery used (lead-acid, Lithium Ion, Zinc-Iron, Vanadium, NaS, etc.), the presence of energized battery systems, and corrosive liquids (if present).
- 7.2.5.3 The signs shall also state that no open flames or smoking is allowed within the room or building.

7.2.6 Operator Safety

- 7.2.6.1 The Contractor shall provide proper safety gear, including, but not limited to, face shields, aprons, rubbers gloves and facilities for quick drenching of the eyes and body within 25 feet of the work area.

7.2.7 Working Space

- 7.2.7.1 Minimum working space shall be provided around all equipment to meet local building, electrical, and/or safety code.
- 7.2.7.2 In the absence of any clearly defined working clearance, those listed in NFPA 70E, Article 320 shall be followed.

7.2.8 Safety Data Sheets (SDS)

- 7.2.8.1 Contractor shall provide SDS for all materials that contain potential hazards to health, fire, reactivity and/or environment.
- 7.2.8.2 These shall be provided in hard copy and stored at the BESS near the point of egress, as well as with the safety officer at the utility.

7.3 Permits and Environmental Compliance

- 7.3.1 Contractor shall be responsible for obtaining all building and construction permits necessary to complete the Work including, but not limited to:

- 7.3.1.1 Building permits issued through the AHJ;
- 7.3.1.2 Electrical permit;

- 7.3.2 Contractor shall comply with all Conditions of Approval and all mitigation measures required by the AHJ and demonstrate compliance as required by the AHJ.
- 7.3.3 Contractor shall inspect any areas where excavation, trenching, foundations or other underground work will be performed for the purposes of determining if any underground utilities are present, including water, sewer, electrical, telecommunications, both private and public and shall provide electronic copies of these inspections and clearance certificates.

7.4 Engineering

- 7.4.1 The Contractor will issue full mechanical, and electrical IFC drawing packages for the construction of the project.
- 7.4.2 The Contractor is responsible for ensuring drawings are complete, containing all necessary components for the successful completion of the project to international best standards.
- 7.4.3 The design basis for the Project shall be the Project specific information included in Section 6, taking into account any formal updates received by the Contractor from CONTRACTING AUTHORITY.
- 7.4.4 The Contractor shall include in the Design Documents a general arrangement drawing, to scale, indicating the location of all major Project Equipment including dimensions of key Site features to existing survey monuments. The general arrangement drawing shall include, at a minimum:
 - 7.4.4.1 PV arrays
 - 7.4.4.2 Inverters
 - 7.4.4.3 Underground low voltage cables
 - 7.4.4.4 Low voltage switchgear
 - 7.4.4.5 Meteorological stations
 - 7.4.4.6 Point(s) of interconnection
 - 7.4.4.7 Batteries
- 7.4.5 The Contractor shall perform all engineering and design Work within the scope defined and in accordance with all applicable building, electrical, safety and fire codes.
- 7.4.6 The Contractor shall provide full turnkey engineering design for all PV systems, battery systems, and ancillary Site Work.
- 7.4.7 The Contractor shall provide As-Built Design Documents to CONTRACTING AUTHORITY.
- 7.4.8 Power generated by the Project shall be compatible with the electric power system to which the Project is interconnected.
- 7.4.9 The Contractor shall complete the final detailed engineering drawing package (IFC Design) required for all permits within fifteen (15) days following the Limited Notice to Proceed (LNTP).
- 7.4.10 All vendor documents received by the Contractor shall be maintained by the Contractor and available to the CONTRACTING AUTHORITY at all times.

7.5 Procurement

- 7.5.1 The Contractor shall be responsible for the procurement, handling, shipping costs and delivery of all Contractor supplied equipment, materials and services, including, without limitation, locating, negotiating, inspecting, expediting, shipping, shipping permits, unloading, receiving, verifying, customs clearance and claims. Note that all overseas equipment and materials for the Project only will be tax free and duty free.



- 7.5.2 Packing lists shall be maintained by the Contractor at the Project site and shall be available for the CONTRACTING AUTHORITY review.
- 7.5.3 The Contractor shall update a schedule of values maintained in electronic format that accurately describes the quantities of all Project Equipment received at the Project site. The schedule of values shall be updated within seven (7) days after each delivery of Equipment. The schedule of values shall be available for the CONTRACTING AUTHORITY review.
- 7.5.4 All freight costs for all Equipment shall be the responsibility of the Contractor.
- 7.5.5 All applicable taxes, service charge, and import duties shall be the responsibility of the CONTRACTING AUTHORITY.
- 7.5.6 All customs documentation and fees shall be the responsibility of the Contractor.
- 7.5.7 All Equipment stored at the Site shall be in accordance with good industry practices and manufacturer's recommendations. The Contractor shall use all reasonable measures to keep the equipment free from dirt and debris.
- 7.5.8 The Contractor shall perform all inspection and pre-installation maintenance activities to ensure compliance with manufacturer's recommendations. The Contractor shall maintain a log of such maintenance activities, such log to include the date of such activities and the names and signatures of the personnel performing such activities. Such a log shall be available to the CONTRACTING AUTHORITY for review.
- 7.5.9 The Contractor shall obtain all warranty information for all Project Equipment. All Key Equipment warranties shall permit assignment to the CONTRACTING AUTHORITY without consent.
- 7.5.10 The Contractor shall obtain all installation, operations, and maintenance manuals for all Project Equipment.
- 7.5.11 The Contractor shall secure all Equipment located at the Site prior to each Phase Completion Date.

7.6 Construction

- 7.6.1 Prior to any Work at the Site, the Contractor shall demonstrate or provide to the CONTRACTING AUTHORITY:
 - 7.6.1.1 All safety requirements have been met.
 - 7.6.1.2 All engineering and design requirements have been met.
 - 7.6.1.3 The Contractor has received all installation manuals and requirements for all Project Equipment.
 - 7.6.1.4 The contractor has provided to the CONTRACTING AUTHORITY an up-to-date procurement and construction schedule indicating firm commitment dates for all Project Equipment.
 - 7.6.1.5 The Contractor has obtained all required permits necessary to conduct the Work at the Site.
- 7.6.2 All workmanship shall comply with good industry practices, Applicable Laws, and Applicable Standards, including but not limited to those specified in Section 5.
 - 7.6.2.1 For each portion of the work, the contractor shall provide a sufficient number of personnel per shift who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the referenced standards and requirements of the work, and who shall personally direct all work performed.
 - 7.6.2.2 For each portion of the work, sufficient skilled workers shall be provided who are thoroughly familiar with the type of construction, materials, and techniques

specified.

7.6.2.3 No allowance will be made for the acceptance or rejection of any portion of the work for lack of skill on the part of the workers.

7.6.2.4 Where regulatory requirements mandate that one or more workers performing a task have specialized training or certification, provide workers that possess such training or certification.

7.6.3 The contractor is responsible for securing all materials, equipment, and tools until Project Completion.

7.7 Quality Assurance and Control

7.7.1 The Contractor shall implement a quality assurance and quality control (QA/QC) program to ensure the necessary measures are taken to support successful execution of the Contract.

7.7.2 The Contractor shall provide QA/QC supervision to maintain quality control in line with industry standards for similar work.

7.7.3 The CONTRACTING AUTHORITY may perform an audit of the QA/QC plan at any point during the Work.

7.7.4 The Plan shall include a continuous improvement program. All improvements shall be logged as lessons learned and made available to CONTRACTING AUTHORITY.

7.8 Commissioning

7.8.1 Commissioning shall be performed in accordance with the manufacturer's installation, commissioning, and O&M manuals, and in accordance with specifications provided by CONTRACTING AUTHORITY.

7.9 Manuals

7.9.1 The Contractor shall provide comprehensive Project Manual which shall contain the following as a minimum:

7.9.1.1 Final Contract Agreements

- The Agreement (including Exhibits)
- Completion Certificates
- Warranties

7.9.1.2 Project Overview and As-Built Drawings

- PV Module Database complete with model number, serial number, power and voltage rating, flash test data, etc. for all modules.
- Balance of System Database complete with model number, serial number, applicable rating for all Equipment including but not limited to inverters, switchgear and breakers.

7.9.1.3 Commissioning Reports

7.9.1.4 Applicable Permits

- CONTRACTING AUTHORITY Permits
- Contractor Permits
- Permit Compliance Matrix

7.9.2 The Contractor shall provide the Operating Manual, detailing all services to be

provided through the duration of the life of the system.

7.9.3 The Complete Project Manual and Operating Manual shall be submitted to CONTRACTING AUTHORITY no later than Substantial Completion.

7.10 Community Relations

7.10.1 The Contractor shall maintain positive relations with the community and neighbors during the Work.

7.10.2 The Contractor shall take appropriate steps to minimize disturbance to local residents.

7.11 Site Restoration

7.11.1 The Contractor shall restore to its original condition any existing sidewalks, pavement or similar prior to completion of the works.

7.12 Security Requirements

7.12.1 The contractor shall provide a Security Plan. At a minimum, the Plan shall address the following:

7.12.1.1 Security measures to protect equipment, materials, and personnel.

7.12.1.2 Coordination with local law enforcement agencies.

7.12.1.3 Warning signs of the presence of hazardous substances and the potential of hazardous work activities, as appropriate.

SECTION 8 : ELECTRICAL REQUIREMENTS

8.1 General

8.1.1 It is the Contractor's responsibility to ensure that all aspects of electrical design for the Project comply with all local code requirements and Applicable Standards.

8.1.1.1 The NEC shall be followed for all interconnections to the CONTRACTING AUTHORITY facilities and equipment.

8.1.1 All electrical design including conductors and equipment design attributes shall comply with the 2020 National Electrical Code (NEC) Standard including, but not limited to, ampacity rating, jacket type, conditions of use, conductor color conventions, labeling, terminations, conduit fill, protection, and isolation, disconnecting means, signage, and labeling requirements.

8.1.2 Equipment specifications shall comply with Section 10.

8.1.3 The Contractor is responsible for ensuring compliance to all FTCI requirements for interconnection of distributed generation to the grid.

8.1.4 The Contractor is responsible to install all aspects necessary for a fully functional Project, including but not limited to, the following items:

8.1.4.1 PV array & DC collection system circuit: Modules, dc cabling, combiner boxes, protection and isolation devices, complete grounding design, surge/lightning protection, and inverters.

8.1.4.2 AC LV collection system: LV cabling between inverters and switchgear/panelboards, protection and isolation devices, surge/lightning protection, as applicable.

8.1.5 Minimum equipment working clearances shall comply with NEC 2020 and IEC 60364 requirements. In the event of disagreement, the more stringent requirement shall be enforced.

8.2 PV Array Design

8.2.1 Project Layout

8.2.1.1 The Contractor shall provide a design layout of the PV Module configuration.

8.2.2 Modules

8.2.2.1 PV modules of the same make, model and wattage shall be used.

8.2.2.2 All PV Modules shall utilize the same brand and model connector.

8.2.2.3 Connections to PV modules shall be made with connectors listed for the purpose. Field made connectors shall be of the exact same manufacturer, make and model as those that come with the PV modules. Only one type of connector (manufacturer, make, model) shall be used for the construction of all facilities.

8.3 DC Collection System

8.3.1 General DC requirements

8.3.1.1 The maximum voltage of the DC collection system shall be 1,000 Vdc, unless otherwise approved by the CONTRACTING AUTHORITY. All components utilized in the DC collection system shall be rated for the maximum voltage of the DC system, 1,000 Vdc.

8.3.1.2 The DC collection system circuits shall be designed to limit total electrical losses at STC conditions to no more than 1.5%.

8.3.2 DC Cabling

8.3.2.1 Wiring located above ground and secured to the PV Module mounting structures shall be UV rated and secured to the mounting structures utilizing UV-resistant devices and secured in a manner such that no exposed wiring is in direct contact with unfinished metal edges.

- UV resistant zip ties shall be allowed for the purpose of securing cabling to racking only for 1 or 2 individual conductors. Zip ties shall not be used to secure cabling to racking, for groups of more than 2 individual conductors.

8.3.2.2 All directly buried conductors shall be protected by conduit from the trench up to the electrical enclosure termination point or three (3) feet above grade, whichever is less.

- Conduit shall comply with NEC requirements.

- Conduit shall include a 90° conduit sweep in the trench to protect the cable as it enters the trench.

8.3.2.3 No splices shall be permitted.

8.3.2.4 Metallic locating type warning tape shall be provided in all trenches.

8.3.3 Combiner Boxes

8.3.3.1 Conduit and cable entry into combiner boxes shall be through the bottom of the enclosure only.

8.3.3.2 The Contractor shall provide universal key locks for all combiner boxes.

8.3.4 Disconnect Switches

8.3.4.1 Disconnect switches shall have visible blades and be rated for full load disconnect.

8.4 AC Collection System

8.4.1 General AC requirements

8.4.1.1 The AC collection system shall encompass all equipment from the inverter output to the POI.

8.4.1.2 AC collection system cabling shall be installed in conduit or duct-bank when crossing under all vehicle roadways.

8.4.1.3 Metallic locating type warning tape shall be provided in all trenches.

8.4.1.4 No splices shall be permitted, except with CONTRACTING AUTHORITY approval.

8.4.1.5 Minimum electrical clearances from energized parts shall be in accordance with NEC requirements.

8.4.1.6 All switchgear shall be rated for the environment and conditions of use and shall meet all Applicable Standards.

8.5 Voltage Drop

8.5.1 To calculate total array wiring losses, each run (Modules to combiner box, combiner box to DC disconnects, etc.) will be individually calculated. Conductor type, current at maximum power, voltage at maximum power, estimated length of line (one-way) and associated voltage drop will be shown in a table.

8.5.2 Cumulative voltage drop shall not exceed the following:

8.5.2.1 DC: 1.5%

8.5.2.2 AC: 2.0%

8.6 Inverters

- 8.6.1 Inverters shall be shaded or shielded from direct sun using manufacturer supplied shields or some other approved structure.
- 8.6.2 If an Inverter Station is proposed, it shall meet or exceed the minimum design requirements:
 - 8.6.2.1 Inverter station, consisting of inverters and switchgear shall be an appropriately sized environment-controlled building or integrated containerized solution.
 - 8.6.2.2 Inverters shall be housed in an appropriate manner that protects internal hardware and circuitry based on the Design Conditions indicated in Section 5 to the Technical Specifications.
 - 8.6.2.3 Inverter station shall include any required HVAC to ensure the inverter performance is not de-rated due to temperatures above or below the temperature at which the inverter is rated for full nameplate operation. If HVAC is required to maintain the temperature inside a shelter housing the inverters, the HVAC system shall be designed to maintain a temperature not to exceed 5°C less than the inverter's maximum temperature rating for full-power operation.

8.7 Conduit

- 8.7.1 Conduit shall comply with NEC requirements for the conditions of use.
- 8.7.2 Where required, PVC conduit shall be a minimum schedule 40 PVC for individual conduits direct-buried in the ground and schedule 80 where exposed to physical damage.

8.8 Protection and Isolation Devices

- 8.8.1 Overcurrent protection devices shall be appropriately rated for the voltage and current as specified in NEC.
- 8.8.2 Overcurrent protection devices shall be rated for bi-directional flow.

8.9 Electrical Grounding

- 8.9.1 The Contractor shall provide an overall electrical grounding schematic of the Project. The grounding schematic shall indicate the primary connections to earth and the manner in which all components are grounded.
- 8.9.2 Grounding design shall comply with all requirements of the NEC. All metal objects, likely to be energized, including but is not limited to:
 - 8.9.2.1 module frames,
 - 8.9.2.2 all racking structure members,
 - 8.9.2.3 metal conduit,

- 8.9.2.4 metal enclosures,
- 8.9.3 All grounding and bonding conductors shall be stranded copper.
- 8.9.4 Hardware utilized in grounding design shall avoid risk of galvanic corrosion from contact of dissimilar metals.
- 8.9.5 All ground lugs and ground terminations shall be UL Listed for use in the environment installed. Grounding connections terminated below grade shall be UL Listed specifically for direct burial applications.
- 8.9.6 Equipment grounding conductors shall be routed with the associated phase conductors.

8.10 Signage

- 8.10.1 A dc and ac single line diagram shall be posted inside the system (at or near the main ac switchgear) that clearly identifies the ac and dc disconnect locations.

8.11 Equipment Marking and Labeling

- 8.11.1 Signage shall be provided on all electrical equipment in accordance with requirements of the NEC.
- 8.11.2 Signage shall be weather-proof, corrosion-proof, UV-stabilized, and fade-resistant and shall be capable to last the duration of the minimum Design Life.
- 8.11.3 Signs shall be attached using non-corrosive materials suitable to meet the Design Life.
- 8.11.4 All combiners, re-combiners, inverters, transformers, disconnect switches and circuit breakers shall have an engraved permanent identification label visible and readable from distance of 1.5m that provides the unique identification number as indicated on the electrical drawings and in the LOTO procedure
- 8.11.5 All conductors, including DC conductors utilized in the PV Module string circuits and for conductors between combiners and inverters, shall bear permanent cable labels at each end that uniquely identify the cables and are traceable to the electrical drawings.

SECTION 9: CIVIL AND STRUCTURAL REQUIREMENTS

9.1 Aluminum

- 9.1.1 Design of structural and miscellaneous aluminum shall be in accordance with the latest edition of the Aluminum Association – “Aluminum Design Manual” and “Aluminum Standards and Data.”
- 9.1.2 Materials for structural and miscellaneous aluminum, including structural shapes and plate, shall conform to ASTM B209 and ASTM B308.

9.2 Corrosion Prevention

- 9.2.1 All Project Equipment shall be protected from corrosion due to known or expected atmospheric and soil conditions local to the Site in accordance with the Design Life and Good Industry Practices. Consideration shall be given to humidity, salinity, acidity, condensation, air particulates and other conditions likely to cause or accelerate corrosion of materials.



- 9.2.2 Contact of dissimilar metals and finishes shall be avoided or intentionally managed to prevent premature galvanic corrosion.
 - 9.2.2.1 Aluminum shall not be in direct contact with concrete or copper.
- 9.2.3 Fasteners and hardware shall be stainless steel (300 series, if available with required mechanical strength) or hot-dipped galvanized steel.
- 9.2.4 Galvanizing of steel products shall conform to the requirements of ASTM A123, ASTM A153 or ASTM F2329, as appropriate.
- 9.2.5 For any components where the galvanization is disturbed due to factory processing or during installation, those surfaces shall be repaired in accordance with ASTM A780 and A780M-09.
- 9.3 Solar Array Racking
 - 9.3.1 The Contractor shall supply a PV racking system engineered to withstand 180mph winds.
 - 9.3.2 Roof mounted racking shall be rail type, constructed of aluminum with stainless steel fasteners.
 - 9.3.3 The Contractor shall minimize roof penetrations to the extent possible.
 - 9.3.4 The Contractor shall seal any roof penetrations using a sealant that has been approved by CONTRACTING AUTHORITY and is UV resistant, permanent, and installed according to manufacturer instructions.
 - 9.3.5 The Contractor shall ensure that all modules are attached to the racking structure in accordance with both module installation manual and racking installation manual guidelines and requirements.
- 9.4 Trenches
 - 9.4.1 Cables and conduits installed in trenches shall comply with NEC requirements.
 - 9.4.2 Direct burial of cables is not permitted. All buried cables shall be in conduit.
 - 9.4.3 Trenching within 3' of any foundation requires replacing the original soil and compaction to 95% standard proctor density.
 - 9.4.4 All buried cables and conduits shall include a marker tape 30 cm below grade continuously over the conductors.
 - 9.4.5 Trench backfills shall comply with NEC requirements and industry best practices.
 - 9.4.6 A sand bed of at least 5 cm shall be used as the base layer for all trenches housing conduit and cables. The sand bed shall be clean natural sand, clay, organic matter and should not include other objectionable materials.
 - 9.4.7 Trench shall be backfilled with clean fill material free from aggregate, debris, organic material and stones. An engineered fill shall be used if required based on the cable ampacity calculations.
 - 9.4.8 Trenches shall be backfilled in layers of no more than 15 cm each and mechanically recommended by the geotechnical engineer.
 - 9.4.9 The Contractor shall take appropriate measures to minimize the time that trenches are left open.
 - 9.4.10 Trenches shall not be backfilled while there is any standing water in the trench.
 - 9.4.11 The Contractor shall inspect and repair sand beds in open trenches after rainfall events.
 - 9.4.12 Conduit stub-ups and sweeps shall be used for all conductors entering and exiting a trench.
 - 9.4.13 Open conduit ends shall be equipped with bushings and approved sealant to reduce

intrusion of water, rodents, and insects.

- 9.4.14 Trenches shall be designed and constructed, to the extent possible, in straight lines and not routed below Project Equipment.

9.5 Site restoration

- 9.5.1 Any cuts in asphalt or concrete shall be straight and finish grouted to a smooth surface transition.
- 9.5.2 Any cuts or demolition of sidewalks and curbs shall be returned to their original pre-construction state.
- 9.5.3 All trash and debris shall be placed in appropriate containers for disposal prior to the conclusion of each workday.
- 9.5.4 The site shall have all materials removed at the conclusion of construction and asphalt/concrete surfaces shall be broom swept clean.

9.6 Delivery & Identification

- 9.6.1 Shipment and handling of materials shall be in a manner that avoids damage.
- 9.6.2 Equipment shall be inspected for damage prior to installation. Damaged equipment shall be repaired or replaced.

SECTION 10: EQUIPMENT SPECIFICATION

10 Equipment Specifications

10.1 General

- 10.1.1 All equipment located outdoors shall have enclosures complying with NEC and/or NEMA requirements for wet and high salinity locations.
- 10.1.2 All equipment shall be new.
- 10.1.3 Enclosures shall have a minimum rating of NEMA3R for electromechanical and electronic equipment and be corrosion resistant.
- 10.1.4 All equipment shall be specified with the Project specific design conditions indicated in Section 5 and the technical specifications provided in the tender dossier.
- 10.1.5 All equipment shall be specified to ensure all required System Operating Conditions are met (Section 7.1.1).
- 10.1.6 All equipment shall be installed according to IFC drawings, manufacturer requirements, code requirements and industry standard best practices.

10.2 PV Modules

- 10.2.1 PV Modules shall have a frame strength rating that meets or exceeds the calculated loads for both upward and downward pressure.
- 10.2.2 PV Modules shall be certified to IEC 61730 and the applicable part of IEC 61215.
- 10.2.3 PV Modules shall be installed according to the manufacturer's installation instructions and in compliance with the IEC.
- 10.2.4 PV Module supplier shall be certified to ISO9001:2000 and ISO14001:2004.
- 10.2.5 PV Modules shall have a minimum 10-year manufacturer's warranty covering defects and workmanship that provides for all shipping costs and parts required to replace or repair warranty-eligible failures.
- 10.2.6 PV Modules shall have a minimum 25-year manufacturer's warranty covering product

performance that incorporates a linear degradation guarantee with peak power rating at year 25 not less than 80% of the original peak power rating identified on the product nameplate.

- 10.2.7 PV Modules shall be marked with a unique serial number.
- 10.2.8 PV Modules shall be supplied with original factory flash test data including, at minimum, serial number, model number, manufacture date, Isc, Voc, Imp, Vmp and Pmp.
- 10.2.9 PV Modules shall be supplied with a copy of UL and/or IEC certification reports indicating compliance for the model numbers used and indicating the certification is in force as of the dates of module manufacture.
- 10.2.10 PV modules shall be supplied with documentation confirming that the PV modules have been manufactured in accordance with the manufacturer's specifications.
- 10.2.11 PV Module Mounting Structures
- 10.2.12 PV Module mounting structures should comply to the extent possible with the grounding and bonding requirements of UL 2703.
- 10.2.13 PV Module mounting structures shall be designed in accordance with applicable building code requirements.
- 10.2.14 PV Module mounting structures shall be aluminum or hot dipped galvanized steel in accordance with ASTM A123.
- 10.2.15 For any components where the galvanization is disturbed due to factory processing after the galvanization, those surfaces shall be repaired in accordance with ASTM A780 and A780M-09.
- 10.2.16 PV Module mounting structures shall be supplied with installation manuals, a list of required fasteners and a torque chart for all fasteners providing structural support.
- 10.2.17 The PV Module mounting structures shall have a minimum 5-year manufacturer's warranty covering defects and workmanship that provides for all parts and labor required to replace or repair warranty-eligible failures.

10.3 Combiner Boxes

- 10.3.1 Components within combiner boxes shall be certified to IEC 61439-2 or IEC 50178, or alternatively to UL 1741.
- 10.3.2 Combiner boxes shall be rated IP65 (NEMA4/4X).
- 10.3.3 Combiner boxes shall be equipped with approved means of drainage for accumulated moisture which does not compromise enclosure warranty or allow entrance of contaminants or rodents and small reptiles into the enclosure.
- 10.3.4 Combiner boxes shall have provisions for a universal pad lock.
- 10.3.5 Combiner boxes shall incorporate overcurrent protection for each String.
- 10.3.6 Combiner boxes shall utilize "touch-safe" fuse holders.
- 10.3.7 Combiner boxes shall be equipped with a load-break disconnect switch.
- 10.3.8 Combiner boxes shall include a touch-safe barrier over exposed terminations or buses.
- 10.3.9 Combiner boxes shall be compatible with the inverters.
- 10.3.10 Combiner boxes terminals for dc output cables shall include provisions to accommodate compression ring lugs.
- 10.3.11 Terminal ratings for the dc output cables shall be 90°C and rated for copper and aluminum.
- 10.3.12 Combiner boxes shall be labeled to comply with IEC requirements and at minimum include:

10.3.12.1 Maximum voltage



- 10.3.12.2 Operating voltage
- 10.3.12.3 Operating current
- 10.3.12.4 Short-circuit current rating
- 10.3.12.5 Short-circuit current rating per pole
- 10.3.12.6 Warning language that fuses are energized if the PV Modules are exposed to light even if the inverter is not running.

10.4 Inverters

- 10.4.1 Inverters shall be as specified, unless otherwise approved by the Contracting Authority.
- 10.4.2 Inverters shall be utility-interactive (not standalone).
- 10.4.3 Inverters shall meet the requirements of IEC 62109.
- 10.4.4 Inverters shall meet the requirements of IEC 61000-6-2:2016.
- 10.4.5 Inverters shall meet the requirements of IEC 61000-6-4:2018.
- 10.4.6 Inverters shall meet the current harmonic requirements of IEEE 519.
- 10.4.7 Inverters shall meet the fluctuation and flicker requirements of IEC 61000-3-22.
- 10.4.8 Inverter voltage and frequency tolerance settings as a default shall meet the requirements of IEEE 1547.
- 10.4.9 Inverters shall meet the loss of mains requirements of IEEE 1547.
- 10.4.10 Inverters and power and control electronics shall be housed in enclosures rated IP54 or above.
- 10.4.11 Inverters shall have a 1-phase, split-phase or 3-phase ac output as applicable.
- 10.4.12 Inverters shall have a maximum dc voltage rating of 1,500 Vdc.
- 10.4.13 String configuration and inverter selection shall be reviewed and approved by the Contracting Authority.
- 10.4.14 Inverters shall have an operating temperature range of 15°C to 40°C at full rated power. Inverter shall be capable of operating with a power factor of 0.95 leading to 0.95 lagging.
- 10.4.15 Inverters shall be capable of completely automatic unattended operation, including wake up, sleep mode, synchronization and disconnect. Inverters shall have an ac disconnect capable of electronic operation by a remote ground fault relay.
- 10.4.16 Inverters shall be capable of communicating with the DAS and allow for monitoring and control of set points.
- 10.4.17 Inverter supplier shall be certified to ISO9001:2000 and ISO140001:2004.
- 10.4.18 The inverter shall not generate audible noise exceeding 68 dB(A) at 10 meters during operation at full-rated power. Inverter noise shall comply with applicable local ordinances.
- 10.4.19 Inverters shall be supplied with installation, operations and maintenance manuals in hard copy and PDF formats.
- 10.4.20 Inverters shall be supplied with a complete points list that provides sufficient information for a DAS engineer to communicate with the inverter and interpret all data points, including read/write status and data type.
- 10.4.21 All inverters shall be of identical manufacturer and model number unless approved by the Contracting Authority.
- 10.4.22 Inverters shall also comply with Section 10.4 if the re-combiner function is integrated into the inverter.

10.4.23 Inverters shall be completely factory-built, assembled, wired, and tested as a complete unit.

10.4.24 Inverter shall have a minimum 10-year manufacturer's warranty covering defects and workmanship that provides for all shipping costs, parts and labor required to replace or repair warranty-eligible failures.

10.4.24.1 Inverter warranty shall allow for unlimited usage at full rated power during the term of the warranty.

10.5 Low Voltage Cable and Terminations (1,500 V or less)

10.5.1 All conductors shall be stranded, single conductor cables.

10.5.2 All conductors shall be rated for 90°C in wet locations.

10.5.3 Conductors utilized in PV circuits shall be specified in accordance with the applicable requirements of the NEC and IEC TS 62548. PV sub-array cables should comply with current international standards as EN 50618 or IEC 62930, but alternatives are allowed if appropriately selected for the routing method (trunk, duct, direct buried underground, etc.)

10.5.4 Ungrounded conductors utilized in battery circuits shall have a red (if positive) and black (if negative) insulation or jacket. If red insulation is unavailable red tape shall be acceptable at all points of termination.

10.5.5 All conductors between PV Modules and combiner boxes shall be copper.

10.5.6 Conductors between combiner boxes and inverters shall be copper.

10.5.7 Terminations for all conductors shall be rated for 90°C and for the conductor material (copper).

10.5.8 All conductors for batteries and battery inverters shall be copper.

10.5.9 All conductor terminations shall utilize appropriately applied antioxidant and shall be mechanically crimped, torqued and permanently marked with paint, mechanical lug terminations are not permitted.

10.6 Batteries

10.6.1 All batteries shall be of the same brand and model, with the same capacity and voltage.

10.6.2 All batteries used shall be new, having not been previously connected to a load for anything other than testing purposes to confirm state of charge.

10.6.3 IP67 enclosure required for cells if Li-ion.

10.6.4 Sealed cells shall be equipped with a pressure-release vent to prevent excessive accumulation of gas pressure, or the battery of cell shall be designed to prevent scatter of cell parts in event of a cell explosion.

10.6.5 Battery strings operating above 250Vdc shall have a minimum separation between live battery parts of opposite polarity of 50mm for battery voltages not exceeding 600Vdc.

10.6.6 Lithium-Ion battery systems shall be equipped with thermal runaway protection.

10.6.7 Lifespan (years) - minimum 10 years

10.6.8 Minimum cycles - 6,000

10.6.9 Minimum warranty - 10 years

10.6.10 End-of-Life shall be when the BESS reaches an actual capacity of 80% of initial capacity.

10.6.11 The Contractor shall adhere to the maximum DoD, conditions for transport and storage, voltage and current operating windows as specified by the manufacturer and shall provide documented evidence for each as part of the project deliverables.

10.6.12 Prior to installation the Contractor shall ensure that the batteries are transported and

stored in a manner consistent with the listed requirements of the manufacturer, including the requirements of UN 38.3.

10.6.13 Prior to installation the Contractor shall visually inspect all batteries to confirm no damage to the battery housing exists.

10.7 Battery Management System (if applicable)

10.7.1 The BMS shall be suitable for use with the manufacturer make and model of the proposed battery.

10.7.2 The BMS shall have the following monitoring and control features:

10.7.2.1.1 Battery over/under charge protection

10.7.2.1.2 Over current

10.7.2.1.3 Over voltage

10.7.2.1.4 Low voltage

10.7.2.1.5 Overload

10.7.2.1.6 Over temperature

10.7.2.1.7 Under temperature

10.7.2.1.8 State of Charge

10.7.2.1.9 State of Health

10.7.2.1.10 Cell balancing

10.7.2.1.11 Individual cell voltage monitoring

10.7.2.1.12 Internal Short Detection

10.7.3 The BMS shall be capable of monitoring, controlling, and mitigating the effects of the following failure modes:

10.7.3.1 Thermal Runaway

10.7.3.2 Shorted Cells

10.7.3.3 Cell Reversal

10.7.3.4 Charger Runaway

10.8 Battery Inverter (PCS)

10.8.1 Inverters shall meet all applicable requirements for PV inverters as listed in Section 10.4.

10.8.2 Inverters shall be capable of maintaining a minimum ramp rate of 10%/s.

10.8.3 BESS shall have a response time not to exceed 25ms.

10.8.4 BESS shall have a minimum RTE of 90% for lithium-ion.

10.8.5 Inverters shall be grid-forming.

10.8.6 Inverters shall be grid interactive.

10.8.7 Inverters shall be suitable for use with the manufacturer make and model of the proposed battery.

10.8.8 Inverters shall be equipped with Ground Fault Detection.

10.8.9 Inverters shall be protected by a Type 2 Surge Arrestor.

10.9 DC Collection System (Batteries)

10.9.1 DC cables or bus between batteries (series wiring) shall be of equal length and of the

same material.

10.9.2 DC cables between the first/last battery in a string to the inverter/charge controller (parallel wiring) for all battery strings shall be of equal length.

10.9.3 DC cables shall be solid copper bus or type DLO cable (or equivalent).

10.9.4 DC cables shall be terminated with purpose-built compression fittings and torqued to manufacturer specified levels at all points of connection and permanently marked with paint markers.

10.10 Fire Protection

10.10.1 All requirements of 7.2.7 shall be adhered to.

10.10.2 Requirements of UL9540A, NFPA 855, NFPA 68, NFPA 69, and IBC 2021 shall be adhered to.

10.7 Meters

10.7.1 Meters shall be ANSI C12.2 revenue grade meters.

10.7.2 Meters shall support the Modbus and DNP 3.0 communication protocols.

SECTION 11: BATTERY ENERGY STORAGE (BESS)

BATTERY ENERGY STORAGE SYSTEM (BESS)

11.1 Required system attributes:

11.1.1 Minimum functional life of the BESS shall be 10 years and 6,000 cycles.

11.1.2 The system shall be designed and constructed in a manner to minimize DC-DC and DC-AC conversion losses.

11.1.3 Minimum Round-Trip Efficiency (RTE) shall not be less than 90% for Lithium-Ion.

11.1.4 The system shall be designed and constructed in a manner that the BESS serves as a load following, load smoothing, frequency, and voltage regulation device.

11.1.5 The Contractor shall include, at a minimum, the following primary components, and features. The Contractor is responsible for identifying and supplying any additional equipment and services which may be required to install and operate a fully functional BESS.

- Engineer, procure, construct and commission a functional, turnkey BESS that meets or exceeds all requirements listed herein;
- Warrant and make ready for service;

11.1.6 Provide on-site training classes for the CONTRACTING AUTHORITY operators, engineers, technicians, and maintenance personnel.

11.1.7 Provide a minimum 5-year warranty for all BESS components along with adders for warranty extensions to 10-year and 15-year.

11.2 Design Conditions

11.2.1 Ambient Temperature Range – Refer to Section 10.4

11.2.2 Wind – Refer to Section 9.3

11.2.3 Nominal Frequency – 60 Hz

11.2.4 Frequency Design Tolerance - +/- 0.5%

11.3 Modes of Operation

11.3.1 Microgrid (isolated from grid, grid forming)

11.3.2 Grid following

11.3.3 Parallel with on-site generator

11.4 Batteries

11.4.1 Batteries installation shall conform to the manufacturer's published data sheet(s), operation and installation manual(s).

11.4.2 Battery string configuration and charging/discharging requirements must be compatible with the proposed inverter/converter.

11.4.3 Minimum battery warranty shall be 10 years. The warranty shall state the Cycle Lifetime and the Expected Lifetime (years) as well as the energy capacity at End of Life (EoL).

11.4.4 Proposal Deliverables (Batteries)

11.4.4.1 At a minimum Contractor shall provide the following information:

- BESS design, including layout and SLD
- Data sheets
- Installation Manual
- Operations Manual
- Warranty, including details on start date of warranty
- Certifications
- Ancillary equipment loads (total kW, annual kWh)
- Site Acceptance Testing (SAT) Plan (commissioning)
- At a minimum Contractor shall provide the following Technical Information:
 - Nameplate power capacity (kW)
 - Nominal energy capacity (kWh)
 - Usable energy capacity (kWh)
 - Maximum nominal charging power (kW)
 - Maximum nominal discharging power (kW)
 - Battery string voltage (Vdc)
 - Response Time (mS)
 - Minimum SoC
 - Maximum DoD
 - Minimum cycles
 - Minimum lifespan (years)
 - Self-discharge (%)
 - Capacity curve (% of nominal over 1, 5 and 10 years)
 - Round Trip Efficiency – AC to DC to AC (%)
 - Maximum Efficiency (%)
 - Min/Max Operating Temperature (°C)

- Min/Max Storage Humidity
- Min/Max Operating Humidity
- Battery Module Dimensions (LxWxD)
- Battery Module Weight (kg)
- Battery Enclosure Dimensions (LxWxD)
- Total Weight per BESS building (kg)

11.4.5 End of Life (EOL) Disposal / Recycling

- Batteries shall be disposed of according to directives 2066/66/EC and 2013/56/EU Amendment.
- The Contractor to provide details of recycling plan at EoL including environmental considerations and decommissioning/recycling cost estimates.

11.5 Battery Inverter and Charge Controller

11.5.1 Battery inverters shall be commercial grade, bi-directional, pure sine wave, grid forming/grid interactive inverters for islanded applications, and specifically designed for battery storage installations.

11.5.2 The BESS can be AC or DC coupled with the PV solar array and AC connected at the load side of existing service.

11.5.3 Minimum inverter warranty shall be 10 years.

11.5.4 Inverters shall be furnished in accordance with the latest revisions of applicable sections of UL, IEC, and IEEE.

11.5.5 Inverter voltage, current, and frequency capability are to be selected in accordance with the battery technology and chemistry, and conditions local to the generating facility.

11.5.6 Inverters shall be capable of providing reactive (VAR) power when necessary.

11.5.7 Inverters shall be capable of grid support through droop control (V/f) and grid-forming as a voltage source according to P-Q level.

11.5.8 Inverters shall have previously demonstrated capacity to operate in parallel when multiple inverters are to be co-located.

11.5.9 Inverters shall be capable of providing full rated power in both directions.

11.5.10 Proposal Deliverables (Inverters)

- Operating Temperature
- Cooling Type
- Enclosure Type
- AC Output
- Voltage (Vac)
- Continuous Power (W, kW)
- Current (A)
- Peak Current (A)
- Frequency (Hz)
- Harmonics TDD (%)
- AC Input

- Voltage (Vac)
- Maximum Current (A)
- Maximum Power (W, kW)
- Battery DC Input
- Nominal Voltage (Vdc)
- Voltage Range (Vdc)
- Maximum Charge Current (A)
- Rated Charging Current (A)
- Rated Discharging Current (A)
- Battery Type
- Battery Capacity Range (Ah, kWh)
- Type of Charge Control
- Peak Efficiency (%)
- Self-consumption loss (W)
- Standby loss (W)

11.6 Conductors and Terminations

11.6.1 DC conductors shall be copper, type DLO or equivalent.

11.6.2 Conductor shall be selected to minimize voltage drop to less than 2%.

11.6.3 Connectors shall be mechanically crimped to provide a low resistance connection.

11.7 Interconnection

11.7.1 The Contractor shall install all necessary equipment for interconnection at the load side of the existing electrical service.

11.8 Factory Acceptance Testing (FAT)

11.8.1 The Contractor shall provide FAT documents to the Contracting Authority for all major equipment prior to equipment leaving the factory.

11.9 Site Acceptance Testing

11.9.1 The Contractor will develop Site Acceptance Testing (SAT) document and submit it to the CONTRACTING AUTHORITY for review and approval within sixty (14) business days of receiving NTP.

11.9.2 SAT document will be developed based upon equipment list and include all manufacturer required site commissioning activities as listed in equipment installation and operating manuals.

11.9.3 SAT activities shall be completed by the Contractor in cooperation with the CONTRACTING AUTHORITY personnel.

11.9.4 SAT documents shall detail parameters within which the system should operate.

11.9.5 SAT document shall contain installation review checklists and inspection activities to be performed prior to energized testing.

11.9.6 SAT document shall contain performance metrics by which the system operations shall be measured and contain 'pass/fail' columns along with details of both actual measured performance and minimum required levels.

11.9.7 SAT document shall contain design verification checklists that confirm the system was installed to design specifications and manufacturer requirements.

11.9.8 At a minimum SAT document shall contain verification of the following (other testing may be required based upon equipment type, configuration and complexity):

- Verify and test that all electrical and mechanical components are ready for start-up;
- Megger testing of all cables;
- Torque checks of all terminations;
- Phase and rotation checks;
- Safety checks (covers and barriers, signage);
- Confirmation that all controls are in place and test operation of controls through 'point-to-point' checks;
- Verify that all protection relays are installed, coordinated and operational;
- Verify and test all safety systems, including leak detection, security, fire alarm, flow and pressure where applicable;
- Verify and test all communications systems;
- Confirm emergency procedures are in place and verify lock-out/tag-out;
- Test all operational modes as detailed in SOO;
- Test 'hand-off' of energy supply for all sources, confirming that hand-off is smooth and no 'transients' or other anomalous power spikes or quality issues exist during hand-off;
- HVAC commissioning if applicable;
- Fire protection system commissioning if applicable;
- Safety system commissioning, including e-stop;
- Capacity testing of batteries, full charge to full discharge, minimum two full cycles.

11.10 Training

11.10.1 The Contractor shall provide a minimum of one full day of training on the proper and safe maintenance and inspection of the BESS, and operation of the PMS, including the integration of existing generators. The training should include, at a minimum, the following operations and maintenance procedures:

- Inspection of sensors that are critical to operation, safety, or computation of capacity (SoC and SoH);
- Verification (by measurement) of energy storage capacity (kWh) and SoH (% of rated capacity);
- Replacement of cells and proper commissioning prior to connecting to a load;
- Visual checks of terminals, and proper cleaning of any oxidation;
- Health and Safety, including recommended PPE;
- SDS of all potentially hazardous materials/chemicals;
- Characteristics of HMI, including interpretation of data and functional characteristics;

- Automatic and Manual operation of system through the PMS;
- User Levels;
- Alarms and alarm response;
- Daily/Weekly/Monthly operational tasks, including data checks and validation (remote operation);
- Emergency protocol;
- Black start sequence in the event of power outage, proper synchronization of BESS and PV Solar to grid in parallel to, or in place of generators.

11.10.2 The Contractor shall provide a proposed syllabus detailing the training regime and schedule, including any materials that will be provided to attendees.

11.11 Closeout Documentation

11.11.1 The following items shall be provided at the time of project handover to the CONTRACTING AUTHORITY:

- As-Built Drawings (DWG and PDF formats);
- Operation Manual;
- Maintenance and Repair Manual;
- Equipment Specification Sheets;
- FAT;
- SAT;
- Maintenance Schedule;
- List of PPE;

SECTION 12: INSTRUCTIONS TO TENDERS

PUBLICATION REF: RES - 33/TCI-04

By submitting a tender, tenderers fully and unreservedly accept the special and general conditions governing the contract as the sole basis of this tendering procedure. Tenderers are expected to examine carefully and comply with all instructions, forms, contract provisions and specifications contained in the tender dossier. Failure to submit a tender containing all the required information and documentation within the deadline specified will lead to the rejection of the tender. No account can be taken of any remarks in the tender relating to the tender dossier; remarks may result in the immediate rejection of the tender without further evaluation.

These instructions set out the rules for the submission, selection and implementation of contracts financed under this call for tenders, in conformity with the practical guide (available on the internet at:

<https://wikis.ec.europa.eu/display/ExactExternalWiki/ePRAG>)

1. The tenderer must comply fully with the technical specifications set out in the tender dossier (technical specifications) and conform in all respects with the drawings, quantities, models, samples, measurements, and other instructions in section 6.1.2. Tenderers are not authorized to tender for a variant solution in addition to the present tender.

2. Timetable

	DATE	TIME
Clarification meeting (Virtual)	April 17, 2023	11:00 AM (TCI Time)
Deadline for requesting clarifications from the contracting authority	April 17, 2023	11:00 AM (TCI Time)
Last date on which clarifications are issued by the contracting authority	April 20, 2023	11:00 AM (TCI Time)
Deadline for submission of tenders	May 1, 2023	4:00 PM (TCI Time)
Tender opening session	May 3, 2023	11:00 AM (TCI Time)
Notification of award to the successful tenderer	May 12, 2023	-
Signature of the contract	May 26, 2023	-

3. Participation

- 3.1. To be eligible to take part in this tender procedure, tenderers must prove to the satisfaction of the contracting authority that they comply with the necessary legal, technical and financial requirements and have the means to carry out the contract effectively.
- 3.2. The successful tenderer must have a registered alternative energy business license in the Turks and Caicos Islands prior to the award of contract.
- 3.3. Subcontracting is allowed. The tenderer and, where applicable, entities on whose capacities it has relied regarding criteria relating to the economic and financial capacity shall be jointly liable for the performance of the contract.

When selecting subcontractors, companies should give preference to natural persons, companies or firms capable of performing the scope of work required on similar terms.

4. Origin

- 4.1 All supplies under this contract may originate in any country.

5. Type of contract

[Unit-price]

6. Currency

Tenders must be presented in United States Dollars (USD)

7. Period of validity



- 7.1 Tenderers will be bound by their tenders for a period of 90 days from the deadline for the submission of tenders.
- 7.2 In exceptional cases and prior to the expiry of the original tender validity period, the contracting authority may ask tenderers in writing to extend this period by 40 days. Such requests and the responses to them must be made in writing. Tenderers that agree to do so will not be permitted to modify their tenders and they are bound to extend the validity of their tender guarantees for the revised period of validity of the tender. If they refuse, without forfeiture of their tender guarantees, their participation in the tender procedure will be terminated.

8. Language of tenders

- 8.1 The tenders, all correspondence and documents related to the tender exchanged by the tenderer and the contracting authority must be written in the language of the procedure, which is English.

9. Submission of tenders

- 9.1 Paper submission:

Tenders must be delivered to the contracting authority before **4:00 PM (TCI Time) on Monday May 1, 2023**. They must include all the documents specified in point 10 (Content of Tenders) of these Instructions and be sent to the following address:

Ministry of Home Affairs, Transportation, Broadcasting, Energy and Utilities and Telecommunications Commission (MOHAT)

Turks and Caicos Islands Government Business Park, Airport Road Providenciales, Turks and Caicos Islands

TKCA 1ZZ

If the tenders are hand delivered, they should be delivered to the following address:

Ministry of Home Affairs, Transportation, Broadcasting, Energy and Utilities and Telecommunications Commission (MOHAT)

Turks and Caicos Islands Government Business Park, Airport Road Providenciales, Turks and Caicos Islands

TKCA 1ZZ

Between the Hours of 8:30 AM – 4:00 PM Monday to Friday

Tenders must comply with the following conditions:

- 9.2 All tenders must be submitted in one original, marked 'original', and two copies signed in the same way as the original and marked 'copy'.
- 9.3 The tenders should be submitted:
 - (a) either by post or by courier service, in which case the evidence shall be constituted by the postmark or the date of the deposit slip
 - (b) or by hand delivery to the premises of the contracting authority by the participant in person or by an agent, in which case the evidence shall be constituted by the acknowledgment of receipt.

The contracting authority may, for reasons of administrative efficiency, reject any application or tender submitted on time to the postal service but received, for any reason beyond the contracting authority's control, after the effective date of approval of the short-list report or of the evaluation report, if accepting applications or tenders that were submitted on time but arrived late would considerably delay the evaluation procedure or jeopardise decisions already taken and notified.

- 9.4 All tenders, including annexes and all supporting documents, must be submitted in a sealed envelope bearing only:
- a) the above address;
 - b) the reference code of this tender procedure, (i.e., RES - 33/TCI-04);
 - c) the words 'Not to be opened before the tender opening session' in the language of the tender dossier and;
 - d) the name of the tenderer.

The technical and financial offers must be placed together in a sealed envelope. The envelope should then be placed in another single sealed envelope/package.

10. Content of tenders

Failure to fulfil the below requirements will constitute an irregularity and may result in rejection of the tender. All tenders submitted must be signed by an authorized person or persons empowered by the power of attorney submitted in accordance with Form 4.3 of the tender dossier.

All tenders must comprise the following information and duly completed documents:

- Tender form, 'Declaration on Honour on exclusion criteria and selection criteria'¹.
- Evidence of the tenderer's fulfilment of the following eligibility and selection criteria:
 - the eligibility requirements in Form 4.3 ('Legal entity file'). Copies of the most recent documents showing legal status and place of registration of the headquarters of the tenderer are to be attached.
 - the economic and financial capacity requirements in section 14.a of the attached contract notice, through Form 4.4;
 - the professional and technical capacity requirements in section 14.b of the attached contract notice, through Form 4.6.5.
- Technical offer:

A detailed description of the supplies tendered in conformity with the technical specifications, including any documentation required, including if applicable:

 - [a list of the spare parts and consumables recommended by the manufacturer];
 - a list of the staff proposed for the execution of the contract, with the CVs of key staff (Forms 4.6.1.2 and 4.6.1.3);

1

- a list of plant proposed for execution of the contract (Form 4.6.2). The descriptions must demonstrate the tenderer's ability to complete the works and should include inter alia:
 - Torque wrenches
 - Cranes and lifting equipment
 - Ladders and scaffolding
 - PPEs
 - Electrical and Mechanical tools
 - The tenderer must indicate whether such equipment is owned, hired or used by a subcontractor.
 - a work plan with brief descriptions of major activities (Form 4.6.3), showing the sequence and proposed timetable for the implementation of the tasks.
 - [a training proposal (indicate training needs)];
 - [technical proposals related to ancillary services].

The technical offer should be presented as per template (Annex II+III*, Contractor's technical offer) adding separate sheets for details if necessary.

- Financial offer:

Financial offer, in accordance with ANNEX IV: Budget breakdown (Model financial offer). This financial offer should be presented as per ANNEX IV, adding separate sheets for details if necessary.

The breakdown of the lump-sum price does not derogate in any way to the clause according to which, in a lump-sum contract, the total contract price remains fixed irrespective of the quantities of work actually carried out. The prices filled are deemed to have been determined on the basis of the conditions in force 30 days prior to the latest date fixed for submission of tenders.

- Documentation:

a power of attorney empowering the person signing the tender and all related documentation (Form 4.3).

Tenders submitted by companies in partnerships forming a joint venture/consortium must also fulfil the following requirements:

The tender must include all the information required by Subclause 10 above for each member of the joint venture/consortium and the summary data for execution of EPC contract by the tenderer.

The tender must be signed in a way that legally binds all members. One member must be appointed lead member and that appointment confirmed by submission of powers of attorney signed by legally empowered signatories representing all the individual members. See Form 4.3 and the tender form.

All members of the joint venture/consortium are bound to remain in the joint venture/consortium for the whole execution period of the contract. See the declaration in the tender form.

Remarks:

Tenderers are requested to follow this order of presentation.

Templates attached to the tender dossier are accessible via the link below:



<https://www.dropbox.com/scl/fo/8795jq7mrf769ve2q12wb/h?dl=0&rlkey=qb7dj25p3jkolte83cbea7ds>
1

11. Additional information before the deadline for submission of tenders

The tender dossier is clear enough so that tenderers do not need to request additional information during the procedure. If the contracting authority, on its own initiative or in response to a request from a prospective tenderer, provides additional information on the tender dossier, it must publish such information in writing to all other prospective tenderers at the same time.

Tenderers may submit questions in writing to the following email address: eud@gov.tc up to 15 days before the deadline for submission of tenders, specifying the publication reference and the contract title:

INVITATION TO TENDER FOR THE PROCUREMENT OF AN ENGINEERING PROCUREMENT AND CONSTRUCTION (EPC) CONTRACT OF 5 ROOFTOP SOLAR PV SYSTEMS WITH BATTERY ENERGY STORAGE TECHNOLOGY AND ACCESSORIES

Any prospective tenderers seeking to arrange individual meetings with the contracting authority during the tender period may be excluded from the tender procedure.

13. Clarification meeting

A virtual clarification meeting will be held on **April 17, 2023** before the deadline for submission of tenders at 11:00 AM (Turks and Caicos Time) to answer any questions on the tender dossier which have been forwarded in writing or are raised at the meeting. Tenderers who would like to participate in this virtual clarification meeting must submit their email address to eud@gov.tc no later than **April 14, 2023**. Minutes will be taken during the meeting, and these will be communicated — together with any clarifications in response to written requests which are not addressed during the meeting — at the latest 8 calendar days before the deadline for submission of tenders. No further clarification will be provided after this date. All the costs of attending this meeting will be borne by the tenderers.

14. Alteration or withdrawal of tenders

- 14.1 Tenderers may alter or withdraw their tenders by written notification prior to the deadline for submission of tenders. No tender may be altered after this deadline. Withdrawals must be unconditional and will end all participation in the tender procedure.

Any such notification of alteration or withdrawal must be prepared and submitted in accordance with Section 9. The outer envelope must be marked 'Alteration' or 'Withdrawal' as appropriate.

- 14.2 No tender may be withdrawn in the interval between the deadline for submission of tenders and the expiry of the tender validity period. Withdrawal of a tender during this interval may result in forfeiture of the tender guarantee.

15. Costs of preparing tenders

No costs incurred by the tenderer in preparing and submitting the tender are reimbursable. All such costs will be borne by the tenderer.

16. Ownership of tenders

The contracting authority retains ownership of all tenders received under this tender procedure. Consequently, tenderers have no right to have their tenders returned to them.

17. Joint venture or consortium



- 17.1 If a tenderer is a joint venture or consortium of two or more persons, the tender must be a single one with the object of securing a single contract, each person must sign the tender and will be jointly and severally liable for the tender and any contract. Those persons must designate one of their members to act as leader with authority to bind the joint venture or consortium. The composition of the joint venture or consortium must not be altered without the prior written consent of the contracting authority.
- 17.2 The tender may be signed by the representative of the joint venture or consortium only if it has been expressly so authorised in writing by the members of the joint venture or consortium, and the authorising contract, notarial act or deed must be submitted to the contracting authority in accordance with point 10 of these instructions to tenderers. All signatures to the authorising instrument must be certified in accordance with the national laws and regulations of each party comprising the joint venture or consortium together with the powers of attorney establishing, in writing, that the signatories to the tender are empowered to enter into commitments on behalf of the members of the joint venture or consortium. Each member of such a joint venture or consortium must provide the proof required under Article 3.1 as if it, itself, were the tenderer.

18. Opening of tenders

- 18.1 The purpose of the opening session is to check whether the tenders have been submitted in accordance with the submission requirements of the call for tenders.
- 18.2 The date and venue of the tender opening session.

Date and Time: **May 3, 2023 at 11:00 AM**

Venue: **TCIG CUSTOMS CONFERENCE ROOM**

Turks and Caicos Islands Government Business Park, Airport Road
Providenciales, Turks and Caicos Islands
TKCA 1ZZ

The committee will draw up minutes of the meeting, which will be available on request.

In the case that at the date of the opening session some tenders have not been delivered to the contracting authority, but their representatives can show evidence that it has been sent on time, the contracting authority will allow them to participate in the first opening session and inform all representatives of the tenderers that a second opening session will be organised.

- 18.3 At the tender opening, the tenderers' names, the tender prices, any discount offered, written notifications of alteration and withdrawal, the presence of the requisite tender guarantee (if required) and such other information as the contracting authority may consider appropriate may be announced.
- 18.4 After the public opening of the tenders, no information relating to the examination, clarification, evaluation of tenders, or recommendations concerning the award of the contract can be disclosed until after the contract has been awarded.
- 18.5 Any attempt by tenderers to influence the evaluation committee in the process of examination, clarification, evaluation and comparison of tenders, to obtain information on how the procedure is progressing or to influence the contracting authority in its decision concerning the award of the contract will result in the immediate rejection of their tenders.
- 18.6 All tenders received after the deadline for submission specified in the contract notice or these instructions will be kept by the contracting authority. The associated guarantees

will be returned to the tenderers. No liability can be accepted for late delivery of tenders. Late tenders will be rejected and will not be evaluated.

19. Evaluation of tenders

19.1 Examination of the administrative conformity of tenders

The aim at this stage is to check that tenders comply with the essential requirements of the tender dossier. A tender is deemed to comply if it satisfies all the conditions, procedures, and specifications in the tender dossier without substantially departing from or attaching restrictions to them.

Substantial departures or restrictions are those which affect the scope, quality or execution of the contract, differ widely from the terms of the tender dossier, limit the rights of the contracting authority or the tenderer's obligations under the contract or distort competition for tenderers whose tenders do comply. Decisions to the effect that a tender is not administratively compliant must be duly justified in the evaluation minutes.

If a tender does not comply with the tender dossier, it will be rejected immediately and may not subsequently be made to comply by correcting it or withdrawing the departure or restriction.

19.2 Technical evaluation

After analysing the tenders deemed to comply in administrative terms, the evaluation committee will rule on the technical admissibility of each tender, classifying it as technically compliant or non-compliant.

The minimum qualifications required (see selection criteria) in the additional information about the contract notice are to be evaluated at the start of this stage.

Where contracts include after-sales service and/or training, the technical quality of such services will also be evaluated by using yes/no criteria as specified in the tender dossier.

19.3 In the interests of transparency and equal treatment and to facilitate the examination and evaluation of tenders, the evaluation committee may ask each tenderer individually for clarification of its tender including breakdowns of prices, within a reasonable time limit to be fixed by the evaluation committee. The request for clarification and the response must be in writing, but no change in the price or substance of the tender may be sought, offered or permitted except as required to confirm the correction of arithmetical errors discovered during the evaluation of tenders. Any such request for clarification must not distort competition. Decisions to the effect that a tender is not technically compliant must be duly justified in the evaluation minutes.

19.4 Financial evaluation

- a) Tenders found to be technically compliant will be checked for any arithmetical errors in computation and summation. Errors will be corrected by the evaluation committee as follows:

where there is a discrepancy between amounts in figures and in words, the amount in words will be the amount taken into account;

except for lump-sum contracts, where there is a discrepancy between a unit price and the total amount derived from the multiplication of the unit price and the quantity, the unit price as quoted will be the price taken into account.

- b) Amounts corrected in this way will be binding on the tenderer. If the tenderer does not accept them, its tender will be rejected.
- c) Unless specified otherwise, the purpose of the financial evaluation process is to identify the tenderer offering the lowest price. Where specified in the technical specifications, the evaluation of tenders may take into account not only the costs but, to the extent relevant, costs borne over the life cycle of the supplies (such as for instance maintenance costs and operating costs), in line with the technical specifications. In such case, the contracting authority will examine in detail all the information supplied by the tenderers and will formulate its judgment on the basis of the lowest total cost, including additional costs.

19.5 Variant solutions

Variant solutions will not be taken into consideration.

19.6 Award criteria

The compliant tender that offers the lowest price will be chosen.

Documentary evidence for exclusion and selection criteria.

At any time during the procurement procedure and before the award of the contract, the contracting authority may request documentary evidence of compliance with the exclusion criteria set out in these instructions.

No documentary evidence of the selection criteria shall be submitted but no pre-financing will be granted.

20. Notification of award

By submitting a tender, each tenderer accepts to receive notification of the outcome of the procedure by electronic means. Such notification shall be deemed to have been received on the date upon which the contracting authority sends it to the electronic address referred to in the offer.

The contracting authority will inform all tenderers simultaneously and individually of the award decision. The successful tenderer will be informed in writing that its tender has been accepted (notification of award).

21. Signature of the contract and performance guarantee

- 21.1 The contracting authority reserves the right to vary quantities specified in the tender by +/- 100 % at the time of contracting and during the validity of the contract. The total value of the supplies may not, as a result of the variation rise or fall by more than 25 % of the original financial offer in the tender. The unit prices quoted in the tender shall be used.
- 21.2 Within 14 days of receipt of the contract signed by the contracting authority, the selected tenderer must sign and date the contract and return it, with the performance guarantee (if applicable), to the contracting authority. On signing the contract, the successful tenderer will become the contractor and the contract will enter into force.
- 21.3 If the selected tenderer fails to sign and return the contract and any financial guarantee required within 30 days after receipt of notification, the contracting authority may consider the acceptance of the tender to be cancelled without prejudice to the contracting authority's right to claim compensation or pursue

any other remedy in respect of such failure, and the successful tenderer will have no claim whatsoever on the contracting authority.

- 21.4 The performance guarantee referred to in the general conditions is set at 10% of the amount of the contract. The performance guarantee must be presented in the form specified in the annex to the tender dossier. It will be released within 30 days of the issue of the final acceptance certificate by the contracting authority.

22. Tender guarantee (Not Applicable)

23. Ethics clauses and code of conduct

23.1 Absence of conflict of interest

The tenderer must not be affected by any conflict of interest and must have no equivalent relation in that respect with other tenderers or parties involved in the project. Any attempt by a tenderer to obtain confidential information, enter into unlawful agreements with competitors or influence the evaluation committee or the contracting authority during the process of examining, clarifying, evaluating and comparing tenders will lead to the rejection of its tender and may result in administrative penalties according to the Financial Regulation in force.

23.2 Respect for human rights as well as environmental legislation and core labour standards.

The tenderer and its personnel must comply with human rights and applicable data protection rules. In particular and in accordance with the applicable basic act, tenderers and applicants who have been awarded contracts must comply with the environmental legislation including multilateral environmental agreements, and with the core labour standards as applicable and as defined in the relevant International Labour Organisation conventions (such as the conventions on freedom of association and collective bargaining; elimination of forced and compulsory labour; abolition of child labour).

Zero tolerance for sexual exploitation, abuse and harassment:

The European Commission applies a policy of 'zero tolerance' in relation to all wrongful conduct which has an impact on the professional credibility of the tenderer.

Physical abuse or punishment, or threats of physical abuse, sexual abuse or exploitation, harassment and verbal abuse, as well as other forms of intimidation shall be prohibited.

23.3 Anti-corruption and anti-bribery

The tenderer shall comply with all applicable laws and regulations and codes relating to anti-bribery and anti-corruption. The European Commission reserves the right to suspend or cancel project financing if corrupt practices of any kind are discovered at any stage of the award process or during the execution of a contract and if the contracting authority fails to take all appropriate measures to remedy the situation. For the purposes of this provision, 'corrupt practices' are the offer of a bribe, gift, gratuity or commission to any person as an inducement or reward for performing or refraining from any act relating to the

award of a contract or execution of a contract already concluded with the contracting authority.

23.4 Unusual commercial expenses

Tenders will be rejected or contracts terminated if it emerges that the award or execution of a contract has given rise to unusual commercial expenses. Such unusual commercial expenses are commissions not mentioned in the main contract or not stemming from a properly concluded contract referring to the main contract, commissions not paid in return for any actual and legitimate service, commissions remitted to a tax haven, commissions paid to a payee who is not clearly identified or commissions paid to a company which has every appearance of being a front company.

Contractors found to have paid unusual commercial expenses on projects funded by the European Union are liable, depending on the seriousness of the facts observed, to have their contracts terminated or to be permanently excluded from receiving EU funds.

23.5 Breach of obligations, irregularities, or fraud

The contracting authority reserves the right to suspend or cancel the procedure, where the award procedure proves to have been subject to breach of obligations, irregularities or fraud. If breach of obligations, irregularities or fraud are discovered after the award of the contract, the contracting authority may refrain from concluding the contract.

24. Cancellation of the tender procedure

If a tender procedure is cancelled, tenderers will be notified by the contracting authority.

If the tender procedure is cancelled before the tender opening session the sealed envelopes will be returned, unopened, to the tenderers.

Cancellation may occur, for example, if:

- 24.1 the tender procedure has been unsuccessful, namely where no suitable, qualitatively or financially acceptable tender has been received or there has been no valid response at all;
- a) the economic or technical parameters of the project have changed fundamentally;
 - b) exceptional circumstances or force majeure render normal implementation of the project impossible;
 - c) all technically acceptable tenders exceed the financial resources available;
 - d) there has been breach of obligations, irregularities or frauds in the procedure, in particular where these have prevented fair competition;
 - e) the award is not in compliance with sound financial management, i.e., does not respect the principles of economy, efficiency and effectiveness (e.g. the price proposed by the tenderer to whom the contract is to be awarded is objectively disproportionate with regard to the price of the market).

In no event will the contracting authority be liable for any damages whatsoever including, without limitation, damages for loss of profits, in any way connected with the cancellation of a tender procedure even if the contracting authority has been advised of the possibility of damages. The publication of a

contract notice does not commit the contracting authority to implement the programme or project announced.

25. Appeals

Tenderers believing that they have been harmed by an error or irregularity during the award process may file a complaint. See Section 2.12. of the practical guide.

26. Early detection and exclusion system

The tenderers and, if they are legal entities, persons who have powers of representation, decision-making or control over them, are informed that, should they be in one of the situations of early detection or exclusion, their personal details (name, given name if natural person, address, legal form and name and given name of the persons with powers of representation, decision-making or control, if legal person) may be registered in the early detection and exclusion system, and communicated to the persons and entities listed in the above-mentioned decision, in relation to the award or the execution of a procurement contract.

SECTION 13: TENDER DOSSIER

The Tender Dossier is accessible via the link below:

<https://www.dropbox.com/scl/fo/8795jq7mrf769ve2q12wb/h?dl=0&rlkey=qb7dj25p3jkolte83cbea7ds1>

SECTION 14: MAP OF TURKS AND CAICOS ISLANDS

