Anguilla Electricity Company Limited

Request for Proposal:

Reconstruction of Anglec Photovoltaic Generating Plant

July 2018

Anguilla Electricity Company Limited

P.O. Box 400

The Valley

Anguilla

Request Number: ANX062018

Table of Contents

1 Background

Anguilla Electricity Company Limited (ANGLEC) is a company duly incorporated under the laws of Anguilla having its Registered Office at Hannah-Waver House, The Valley, Anguilla. ANGLEC is the sole provider of electricity in Anguilla and presently does so using diesel generators. The power is produced by a single generating power plant (Corito Power Station), containing 11 turbo-diesel generating units. The output voltage and frequency of the plant is 13.8kV and 60Hz respectively. The installed capacity of the generating plant is 24 megawatts (MW). The peak load is 15.5 MW. The Company's transmission and distribution (T&D) system is comprised of a 34.5kV transmission line (that feeds a 13.8kV substation on the Western end of Anguilla); and a 13.8kV distribution network that emanates directly from Corito Power Station. Future plant requirements are determined by load projections and plant firm capacity. Plant firm capacity is based on dispatchable generating plant (using the n-2 method) to ensure a reliable supply of electricity after allowance for breakdown and scheduled maintenance. Capacity planning also takes into account a 15% spinning reserve policy. More information on ANGLEC is available at **www.anglec.com**.

1.1 Scope of Services Required

The objective of this Request for Proposal (RFP) is to select the most qualified bidder for the turnkey reconstruction of certain key components of a (1) Megawatt (MW) or higher, grid-connected, ground mounted solar PV system on land located South-West of the Corito Power Station. A new Battery storage system is also required. The original solar farm suffered wide spread damage during the passage of hurricane Irma with sustain winds of 185 miles per hour and gusts up to 230 miles per hour on September 6, 2017. The reconstructed Solar PV Power Generating Plant must be commissioned and handed over to ANGLEC before the commercial operating date outlined in this request for proposals.

1.1.1 Solar Plant

The scope of services provided by the bidder for the reconstruction of the solar plant shall include all tasks required including the design, fabrication, delivery, installation, and commissioning of the solar panels and all supporting structures including the combiner boxes. The bidder shall be responsible for making all the connections to the existing inverters, transformers, switchgear and other equipment already onsite.

The reconstructed solar farm must be able to communicate and integrate seamlessly with the existing inverters and all other medium voltage switchgear and control and monitoring systems. The bidder shall have the option of installing an independent software control and monitoring system.

Any upgrading of the existing inverters, transformers and medium voltage switchgear must be included in the proposal.

The battery system shall be a fully integrated containerized product capable of interconnecting to the existing 13,800 volts utility infrastructure and functioning in conjunction with the existing diesel generation system and the PV system. This battery system is intended to typically feed-in power to compensate load steps due to sudden curtailment of the solar PV system output (cloud), allowing for smoother handling of the diesel gen sets. Based upon the two solar plant proposals required above, an equivalent battery system will be required to compensate for the additional capacity.

Both proposals must include a comprehensive design that can be evaluated to ensure that minimum requirements are met.

Both proposals must indicate the levelized cost of energy (LCOE) and the electrical characteristics of the resource delivered to ANGLEC's existing Connection Point. The stated output must accept the curtailment, congestion and losses to the Point of Delivery.

The scope of services shall also include, but not be limited to all labor, taxes (outside of Anguilla), services, equipment and staff training necessary to produce a fully reliable and operational Solar PV Power Plant.

Bidders are required to submit two proposals:

1.1.2 Solar Plant Proposal one

Reconstruct the solar farm with capacity of existing solar farm which is 1.1 MW. Bidder must indicate the efficiency of the solar farm.

The battery system for the 1.1. MW solar farm shall be approximately 400 kW, 200Kwh.

1.1.3 Solar Plant Proposal two

Given the current land limitations, ANGLEC is seeking to maximize the output and related production within the existing land area which is approximating 4.1 acres. Bidders are asked to submit proposals providing the maximum output and related production that is possible within the existing land area of approximately 4.1 megawatts. The proposed solar farm must have an efficiency level that is acceptable within industry standards. Bidder must clearly indicate the efficiency level of the solar farm.

The battery system for the proposal two shall be approximately 600 kW, 300 kWh and 400 kW, 200kWh.

1.2 Solar Farm Existing Condition

The Inverters, medium voltages switchgear and power transformer are in an Ingecon Sun PowerStation container. These components suffered limited damage and their replacement is not in the scope of this RFP.

The existing medium voltage transformer has a capacity of 1.1 MW, the input voltage is 420 volts and the output voltage is 13800 which is Anglec system voltge.

The existing inverter system consist of four inverter modules each with a capacity of 270 kw for a total of 1080 kw. Model number is (1070TL X420 DCAC Indoor). The output voltage of the inverter is 420 volts

The name of the existing power monitoring and control software is Ingesys™ IT

The interconnection of the solar farm to the power station suffered minimal damage and its replacement is not within the scope of this RFP.

Specifications of the housing container for the existing medium voltage switchgear, powers transformers and other associated apparatus is given in Appendix B

Specification of the existing inverters is given in Appendix C

2 Eligible Proposals, Instructions and Minimum Requirements

2.1 Eligible Resource Types

The proposed PV modules, mounting mechanism, and other balance of system components must meet the minimum requirements using proven, reliable, environmentally friendly, and commercially-available technology. Proposed PV modules may not utilize hazardous materials (i.e. Cadmium or any other hazardous materials). Resource materials should be able to maintain structural integrity within Anguilla's climatic conditions.

2.2 General Minimum Eligibility Requirements

In addition to the commercial operation date and capacity requirements identified above, proposals must meet the general minimum eligibility requirements described herein. ANGLEC will screen all proposals for compliance with these requirements. Proposals that fail to meet one or more of the general minimum eligibility requirements will be disqualified from further consideration.

2.3 Capacity

All proposals must offer capacity that is accreditable under IEC61730. The capacity of the photovoltaic (PV) plant and the battery system will be measured at the Point of Delivery.

2.4 Proven and Commercially-Available Technology

Proposals must offer capacity and energy that will be generated from proven and commercially-available PV and battery technology. Bidder's proposal must include information on at least one project using the proposed technology under climatic conditions similar to Anguilla.

2.5 Hurricane Rating

The existing PV installation was designed to withstand sustained wind speeds of 120 mph in any direction for a minimum of one hour and withstand wind-borne debris to ASTM 1996-06 (Test method ASTM E188605).

The reconstructed PV installation must withstand minimum sustained wind speeds of 160 mph in any direction for a minimum of one hour and withstand wind-borne debris to ASTM 1996-06 (Test method ASTM E1886-05).

The battery container must be able to withstand minimum sustained wind speeds of 160 mph in any direction for a minimum of one hour and withstand minimum wind-borne debris to ASTM 1996-06 (Test method ASTM E188605).

The bidder must give a comprehensive justification why the reconstructed design of the solar farm and the design of the battery system can withstand windspeeds of 160 miles per hour and the advantages of the design.

The ability of the bidder to comprehensively prove the design of both the reconstructed solar farm and the battery system can withstand windspeeds of 160 miles per hour will be a key evaluation criterion when short listing and for final bidder selection.

2.6 Solar Farm Specifications

2.6.1 Minimum Design Specification

The system, facilities, and components shall be designed and constructed considering the effects of all applicable environmental conditions such as wind, earthquakes, corrosion, precipitation, flooding and temperature and humidity extremes

The system shall be designed to enable ease of maintenance and cleaning

The systems shall be designed and constructed for a minimal functional life of 25 years. The material used must be able to withstand a category E corrosion zone and a seismic zone of level three. The Bidder must produce a product data sheet of the following as a separate attachment.

- Mounting frame material
- Foundation Design and Material

  Data sheets must include manufacturer specifications

All hardware must be sized based on 25 years of corrosion

The systems shall be designed and constructed in a manner to minimize losses due PV module shading, soiling and wire loss.

The structures must resist both static and dynamic wind loading without damage due to resonance or fatigue.

The structures must be designed to withstand gravitational loads and combined loads as required by applicable codes.

The structures must take into account the expected thermal expansion, contraction and thermal cycling

2.6.2 Minimum Construction Specifications of Reconstructed Solar Farm

Combiner boxes must be mounted on separate foundations.

Cable bracing or strapping must be used to increase the capacity for rack side loading.

Module should have front rating of 5400 Pa for higher wind capability.

All modules must be through bolting. Top-down or T clamps is not acceptable.

The module mounting design must have at least (4) through bolts per module.

Nylon insert nuts must be use on all module mounting bolts to eliminate workmanship and vibration failure modes.

All bolted connections must be torque and have QC marks applied.

The rack design must have all bolts except module mounting bolts loaded in shear.

Rack design must connect all light gauge rolled structural members through the Web and not the flange.

No self-tapping screws must be used for any application.

A structural engineering review and professional stamp is required for module connection.

A structural engineer review and professional stamp of lateral loads due to racking and electrical hardware is required.

A structural engineering wind tunnel report review is required. It must be ensured that module load does not exceed load rating.

Design trackers for worst case wind exposure is required, no stow position for extreme wind allowed.

The selected bidder will be required to provide structural details on engineering drawing. Structural details include but are not limited to PV module mounting, fasteners, support structures, material specifications, grades and finishes, foundation, and array layout drawing.

The bidder shall provide structural engineering documentation verifying that the design and the materials meet the minimum specifications.

The selected bidder shall be required to provide preliminary technical design (One Line) included detail sheets showing the general placement of the PV panels the existing inverters and battery storage.

2.7 Battery System Specifications

The battery system shall consist of the battery supply, a suitable size inverter, control systems and all other necessary accessories. The battery system must have a performance warranty for at least 10 years or a minimum of 4000 cycles.

When a stable AC input power source is present, (from existing Solar Plant) the rectifier/charger shall simultaneously supply the inverter with DC power and recharge the battery. This shall be an automatic function and shall cause no disturbance to the loads.

2.7.1 Quality Standards

The following data is required for the Battery system Supply

I. Quality norm II.
II. Useable capacity III.
III. End of Life capacity IV.
IV. DC/DC round trip efficiency on system level
V. Design cycling capacity shall be above 4000 cycles at 80% depth of discharge.

2.7.2 Low Voltage Disconnect

Should the battery voltage reach the discharge limit, the battery system shall disconnect from the critical load to safeguard the battery.

2.7.3 Battery System Drawings

Detail drawings consisting of a complete list of equipment and materials, manufacturer's descriptive and technical literature, battery sizing calculations per IEEE 485, installation instructions, single-line diagrams, ladder-type schematic diagrams, elevations, layout drawings, and details required to demonstrate that the system has been coordinated and will function properly as a unit.

2.7.4 Performance Test Plan

Submit test plans and procedures at least 15 calendar days prior to the start of field tests. Provide detailed description and dates and times scheduled for performance of tests, and detailed description of test Procedures, including test equipment (list make and model and provide functional description of the test instruments and accessories) and setups of the tests to be conducted to ensure the battery system meets the performance specification. Explain the test methods to be used.

2.7.5 Environmental Conditions

The battery system shall be capable of withstanding any combination of the following external environmental conditions without mechanical or electrical damage or degradation of operating characteristics.

a. Operating altitude: Sea level.

b.Operating ambient temperature range: 32 to 104 degrees F. Range for batteries are 50 to 86 degrees F

c. Non-operating and storage ambient temperature range: Minus 4 to plus 122 degrees F.

d. Operating relative humidity: 0 to 95 percent, without condensation.

2.7.6 Delivery and Storage

Equipment placed in storage shall be protected from humidity and temperature variations, moisture, water intrusion, dirt, dust, or other contaminants. In harsh environments where temperatures exceed nonoperational parameters established within this specification, the equipment storage facility shall be environmentally controlled to ensure temperature parameters are within equipment specification.

2.7.7 Sound Pressure Levels

Sound pressure levels produced by the battery system, when operating under full rated load, at five (5) feet in any direction from the perimeter of the unit, shall not exceed 75 dB as measured on the A scale of a Type 1 sound level meter at slow response conforming to ASA S1.4.

2.7.8 Other Battery technical requirements

The features of battery system are mainly Frequency Response and Ramp Rate control of the existing PV power plant. The battery system control should be able to interface with the solar pv inverter/control system.

The battery system should only be activated only after the solar farm output has dip to more than 400 kw. At this point the declining ramp rate of the solar farm should be limited by the batteries to about 50 kw per

minute or less until the frequency is stabilized. The system is required to monitor the solar farm output for approximately 3 minutes and respond until the next triggered event.
After the 3-minute monitoring period, the battery system should disconnect and recharge at a rate of no more than 100 kw per minute.

The batteries have to be designed for a minimum of 10-year period

A system that monitors the battery system and the pv plant is required, the battery control system must allow remote monitoring and control from the PowerStation control room

The capacity of the batteries stated in this RFP is the beginning of life capacity (BOL) however the end of life capacity after the 10 years must also be stated.

2.8 Warranties and Guaranties

The bidder shall prepare and submit to Anglec plans for a comprehensive project warranty including but not limited to the following:

1. PV module (at least 25 years)
2. Workmanship (at least 5 years)
3. Mounting frame (at least 20 years)
4. Other mounting materials (at least 20 years)
5. PV Foundation & materials (at least 25 years)
6. Batteries (at least 10 years)
7. Inverters (at least 10 years)
8. Other system materials (at least 10 years)
9. Energy performance guarantee at point of delivery (at least 25 years)

2.9 Local Labor Requirements

The bidder shall provide a local labor plan showing the percentage of locals to be employed on the project. Anglec considers 40 % of the onsite manhours to be supplied by locals as the minimum for the duration of the project. This percentage will be as an evaluation criterion when short listing and for the final bidder selection.

2.9.1 Local equipment Requirements

The bidder must ensure that all non-specialized equipment is provided from local sources

2.10 Environmental management plan

A detailed environmental management plan has to be submitted

2.11 Firm, Binding Prices

Proposals must include pricing that is firm and not subject to unilateral revision during ANGLEC's evaluation and negotiation process. All prices must be in United States dollars and not subject to currency exchange rate adjustment. The proposal must be signed by an officer of the bidding firm who is duly authorized to commit the firm to carry out the proposed power supply should ANGLEC accept the proposal. All prices must be firm and binding for 90 days.

2.12 Bond

As part of the contract the selected bidder will be required to provide a bond in the amount of $2,500,000 dollars payable to Anglec prior to the start of construction in the event the selected bidder is unable to perform actions as set forth is the contract. No bid bond is required.

2.13 Insurance

All contractors and subcontractors performing work on Anglec property will be required to carry standard insurance requirements as set forth in Attachment A

2.14 Legal Certifications

Bidders must certify that:

- The bidder has not directly or indirectly induced or solicited any other respondent to submit a false or sham proposal, the bidder has not solicited or induced any other person, firm, or corporation to refrain from submitting a proposal, and
- The bidder has not sought by collusion to obtain any advantage over any other respondent.

2.15 Additional Eligibility Considerations

Proposals must include sufficient information to allow ANGLEC to evaluate an offer. Section 6 (Proposal submission requirements) includes further instructions on what must be included in the proposal. Proposals that are deficient or incomplete will be rejected by ANGLEC.

2.16 Proposal Submission Requirements

To be eligible for consideration, a duly signed proposal must be physically received by ANGLEC's Contact by the Proposal Submission Deadline stated in the schedule outlined in Section 4, and in accordance with the proposal content highlighted in Section 6.

2.17 Point of Delivery/Siting/Interconnection/Firm Transmission

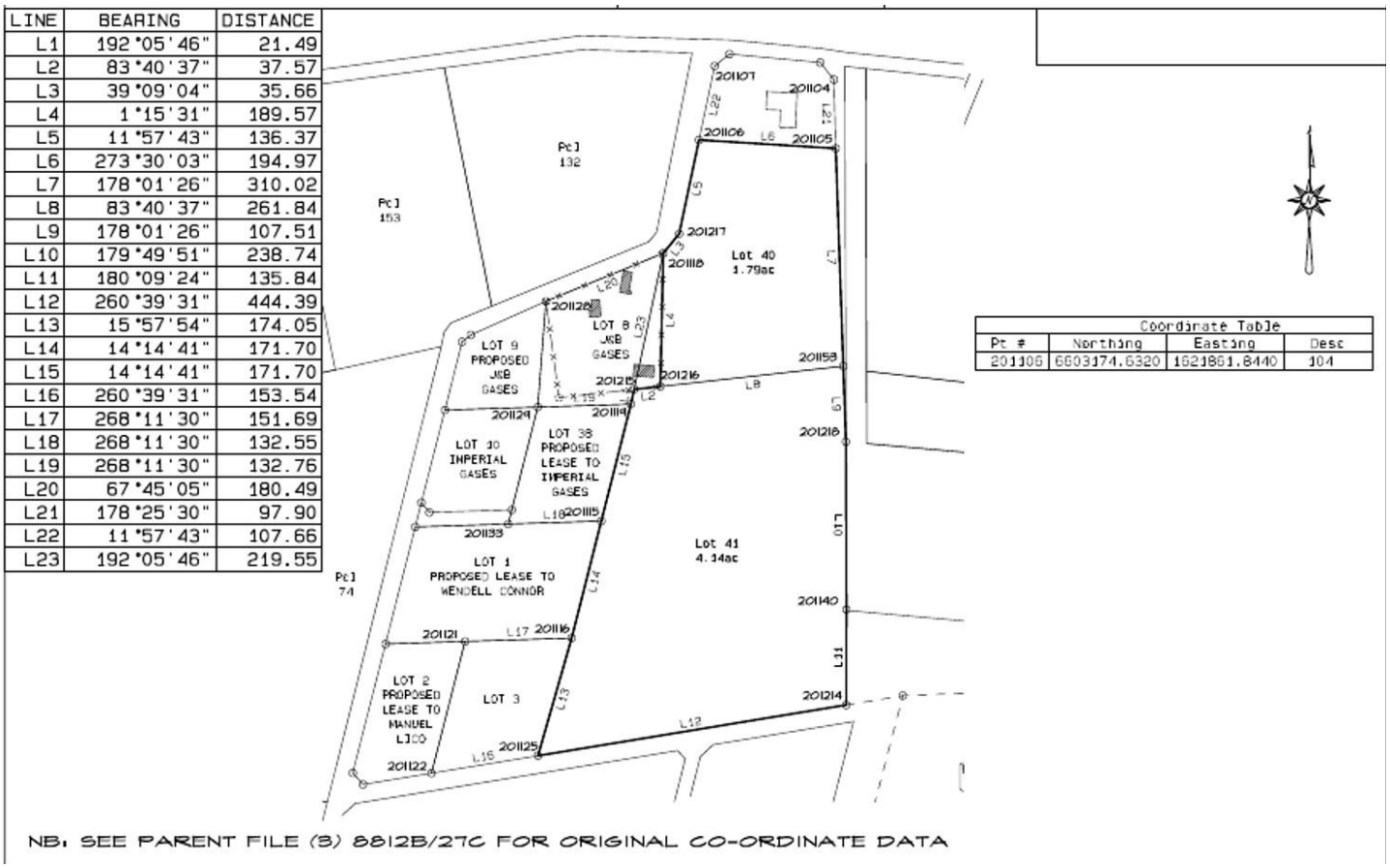
The Point of Delivery for the reconstructed solar plant shall be the terminals of the existing solar farm medium voltage switchgear which is located in an Ingecon Sun PowerStation container.

The point of delivery for the battery system shall be the existing solar plant circuit breaker at the power station. Anglec will be responsible for the installation of the medium voltage cables from the battery container to the PowerStation solar plant circuit breaker and the connections to that circuit breaker at the PowerStation. The supplier will be responsible for all connection to the battery system and all control wiring installations and connections.

The battery container will be located within 150 feet of the Ingecon sun PowerStation container which contains the existing inverters and the medium voltage switchgear for the reconstructed solar farm.

Images of the approximate locations is shown below:

LINE	BEARING	DISTANCE
L1	192°05'46"	21.49
L2	83°40'37"	37.57
L3	39°09'04"	35.66
L4	1°15'31"	189.57
L5	11°57'43"	136.37
L6	273°30'03"	194.97
L7	178°01'26"	310.02
L8	83°40'37"	261.84
L9	178°01'26"	107.51
L10	179°49'51"	238.74
L11	180°09'24"	135.84
L12	260°39'31"	444.39
L13	15°57'54"	174.05
L14	14°14'41"	171.70
L15	14°14'41"	171.70
L16	260°39'31"	153.54
L17	268°11'30"	151.69
L18	268°11'30"	132.55
L19	268°11'30"	132.76
L20	67°45'05"	180.49
L21	178°25'30"	97.90
L22	11°57'43"	107.66
L23	192°05'46"	219.55



{Image and coordinates of the land where the existing solar farms panels that has to be rebuilt is located. The lot is # 41 The area is approximately 4.14 acres}

Image showing the approximate plan location of the battery system relative to the existing Ingeteam container

2.18 Voltage and Frequency

Voltage and frequency required at the existing Point of Delivery for the reconstructed solar plant and the battery system are 13.8kV and 60Hz respectively.

3 Visit to Existing Site for Photovoltaic Resource

Bidders may arrange with the ANGLEC contact person (in Section 5) for a visit to the existing site in order to conduct any site- specific that they require.

4 Schedule

ANGLEC's expected time-line for conducting this resource solicitation is as follows:

1. Deadline for receipt of proposals – 14th September 2018
2. Completion of Proposal Evaluations – 28th September 2018
3. Completion of negotiations and contract award – 31st October 2018
4. PV Plant commissioning – 30th June 2019

ANGLEC reserves the right to modify this schedule as circumstances warrant and/or as ANGLEC deems appropriate.

5 Communication with ANGLEC

All questions regarding the RFP shall be submitted in written form and shall be sent to the following person: Mr Sylvan Brooks, Anguilla Electricity Company Limited, P.O. Box 400, The Valley, Anguilla, Phone: (264) 497-5200. Document number ANX04242018, as printed on the cover of this document must be referenced in all queries. Queries should be submitted before, August 17th, 2018. ANGLEC cannot guarantee a timely response on any query submitted after that date.

6 Proposal Submission Requirements

By the Proposal Submission Deadline identified in Section 4, bidders must submit sealed packages that include:

- Proposal original, designated "Original Tender"
- One additional copy of the proposal
- Two CD-ROM copies of all bid documents

The proposal package must be received via mail or courier, or hand-delivered to:

Mailing Address	**Courier**
Mr. Sylvan Brooks	Mr. Sylvan Brooks
P.O Box 400	Airport Road
The Valley	The Valley
Anguilla	Anguilla
West Indies	British West Indies

Contact No. 264-497-5200

The package must be sealed and clearly labelled “ANGLEC reconstructed Photovoltaic Project Proposal”.

Proposals must be received by ANGLEC’s Contact by 4:00 p.m. (EST) before 14th September 2018. ANGLEC reserves the right in its sole discretion to modify this deadline or accept late bids based upon extenuating circumstances.

6.1 Proposal Content

The proposal must contain a cover letter bearing the company letterhead providing information regarding the firm and its ability to perform the requirements outlined in this RFP. The cover letter must be signed by an officer of the bidding firm who is duly authorized to commit the firm to the execution of the proposal. The cover letter must include the following table:

Bidder Information
Name of Firm
Description of the Organization: Corporation, limited liability company, sole proprietorship etc.
Address:
City, State and Zip Code (if applicable)
Country
Main Telephone
Contact Name
Contact Telephone
Contact Facsimile
Contact Email Address
Partner(s) Information
Firm Name
Address
City, State and Zip Code (if applicable)
Country

In the event of any discrepancy in the content of the copies, the copy marked “Original Tender” shall prevail. Faxed or emailed submissions will not be accepted.

Proposals not adhering to this protocol will be deemed non-responsive. Proposals received after the stated time and date, will be considered late and will be rejected. Please allow ample time for delivery of your proposals by the stated due date.

Proposal emphasis should be on completeness and clarity of content with sufficient detail to allow for accurate evaluation and comparative analysis. Proposals shall be clear, accurate, and comprehensive. A material departure from the format requirements listed herein will render the proposal as non-responsive. The proposal shall be organized in separate sections tabbed with the corresponding section numbers and related headings in the order presented below:

The following additional information will also be required.

6.2 Company Profile

a) Year founded and number of continuous years in business. Minimum of five (5) years in business is required.
b) Ownership status (private or publicly-held).
c) Number of employees in local branch office at the time of submittal (full-time employees, excluding contractors
d) Corporate office location
e) Local Office location

6.3 Project Team Qualification and Experience

Bidders must state the technical qualification and experience of the principal members of the project team. In addition to the O&M issues, proposals must also include information on who will be responsible for design, siting, and construction of the facility. Each member that will lead key aspects of the project must have experience in leading those tasks on previous projects that are similar to the proposed project. Bidders must list these members. The following detail information is required

a) Team leader identification for the entire proposal, including full contact information, office location and key qualifications and professional credentials.
b) Identification of each business entity, person or firm involved in the proposal and their role (design, installation, civil/environmental, permitting, equipment supply, operations and maintenance, etc.). Prior experience collaborating on projects is preferred.
c) Resumes of personnel directly involved with the development of the proposed Systems. Provide evidence of relevant certification.

6.4 6.2.2 Bidder's Financial Status

Proposals must include the bidder's (or guarantor's, if applicable) most recent audited financial statements and any filings covered in the annual report.

Bidders must state any officers, directors and owners or shareholders having (10%) or more interest or ownership of the bidding company. If a partnership or joint venture between two or more parties or entities is contemplated, a description of past and current relationship of the parties must be included in your description.

Bidders must provide a list of all legal proceedings (including bankruptcy) to which the bidder or its subsidiaries or affiliates have been a party during the last ten (10) years.

ANGLEC reserves the right to verify the bidder's financial status prior to the execution of any agreement(s).

6.5 Relevant Experience Constructing Solar Farms

The following information is required

a) List the number, size (in kW DC) and location of PV projects with energy storage completed in the last 10 years
b) List the number, size (in kW DC) and location of PV projects completed within the last 10 years
c) List the total capacity (in kW DC) of operational solar PV installations completed by the firm to date.
d) List experience in installing utility scale solar PV systems with battery storage.
e) List firm's direct experience with installed solar PV module technologies including brand, module rating and technology type (crystalline, thin-film, etc.). If the firm has any proprietary and/or exclusive corporate affiliation to any materials, equipment, or manufacturers related to the System, please state those relationships.
f) List firm's direct experience with installed energy storage systems including brand and type. If the firm has any proprietary and/or exclusive corporate affiliation to any materials, equipment, or manufacturers related to the System, please state those relationships.

6.6 References

For the projects listed above, please provide reference information as listed below. Please note that the Anglec may contact all or some of the reference listed to aid in the Anglec assessment of bidders proposal. Required information includes:

- Reference project name and location.
- Host Customer and/or Owner's name with contact person's name, email, address and phone number.
- Commencement and Completion Dates
- Indicate if the installation was installed as a remote net metering
- Any other installation – specific information that may be relevant

6.7 Insurance

Provide evidence of the insurance limits held by firm demonstrating bidders ability to comply with the insurance requirements set forth in this RFP.

6.8 Detailed engineering design of project

Bidders must provide a comprehensive design of the project with supporting documentation that can be evaluated to ensure that the minimum requirements are met

6.9 Project Schedule and Current Status

Proposals must include a detailed project schedule that shows the expected commencement, duration, and completion of all significant project milestones.

6.10 Design and Construction Plan

Bidders should provide information on what firm(s) will be involved with the design and construction of the facility and describe any relevant issues that may positively or negatively influence the project's design and construction.

6.11 Resource Supply Plan

Bidders must clearly state the source of their average hourly irradiation estimates and provide hourly estimates of PV generation net of all estimated system losses up to the connection point. Estimates for an average day of each month i.e. 24 hours of estimates for each of 12 months should be itemized in a spread sheet. Using the spreadsheet format below, bidders must also provide the Expected Annual Generation from their project(s). All calculations must be based on the performance guarantee of the PV modules over a 20-year period.

	Size of Plant (MW)	Annual Capacity Factor (%)	Expected Annual kWh Production (kWh)
Year 1			
Year 2			
Year 3			
Year 4			
Year 5			
Year 6			
Year 7			
Year 8			
Year 9			
Year 10			
Year 11			
Year 12			
Year 13			
Year 14			
Year 15			
Year 16			
Year 17			
Year 18			
Year 19			
Year 20			

6.12 O&M plan and training

Proposals should include a discussion of the bidder's O&M plan as well as a schedule of O&M costs. The O&M plan should include the maintenance requirements for all solar panels and supporting structures, also the battery system, and the respective expected replacement timeline over the economic life of the reconstructed solar plant and the battery system.

The selected bidder shall provide the appropriate documentation for all deliveries. These shall include, but not limited to:

a. Operation and maintenance manuals for both the reconstructed solar farm and the battery system.
b. Installation diagrams
c. Component specifications
d. Electrical and civil schematics
e. Individual components 0&Ms

6.13 Cost Schedules

Proposals should include completed cost schedules in the format provided below:

6.13.1 Schedule A - Installation Costs

	Proposal 1		***Proposal 2***	
Category	*Details*	*Price US Dollars*	*Details*	*Price US Dollars*
Capacity (kW/kWh's)				
Engineering and Design				
PV Panels ***PV Moule procurement (including shipping)*** ***Installation and connectivity*** ***Total cost of PV panels***				
Additional inverter cost if required ***Inverter procurement (including shipping)*** ***Installation and connectivity*** ***(Applicable only to proposal two)***				
Additional transformer cost if required ***Transformer procurement (including shipping)*** ***Installation and connectivity*** ***(Applicable only to proposal two)***				

Mounting Mechanism ***Mounting System procurement (including shipping)*** ***Installation and connectivity*** ***Total cost for mounting systems***				
Interface with existing Inverters and control system				
Wiring and Cabling ***Photovoltaic DC string cable*** ***Installation cost*** ***Other*** ***Total cost for wiring and cabling***				
Battery System ***Batteries procurement (including shipping)*** ***Batteries Installation and connectivity*** ***Battery system Inverter procurement (including shipping)*** ***Battery system Inverter Installation and connectivity*** ***Battery system medium voltage, low voltage switch gear and metering procurement (including shipping)*** ***Battery system medium voltage, low voltage switchgear, and metering installation and connectivity*** ***Battery system instrumentation, control and protective systems*** ***Other Battery systems*** ***Total cost for battery system***				

Civil Works ***Site clearing preparation*** ***Drainage*** ***Trenching*** ***Evacuation*** ***Site preparation, earth works, materials and labor for*** ***Option1*** ***Drilled shaft piling (including hammer drill required for limestone/ coral rock formation)*** ***Option 2*** ***Concrete ballast foundation (Including anchorage)*** ***Management design and other overhead cost*** ***Total cost for civil works***				
Training and O&M manuals				
Other Cost ***Project management*** ***Other Miscellaneous*** ***Total cost of project management and miscellaneous***				
Total				

6.13.2Schedule B – O&M Costs

			Proposal 1	Proposal 2
Category	***Frequency***	***Details***	***Projected Monthly Cost (US Dollars)***	***Projected Monthly Cost (US Dollars)***
Maintenance Routine 1	*Daily*			
Maintenance Routine 2	*Weekly*			
Maintenance Routine 3	*Monthly*			
Maintenance Routine 4	*Annually*			

7 Information Disclosure

Note that any portion of a bidder's proposal that the bidder deems to be confidential must be clearly marked. ANGLEC and its consultants will take reasonable precautions to maintain the confidentiality of such information. However, ANGLEC is rate regulated by the Ministry of Infrastructure; therefore, bidders must recognize that their confidential information may have to be shared with regulatory agencies and provided in Ministry of Infrastructure regulatory proceedings as well as other regulatory or legal proceedings. ANGLEC will employ reasonable efforts to ensure that such confidential information is not publicly disclosed in such proceedings but can give no guarantees of such protection.

8 The Evaluation Process

ANGLEC will undertake an evaluation of power supply proposals that will involve the following steps:

- Screening for completeness and compliance with minimum eligibility requirements
- Preliminary and detailed economic assessment
- Non-economic/risk assessment
- Further due diligence
- Final selection

Note: ANGLEC reserves the right to eliminate any or all proposals during any of these steps. Any proposal advancing any one or more steps does not create any entitlement or reasonable expectation that the proposal will be accepted. All contractual obligations between ANGLEC will be governed by FIDIC Conditions of Contract for PLANT and Design-Build (for electrical and mechanical works and for building and engineering works designed by the contractor), with special conditions subject to negotiation between parties.

8.1.1 Screening for completeness/compliance with minimum eligibility requirements

ANGLEC's evaluation team will perform an initial screening of each proposal to ensure that the proposal is complete and complies with minimum eligibility requirements. Proposals with substantial deficiencies will be rejected. For proposals with marginal deficiencies, ANGLEC may request that the bidder promptly provide missing information or appropriate clarifications; failure to provide such information may result in a proposal being rejected. All proposals that are deemed to be reasonably complete and compliant will be passed to the economic and non-economic/risk assessment processes.

8.1.2 Preliminary and detailed economic assessment

ANGLEC may conduct spreadsheet evaluations to review and rank the proposals based on pricing and operational information from the proposal including:

- expected generation patterns,
- total energy prices.

These annual production costs will be combined with fixed costs and present-valued and/or levelized back to a base year.

- Bond capacity. Bidder shall provide evidence of bond capacity of at least the value of the construction from a surety company license to do so in their home country.

8.1.3 Non-economic/risk assessment

In parallel with the economic assessment, ANGLEC's evaluation team will also assess each resource's or portfolio's non-economic characteristics and risks. Such analysis will involve a qualitative consideration of such issues as:

- Bidder's project team experience and financial strength,
- Feasibility of schedule and current status,
- Acceptance by local community,
- Environmental impacts,
- Quality of design and construction plan and assessment of acceptable photovoltaic technology, and battery technology
- Independent ranking or performance reviews of proposed technology
- Ability to prove that the reconstructed solar farm and the battery system can withstand the required windspeeds of 160 miles per hour for one hour and the other key technical requirements.
- Local Labor plan
- Quality of O&M plan,

ANGLEC's evaluation team will rank the projects by levelized total system cost and supplement each project's place in the ranking with a qualitative assessment of the above risks in developing a final ranking.

8.1.4 Additional due diligence

ANGLEC reserves the right to conduct additional due diligence on all shortlisted parties as it deems necessary. It is anticipated that any bidder that is selected will employ all reasonable efforts to complete negotiations with ANGLEC and execute a contract in the 2018

9 Reservations

ANGLEC makes the following reservations in undertaking this power supply solicitation:

8.1 ANGLEC reserves the right to modify or withdraw this Request for Proposal.
8.2 ANGLEC reserves the right to reject any and all responses to this Request for Proposal.
8.3 This request should not be construed as an offer to purchase any Photovoltaic generating plant.
8.4 All proposal preparation costs must be borne by the bidder.
8.5 Proposals will not be returned to the bidders.
8.6 ANGLEC may select proposals that total more or less than the stated need.
8.7 ANGLEC may accept other than the lowest cost proposal(s).
8.8 ANGLEC may seek clarification from bidders and may request additional information from bidders beyond that which is specifically identified in this document.
8.9 ANGLEC reserves the right to waive bidder noncompliance with any aspect of this request.
8.10 ANGLEC may conduct negotiations with selected bidders and may terminate negotiations at any time.
8.11 Any and all decisions are conditioned on the approval of ANGLEC's management and Board of Directors as well as all required regulatory and other approvals.
8.12 ANGLEC reserves the right to modify or supplement this request at any time during this process. Any such modifications or supplements shall become part of this process and shall be addressed as part of any proposal submitted.

Appendix A

Insurance Requirements

The winning Bidder shall purchase and maintain such insurance as will protect the contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operation be by itself or by any subcontractor or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable.

A. Worker's Compensation to cover disability benefits, occupational sickness or disease, death of employees, claims insured by usual personal injury liability coverage and other similar employee benefit acts of no less than US$500,000 per occurrence and US$2,000,000 in aggregate.

B. Comprehensive Liability to cover claims for damages including bodily and personal injury, property damage, and contractual liability with a minimum of US$3,000,000.

C. Automobile comprehensive liability to include owned, hired, and non-owned vehicles and equipment with a minimum of US $1,000,000 per occurrence and US$3,000,000 aggregate.

D. In addition, during the entire contract period, the Contractor, at its own expense, shall maintain sufficient construction insurance of US$3,000,000 in aggregate.

E. Excess liability (umbrella coverage) as needed to provide a minimum of US$5,000,000 per occurrence.

Appendix B

Ingecon Power Station Specifications

INGECON SUN PowerStation

40-foot MV turnkey solution, customised up to 3500 kVA

Ingeteam

From 300 to 3500 kVA

The complete turnkey solution, customized up to 4.2 MWp, 40 ft. container with innovative forced air or air conditioned cooling systems for adverse environmental conditions

Thanks to its CSC approval for overseas shipment, The INGECON® SUN PowerStation CON 40 can be marketed and installed everywhere in the world. It is a fully equipped container with three separate compartments and different cooling systems (up to 2330 kVA) or two separate compartments with different cooling systems and outdoor mounted LV / MV transformer (up to 3500 kVA).

Robust and long-lasting design
The INGECON® SUN PowerStation CON 40 is a standard solution specifically designed for dusty areas with innovative cooling systems to ensure the nominal output power up to 60 °C. Moreover, this solution avoid any problem regarding the corrosion generated from sandstorms. To ensure the maximum protection against weather conditions, external sides are coated with a galvanized layer and painted with polyurethane lacquer. The load-bearing structure is single-block made of welded steel, to ensure top resistance and durability over time. Rooftop and walls are coated with insulated sandwich panels. The sandwich panels are made of galvanized painted steel, filled with a 50 mm layer of rigid fireproof polyurethane foam, ensuring perfect waterproofness over time and efficient thermal insulation.

Equipped with everything necessary
High efficiency inverters, auxiliary services switchgear, Medium Voltage cubicle and LV / MV transformer. Available with High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller, monitoring and SCADA systems.

Complete accessibility
Thanks to its innovative design, all devices are readily accessible, thereby making it easier to inspect, maintain and repair the INGECON® SUN PowerStation CON 40. The transformer compartment door is equipped with AREL safety lock with a blocking code.

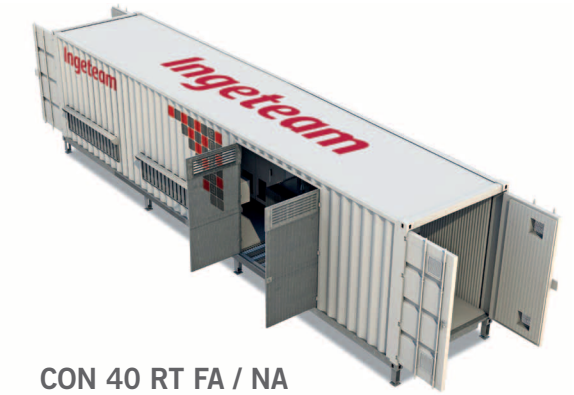
Ideal for adverse environments
The INGECON® SUN PowerStation CON 40 is a standard solution able to withstand adverse environmental conditions without any loss of performance. Thanks to its recirculation air conditioning system, the “RC” version can provide its rated power up to 60 °C (ambient temperature) without derating and IP65 / NEMA 4 protection degree.

Innovative cooling system
FA type: the internal temperature of inverters compartment is controlled by high efficiency hot air extraction plenums and centrifugal fan systems. A number of internal and external probes guarantee a constant ambient temperature. The incoming air is filtered through special sand trap grids mounted on the bottom of the walls.

AC type: the container is equipped with an internal cooling system featuring a Free Cooling function for inverters compartment. The air conditioning units, sized for each of the inverters, feature the following operating modes:

- Pure Free Cooling: Compressor in OFF mode. The outdoor air temperature is low and the conditioner operates like a ventilation system, with an air inflow and outflow.
- Assisted Free Cooling: Compressor operates in ON-OFF mode. The outdoor air temperature is relatively low to allow operation in Free Cooling mode. However, it is not low enough to maintain the desired interior temperature.
- Cooling Compressor in ON mode: The system operates like a normal air conditioner.

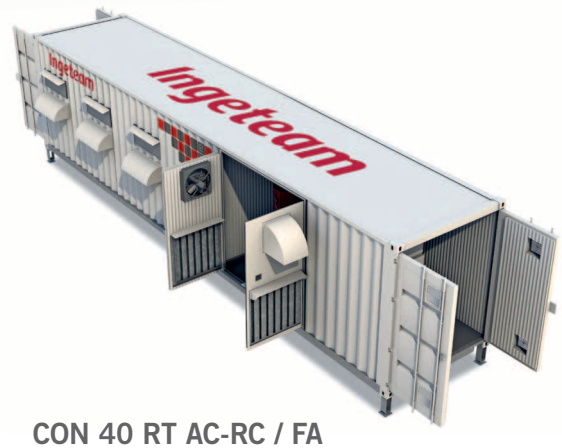
RC type: the container is equipped with an internal Recirculation Air Conditioning system for inverters compartment, to maintain the correct internal temperature over the entire operating temperature range.



CON 40 RT FA / NA

CON 40 RT FA / FA

CON 40 RT AC-RC / NA



CON 40 RT AC-RC / FA

MAIN FEATURES

- Output power up to 3500 kVA.
- Available up to 36 kV output voltage.
- Available with cast resin or oil immersed hermetically sealed LV / MV transformer (up to 2330 kVA).
- Available with outdoor mounted hermetically sealed LV / MV transformer (up to 3500 kVA).
- Up to IP65 / NEMA 4 protection degree for inverter compartment. (1)
- Rated power up 60 °C ambient temperature. (1)
- Protected against solar and sand corrosion.
- CSC certification for container shipping.
- Plug & Play solution.
- Maximum reliability, higher safety and reduced maintenance thanks to solid aluminium and flexible copper busbars for Low Voltage power distribution.
- Different cooling systems for inverter compartment (1):

  Type FA: Forced Air ventilation, operating temperature range from -20 °C to +60 °C.

  Type AC: Free Cooling Air Conditioning system, operating temperature range from -20 °C to +55 °C without derating.

  Type RC: Recirculation Air Conditioning system, operating temperature range from -20 °C to +60 °C without derating.
- Relative Humidity: 0 - 95%.
- Installation Altitude: 3000 m above sea level. (1)

ELECTRICAL PROTECTIONS

- Reverse polarity.
- Output short-circuits and overloads.
- DC fuses.
- DC switch with door control.
- AC circuit breaker with door control.
- DC and AC overvoltage suppressors.
- Anti-islanding monitoring system with automatic disconnection.
- Insulation monitoring system.
- Automatic disconnection system in case of LV / MV transformer overheat.
- Emergency disconnection button, accessible from outside.

STANDARD EQUIPMENT

- Internal lighting system.
- Emergency lighting system.
- Auxiliary power outlet.
- Fire detection system with automatic disconnection (both DC and AC sides).
- Safety interlocks for MV transformer compartment door.
- Fire safety kit.
- Medium Voltage safety kit.
- First aid kit and safety signals.

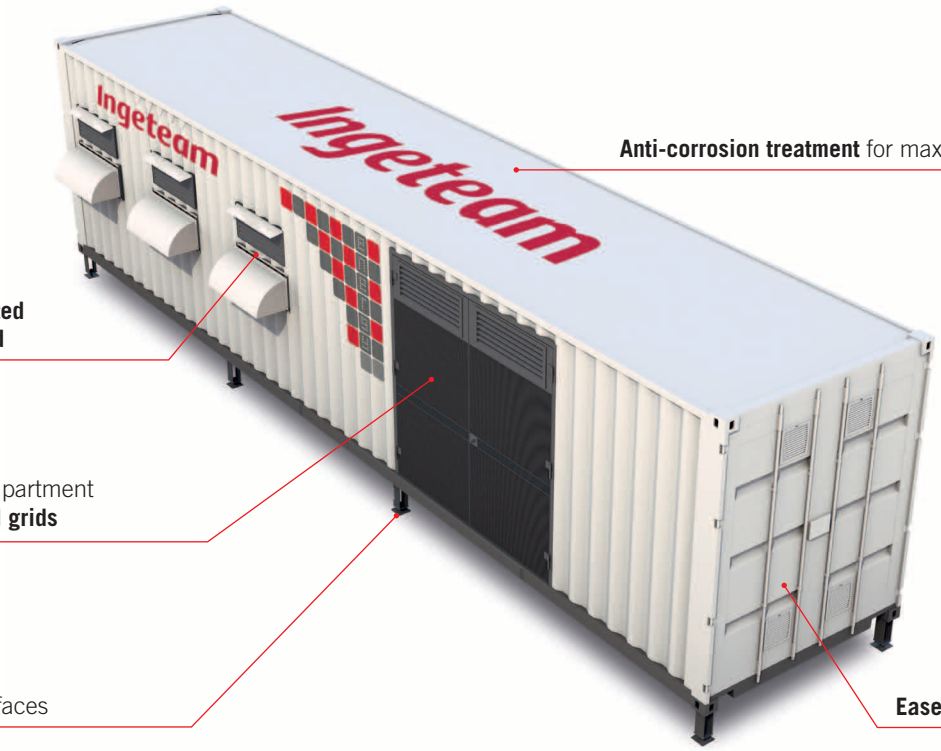
OPTIONAL EQUIPMENT

In addition to the standard equipment, the INGECON® SUN PowerStation can be supplied with the following options:

- LV / LV transformer for the power supply to the auxiliary services panel.
- UPS for auxiliary services.
- INGECON® SUN String Control 16 / 32 inputs string combiner boxes.
- Meteo station.
- Energy meter with GSM / GPRS system for remote metering.
- High-speed Ethernet / Fiber Optic communication infrastructure for Plug & Play connection to PV Plant Controller and SCADA systems.
- SCADA supervision, control and data acquisition system.
- PV Plant Controller compliant with the most widely international Grid Codes.
- Gateway for monitoring and control of the PV Plant by the Grid Operator using standard protocols (like IEC 61850, IEC 60870-5-101/104, DNP 3.0, etc.).
- HV surge arresters.
- Anti-rodent system.
- Human intrusion detection system.
- External lighting system.

(1) *Refer to Technical Characteristics tables for further details.*

Solution up to 2330 kVA (2 PV inverters)



Anti-corrosion treatment for maximum durability

Dust and rain protected
Sand storm protected

MV transformer compartment
with **protective metal grids**

Easily adaptable to
different ground surfaces

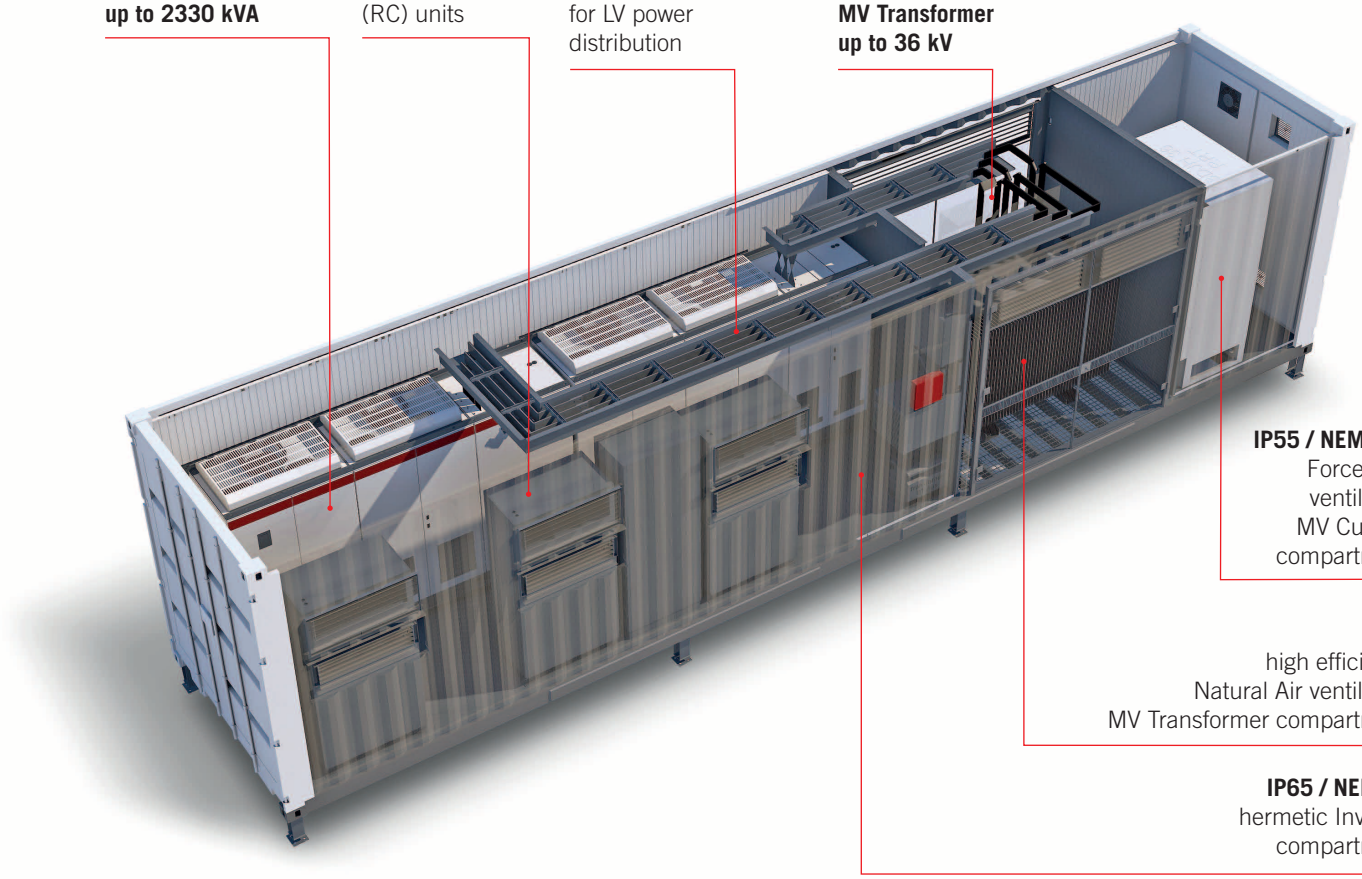
Ease of maintenance

INGECON® SUN
PowerMax inverters
up to 2330 kVA

Recirculation
Air Conditioning
(RC) units

Solid aluminium and
flexible copper busbars
for LV power
distribution

Oil immersed
hermetically sealed
MV Transformer
up to 36 kV



IP55 / NEMA 3R
Forced Air
ventilation
MV Cubicle
compartment

IP21
high efficiency
Natural Air ventilation
MV Transformer compartment

IP65 / NEMA 4
hermetic Inverter
compartment

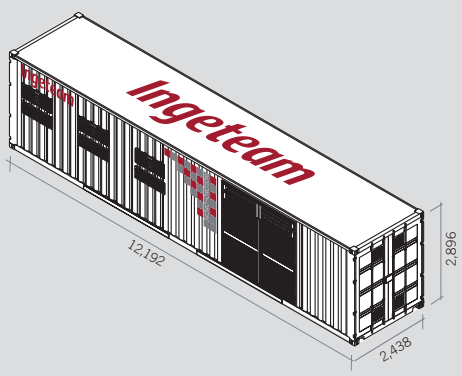
** Illustrative image. It might not correspond with the basic configuration.*

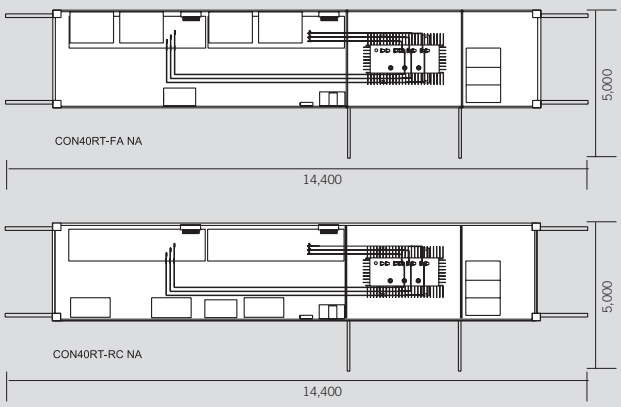
		CON 40 RT - FA / xx	CON 40 RT - AC / xx	CON 40 RT - RC / xx
General Information				
Inverter Compartment [1]	Cooling system	Forced air ventilation	Air conditioning with Free Cooling function	Recirculation air conditioning
	Air extraction / Air intake	Overpressure Dampers with anti-rain covers / Filtered sand trap grids	Overpressure Dampers / Filtered grids with anti-rain covers	
	Max. power consumption	420 W	5,400 / 18,000 W [2]	18,000 W
	Protection degree	IP54 / NEMA 3R	IP54 / NEMA 3R	IP65 / NEMA 4
LV / MV Transformer compartment **CON 40 RT - xx / FA**	Cooling system	Forced air with temperature control		
	Air extraction / Air intake	Overpressure dampers with anti-rain covers / Filtered sand trap grids		
	Max. power consumption	2,720 W		
	Protection degree	IP54 / NEMA 3R		
LV / MV Transformer compartment [3] **CON 40 RT - xx / NA**	Cooling system	Natural air ventilation		
	Air extraction / Air intake	Protective metal grids		
	Max. power consumption	0 W		
	Protection degree	IP21		
MV Cubicle compartment	Cooling system	Forced air with temperature control		
	Air extraction / Air intake	Filtered anti-rain grids		
	Max. power consumption	65 W		
	Protection degree	IP55 / NEMA 3R		
Operating temperature range [5]		from -20 °C to +60 °C [4]	from -20 °C to +55 °C	from -20 °C to +60 °C
Relative humidity		0 - 95%		
Installation altitude [6]		3,000 m above sea level		
Equipment				
Inverter version		X series (Master-Slave), M series (Multi-MPPT), B series (Monoblock)		
BT-AUX switchgear		BASE version (FULL version and high-speed communication infrastructure optional)		
LV / MV Transformer		Dry type cast resin or Oil immersed hermetically sealed		
MV Switchgear		1P-1L or 1P-2L protection cells		
Mechanical Information				
Structure Material		Steel		
Insulation		Sandwich panels containing a 50 mm rigid fire-proof polyurethane foam filling		

Notes: [1] Including inverters, instrumentation, auxiliary services switchgear, monitoring systems [2] Pure Free Cooling function / Cooling function [3] Equipped with oil immersed hermetically sealed LV / MV transformers [4] For INGECON® SUN PowerMax, "M" and "X" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 45 °C operating temperature. Derating above 45 °C of 1.8% for each °C of increase until 60 °C operating temperature [4] For INGECON® SUN PowerMax, "B" series: rated output power indicated in the Technical Characteristics tables is guaranteed up to 50 °C operating temperature. Derating above 50 °C of 1.8% for each °C of increase until 60 °C operating temperature [5] -30 °C with optional kit [6] Please contact Ingeteam for altitudes higher than 1,000 m.

	Length	Width	Height
Size (mm)			
Body dimensions	12,192	2,438	2,896
Overall dimensions with all doors open	14,400	3,700	2,896
Foundation dimensions	14,142	5,000	300

CON 40





Appendix C

IngeconSUN PowerMax X Series 400 Vac Inverter

INGECON SUN

PowerMax X Series
400 Vac

500TL X400 DCAC Indoor / 755TL X400 DCAC Indoor / 1000TL X400 DCAC Indoor

TRANSFORMERLESS CENTRAL INVERTERS WITH A MASTER-SLAVE CONFIGURATION

The central inverter with a Master-Slave configuration, in any of its configurations, is equipped with two to four power blocks connected in parallel to the same PV generator and to the same medium voltage transformer.

DC and AC supplies in the same cabinet
The input and output lines are integrated into the same cabinet, facilitating maintenance and repair work.

Maximum protection
These three phase inverters are equipped with a motorized DC load break switch to decouple the PV generator from the inverter. Optionally, the inverters can be supplied with an AC thermal magnetic breaker with door control, in addition to fuses, grounding kit and input current monitoring.

Maximum efficiency values
Through the use of innovative electronic conversion topologies, efficiency values of up to 98.8% can be achieved. Thanks to a sophisticated control algorithm, this equipment can guarantee maximum efficiency through the selective operation of its power blocks, based on the PV power available. This maximizes the efficiency and service life of the equipment. In this way, in periods of low irradiance, it is able to increase performance by up to 1.8 points.

A complete range of equipment for all types of projects
Versions available:

- Indoor inverters with integrated DCAC cabinet.
- Indoor inverters with DC cabinet.
- Outdoor inverters with integrated DCAC cabinet.
- Symmetrical indoor inverters, with the connection cabinet on the opposite side, to make it possible to install two inverters facing each other, with a common power supply point.

Enhanced functionality
This new INGECON® SUN PowerMax range features a revamped, improved enclosure which, together with its innovative air cooling system, makes it possible to increase the ambient operating temperature to deliver its rated power up to 45 ºC.

www.ingeteam.com
solar.energy@ingeteam.com

Ingeteam

500TL X400 DCAC Indoor / 750TL X400 DCAC Indoor / 1000TL X400 DCAC Indoor

Long-lasting design
The inverters have been designed to guarantee a service life of more than 20 years, as demonstrated by the stress tests they are subjected to.

Grid support
The INGECON® SUN PowerMax family has been designed to comply with the grid connection requirements in different countries, contributing to the quality and stability of the electric system. These inverters therefore feature a low voltage ride-through capability, and can deliver reactive power and control the active power delivered to the grid.

Ease of maintenance
Easily replaceable modular power blocks for shorter maintenance times.

Easy to operate
The INGECON® SUN PowerMax inverters feature an LCD screen for the simple and convenient monitoring of the inverter status and a range of internal variables. The display also includes a number of LEDs to show the inverter operating status with warning lights to indicate any incidents. All this helps to simplify and facilitate maintenance tasks.

Monitoring and communication
RS-485 communications supplied as standard. Ethernet, Bluetooth and GSM / GPRS are also available. The following applications are included at no extra cost: INGECON® SUN Manager, INGECON® SUN Monitor and its Smartphone version iSun Monitor, available on the App Store. These applications are used for monitoring and recording the inverter's internal operating variables through the Internet (alarms, real time production, etc.), in addition to the historical production data.

PROTECTIONS

- DC Reverse polarity.
- Short-circuits and overloads at the output.
- Anti-islanding with automatic disconnection.
- Insulation failure DC.
- DC load breaker.
- 12 pairs of fuse-holders for inverters with 3 and 4 power blocks, and 8 pairs of fuse-holders for inverters with 2 power blocks.
- Lightning induced class 2 DC and AC surge arrestors.
- DC contactor to automatically disconnect the inverter from the PV array.

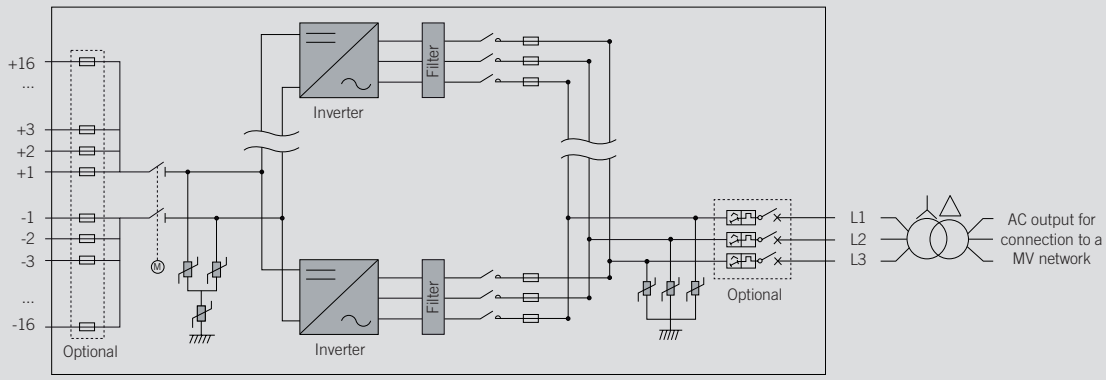
OPTIONAL ACCESSORIES

- AC circuit breaker.
- Motorization kit for the AC circuit breaker.
- Inter-inverter communication via Ethernet, Bluetooth or GSM / GPRS.
- Insulation failure AC.
- Grounding kit.
- Kit for operating at an ambient temperature of -30 ºC.
- DC fuses.
- Blown fuse sensor at the DC input.
- Monitoring of the group currents at the DC input.
- Remote tripping of the AC protection.
- Wattmeter on the AC side.
- Low voltage ride-through kit.
- Extendable up to 16 fuse holders per inverter.

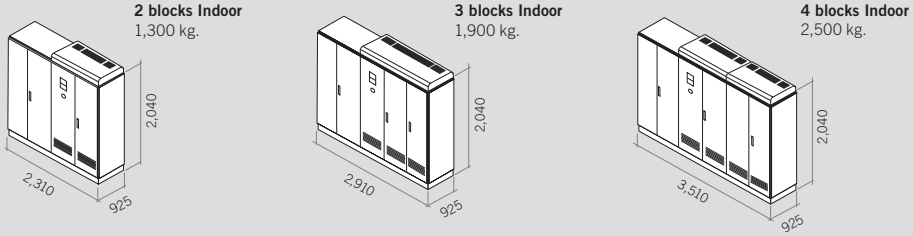
ADVANTAGES OF THE MASTER-SLAVE VERSION

- Enhanced performance.
- In the event of the failure of one of the blocks, the power is then distributed amongst the remaining blocks.
- Lightweight spares, for shorter delivery times.
- It allows to ground the PV array.

PowerMax X DCAC



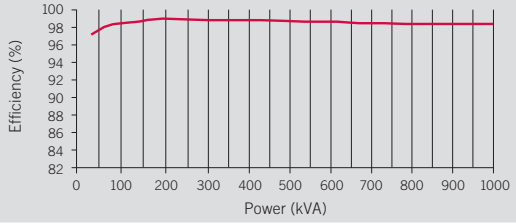
Size and weight (mm)



	500TL X400 DCAC Indoor	750TL X400 DCAC Indoor	1000TL X400 DCAC Indoor
Input (DC)			
Recommended PV array power range[1]	515.8 - 662.9 kWp	773.7 - 994.4 kWp	1,031.6 - 1,325.7 kWp
Voltage Range MPP	581 - 820 V	581 - 820 V	581 - 820 V
Maximum voltage[2]	1,050 V	1,050 V	1,050 V
Maximum current	900 A	1,350 A	1,800 A
Nº inputs with fuse holders	8	12 (extendable up to 16)	12 (extendable up to 16)
Fuse dimensions	63 A / 1,000 V to 630 A / 1,000 V		
Type of connection	Connection to copper bars		
Power blocks	2	3	4
MPPT	1	1	1
Max. current at each input	From 40 A to 410 A for positive and negative poles		
Input protections			
Overvoltage protections	Type 2 surge arresters		
DC switch	Yes, motorized DC switch		
Other protections	Reverse polarity / Insulation failure monitoring / Anti-islanding protection		
Output (AC)			
Power @30 °C / @45 °C[3]	554.3 kVA / 509.9 kVA	831.4 kVA / 764.9 kVA	1,108.5 kVA / 1,019.8 kVA
Current @30 °C / @45 °C	800 A / 736 A	1,200 A / 1,104 A	1,600 A / 1,472 A
Rated voltage	400 V IT System	400 V IT System	400 V IT System
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Phi Cosine[4]	1	1	1
Phi Cosine adjustable	Yes. Smax=554.3 kVA	Yes. Smax=831.4 kVA	Yes. Smax=1,108.5 kVA
THD (Total Harmonic Distortion)[5]	<3%	<3%	<3%
Output protections			
Overvoltage protections	Type 2 surge arresters		
AC breaker	Optional AC circuit breaker with door control, remote trip or motorized		
Anti-islanding protection	Yes, with automatic disconnection		
Other protections	AC short circuits and overloads		
Features			
Maximum efficiency	99.1%	99.1%	99.1%
Euroefficiency	98.8%	98.9%	99%
Stand-by consumption[6]	60 W	90 W	120 W
Consumption at night	60 W	90 W	120 W
General Information			
Ambient temperature	-20 °C to +55 °C	-20 °C to +55 °C	-20 °C to +55 °C
Relative humidity (non-condensing)	0 - 95%	0 - 95%	0 - 95%
Protection class	IP20	IP20	IP20
Maximum altitude[7]	3,000 m	3,000 m	3,000 m
Cooling system	Air forced with temperature control (230 V phase + neutral power supply)		
Air flow	2,670 m³/h (fans: 1,000 VA)	4,640 m³/h (fans: 1,300 VA)	5,340 m³/h (fans: 1,500 VA)
Acoustic emission	< 67 dB (A) at 1 m with fans working at maximum power		
Marking	CE		
EMC and security standards	EN 61000-6-1, EN 61000-6-2, EN 61000-6-4, EN 61000-3-11, EN 61000-3-12, EN 62109-1, EN 62109-2, IEC62103, EN 50178, FCC Part 15, AS3100		
Grid connection standards	IEC 62116, Arrêté 23-04-2008, CEI 0-16 Ed. III, Terna A68, G59/2, BDEW-Mittelspannungsrichtlinie:2011, P.O.12.3, South African Grid code (ver 2.6), Chilean Grid Code, Romanian Grid Code, Ecuadorian Grid Code, Peruvian Grid code, IEEE 929, Thailand MEA & PEA requirements, IEC61727, UNE 206007-1, ABNT NBR 16149, ABNT NBR 16150, IEEE 1547, IEEE1547.1, GGC&CGC China, DEWA (Dubai) Grid Code, Jordan Grid Code		

Notes: [1] Depending on the type of installation and geographical location. Data for STC conditions [2] Consider the voltage increase of the 'Voc' at low temperatures [3] For each ºC of increase between 30 ºC and 45 ºC, the output power will be reduced at the rate of 0.57% / ºC. Over 45 ºC, the output power will be reduced at the rate of 1.8% / ºC [4] For P_{out}>25% of the rated power [5] For P_{out}>25% of the rated power and voltage in accordance with IEC 61000-3-4 [6] Consumption from PV field [7] Over 1,000 m temperature for rated power is reduced at the rate of 4.5 ºC for each 1,000 m.

Efficiency INGECON® SUN 1000TL X400 Vdc = 650 V



Ingeteam Power Technology, S.A.
Avda. Ciudad de la Innovación, 13
31621 SARRIGUREN (Navarra) - Spain
Tel.: +34 948 288 000 / Fax: +34 948 288 001
e-mail: solar.energy@ingeteam.com

Ingeteam S.r.l.
Via Emilia Ponente, 232
48014 CASTEL BOLOGNESE (RA) - Italy
Tel.: +39 0546 651 490 / Fax: +39 054 665 5391
e-mail: italia.energy@ingeteam.com

Ingeteam GmbH
Herzog-Heinrich-Str. 10
80336 MUNICH - Germany
Tel.: +49 89 99 65 38 0 / Fax: +49 89 99 65 38 99
e-mail: solar.de@ingeteam.com

Ingeteam SAS
La Naurouze B - 140 rue Carmin
31670 Labège - France
Tel: +33 (0)5 61 25 00 00 / Fax: +33 (0)5 61 25 00 11
e-mail: france@ingeteam.com

Ingeteam INC.
5201 Great American Parkway, Suite 320
SANTA CLARA, CA 95054 - USA
Tel.: +1 (415) 450 1869 / +1 (408) 524 2929 / Fax: +1 (408) 824 1327
e-mail: solar.us@ingeteam.com

Ingeteam INC.
3550 W. Canal St.
MILWAUKEE, WI 53208 - USA
Tel.: +1 (414) 934 4100 / +1 (855) 821 7190 / Fax: +1 (414) 342 0736
e-mail: solar.us@ingeteam.com

Ingeteam, a.s.
Technologická 371/1
70800 OSTRAVA - PUSTKOVEC
Czech Republic
Tel.: +420 59 732 6800 / Fax: +420 59 732 6899
e-mail: czech@ingeteam.com

Ingeteam Shanghai, Co. Ltd.
Shanghai Trade Square, 1105
188 Si Ping Road
200086 SHANGHAI - P.R. China
Tel.: +86 21 65 07 76 36 / Fax: +86 21 65 07 76 38
e-mail: shanghai@ingeteam.com

Ingeteam, S.A. de C.V.
Ave. Revolución, nº 643, Local 9
Colonia Jardín Español - MONTERREY
64820 - NUEVO LEÓN - México
Tel.: +52 81 8311 4858 / Fax: +52 81 8311 4859
e-mail: northamerica@ingeteam.com

Ingeteam Ltda.
Estrada Duílio Beltramini, 6975
Chácara Sao Bento
13278-078 VALINHOS SP - Brazil
Tel.: +55 19 3037 3773 / Fax: +55 19 3037 3774
e-mail: brazil@ingeteam.com

Ingeteam Pty Ltd.
Unit 2 Alphen Square South
16th Road, Randjiespark, Midrand 1682 - South Africa
Tel.: +2711 314 3190 / Fax: +2711 314 2420
e-mail: southafrica@ingeteam.com

Ingeteam SpA
Cerro El Plomo 5630, Piso 9, Oficina 901
7560742 Las Condes - Santiago de Chile - Chile
Tel.: +56 2 26664370
e-mail: chile@ingeteam.com

Ingeteam Power Technology India Pvt. Ltd.
2nd Floor, 431
Udyog Vihar, Phase III
122016 Gurgaon (Haryana) - India
Tel.: +91 124 420 6491-5 / Fax: +91 124 420 6493
e-mail: india@ingeteam.com

Ingeteam Sp. z o.o.
Ul. Koszykowa 60/62 m 39
00-673 Warszawa - Poland
Tel.: +48 22 821 9930 / Fax: +48 22 821 9931
e-mail: polska@ingeteam.com

Ingeteam Australia Pty Ltd.
Suite 112, Level 1, Mike Codd Biulding 232
Innovation Campus, Squires Way
North Wollongong, NSW 2500 - Australia
Tel.: +61 499 988 022
e-mail: australia@ingeteam.com

Ingeteam