



REQUEST FOR QUOTATION

REMOTE OPERATIONS

RFQ NUMBER	GRD00192-15
RFQ TITLE	DARWIN - SUPPLY OF SOLAR FORECASTING SKY CAMERA (SETuP)
CLOSE DATE	2.00 PM AUSTRALIAN CENTRAL STANDARD TIME THURSDAY 26 FEBRUARY 2015 (LATE QUOTATIONS WILL NOT BE ACCEPTED)

HOW TO RESPOND TO THIS REQUEST FOR QUOTATION

Complete the Quotation Response Schedules provided separately. This will become your Quotation which may be lodged in any of the following ways:

By Electronic lodgement facility at: www.nt.gov.au/tenders

By FAX to: 08 8999 1935

Note: no other form of delivery is acceptable

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**ANNEXURE TO THE CONDITIONS OF QUOTING AND CONTRACT
QUOTATION - GOODS**

1. CONDITIONS OF QUOTING

The Conditions of Quoting applicable to this RFQ are the **Northern Territory Government Conditions of Quoting V5.0 (July 2014)**

2. CONDITIONS OF CONTRACT

The Conditions of Contract applicable to this RFQ are the **Northern Territory Government Conditions of Contract – Quotation Goods v5.0 (July 2014)**

Respondents please note:

Sections 1 and 2 comprising the Conditions of Quoting and Conditions of Contract are provided separately with the RFQ document.

Electronic copies are also available at:

www.dob.nt.gov.au/business/tenders-contracts/legislative_framework/tendering-contract/Pages/default.aspx

Alternatively hard copies (paper) are available from the point of issue of the RFQ.

You are advised to ensure you are familiar with the rules of quoting and with the contractual obligations of the parties under any subsequent Contract. You are further advised to reference the Annexure to Conditions of Quoting and Contract, which appear on the following pages that detail specific requirements applicable to this RFQ.

Q01	For enquiries contact	Name	Phillip Maker
	<i>(Clause 2.5 – Condition of Quoting)</i>	Telephone	(08)8924 5161 +61 (0) 415 629 100
		Facsimile	(08)8923 9582
		Email	phillip.maker@powerwater.com.au

	If unable to contact above	Name	Procurement Officer
		Telephone	(08)8924 5013
		Email	pwc.quotations@powerwater.com.au

Q02	Contact for Inspection of Site		Not Applicable
		Telephone	Not Applicable
	Location of Site Inspection		Not Applicable
	Designated Time/Day for Site Inspection		Not Applicable
	Attendance at Site Inspection:		Not Applicable
	Registration Required		Not Applicable
	<i>(Clause 4 – Conditions of Quoting)</i>		

Q03	Contact for Industry Briefing		Not Applicable
		Telephone	Not Applicable
	Location of Industry Briefing		Not Applicable
	Designated Time/Day for Industry Briefing		Not Applicable
	Attendance at Industry Briefing:		Not Applicable
	Registration Required		Not Applicable
	<i>(Clause 5 – Conditions of Quoting)</i>		

**ANNEXURE TO THE CONDITIONS OF QUOTING AND CONTRACT
QUOTATION - GOODS**

Q04	Enquiries about lodgement contact	Name	Tenders Manager
	<i>(Clause 15 – Conditions of Quoting)</i>	Telephone	(08) 8999 1934
		Email	CAPSAssist.NTG@nt.gov.au
Q05	Probity Advisor	Name	Not Applicable
	<i>(Clause 2.6 – Condition of Quoting)</i>	Telephone	Not Applicable
		Email	Not Applicable
Q06	Documents to be Lodged	RESPONDENT DETAILS DECLARATON BY RESPONDENT SCHEDULE OF PRICES RESPONSES TO ASSESSMENT CRITERIA	
	<i>(Clause 2.1 – Conditions of Quoting)</i>		
Q07	Quotation Validity Period	60 Days	
	<i>(Clause 3 – Conditions of Quoting)</i>		
Q08	Industry Accreditation	No	
	Category/Subcategory/Subgroup	Not Applicable	
	<i>(Clause 6 – Conditions of Quoting)</i>		
Q09	Alternative Quotations	Alternative Quotations are not allowed	
	Conforming Quotation Required	Not Applicable	
	<i>(Clause 7 – Conditions of Quoting)</i>		
Q10	Part Offer Acceptable	No	
	<i>(Clause 8 – Conditions of Quoting)</i>		
Q11	Panel Contract	No	
	<i>(Clause 11 – Conditions of Quoting)</i>		
Q12	Common Use Contract	No	
	<i>(Clause 12 – Conditions of Quoting)</i>		
Q13	Indigenous Development Plan	Not Applicable	
	<i>(Clause 13.2 – Conditions of Quoting)</i>		
Q14	Indigenous Employment	Not Applicable	
	<i>(Clause 13.3 – Conditions of Quoting)</i>		
Q15	Changes to Conditions of Contract	Changes are not allowed	
	<i>(Clause 18.2 – Conditions of Quoting)</i>		

**ANNEXURE TO THE CONDITIONS OF QUOTING AND CONTRACT
QUOTATION - GOODS**

Q16 Percentage Weightings & Assessment Criteria are <i>(Clause 19 – Conditions of Quoting)</i>	Past Performance	0%
	Timeliness	0%
	Capacity	10%
	Quality	20%
	Innovation	0%
	Scope Specific Criteria	40%
	Price	30%
	TOTAL	100%

Q17 Site Rules		
Royal Darwin Hospital		Not Applicable
Katherine Hospital		Not Applicable
Gove District Hospital		Not Applicable
Tennant Creek Hospital		Not Applicable
Alice Springs Hospital		Not Applicable
Uluru – Kata Tjuta National Park		Not Applicable
Kakadu National Park		Not Applicable
Workers Accommodation Jabiru		Not Applicable
Groote Eylandt		Not Applicable
Work on Communities		Not Applicable
NT Correctional Centres		Not Applicable
NT Schools		Not Applicable
Parliament House		Not Applicable
NT Police Fire and Emergency Services Assets		Not Applicable
Aerodromes		Not Applicable
Defence Areas		Not Applicable

(Clause 24 – Conditions of Quoting)

Q18 Security Conditions		Not Applicable
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(Clause 25 – Conditions of Quoting)

Q19 Specified Sub-Contractors		Not Applicable
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(Clause 26 – Conditions of Quoting)

**ANNEXURE TO THE CONDITIONS OF QUOTING AND CONTRACT
QUOTATION - GOODS**

Conditions of Contract

C01	Principal's Representative is	Title	General Manager Remote Operations
	<i>(Clause 5.1 – Conditions of Contract)</i>	Address	15 Iliffe Street Stuart Park NT 0820
		Facsimile	(08)8923 9582
C02	Address for service of Notices is	Title	Chief Executive
	<i>(Clause 10.1 – Conditions of Contract)</i>	Department	Power Water
		Address	15 Iliffe Street Stuart Park NT 0820 Attn: Contract Manager Contract No.:GRD00192-15
C03	Public Liability Insurance required		\$10,000,000
	<i>(Clause 15.2 – Conditions of Contract)</i>		
C04	Product Liability Insurance required		No
	<i>(Clause 15.3 – Conditions of Contract)</i>		
C05	Address for Delivery of Goods		15 Iliffe Street Stuart Park NT 0820
	<i>(Clause 16.1 – Conditions of Contract)</i>		
C06	Delivery Terms		Free In Store, Darwin
	<i>(Clause 16.1 – Conditions of Contract)</i>		The Contractor is responsible for unloading
C07	Delivery Time – number of weeks from date of order delivery is required		4 weeks
	<i>(Clause 16.1 – Conditions of Contract)</i>		
C08	Warranty Period		24 months
	<i>(Clause 17 – Conditions of Contract)</i>		

3. SPECIAL CONDITIONS OF QUOTING

3.1 GENERAL

- a) The special conditions set out in this section of the RFQ are alterations, omissions, additions and amendments to the standard conditions of quoting applicable to this RFQ, as referenced in part 1 of the RFQ (the "Conditions of Quoting").
- b) Words and phrases used in these special conditions that are defined in the Conditions of Quoting have the meanings given to them in the Standard Conditions.
- c) In the event of any inconsistency between the Conditions of Quoting and these special conditions, these special conditions prevail to the extent of the inconsistency.

3.2 SPECIAL CONDITIONS OF QUOTING

- a) The Conditions of Quoting are amended as follows:
 - i. the clause entitled "**Compliance with NT Procurement Code**" is amended by adding the following paragraph at the end of the clause:

"The section of the NT Procurement Code titled "Appeals and Review" does not apply to these Conditions of Quoting";
 - ii. the following new clause is added after the clause entitled "**Compliance with NT Procurement Code**":

"Collusion and Anti-Competitive Conduct

 - (a) This clause is intended to operate in addition to and not derogate from the clause entitled "Compliance with NT Procurement Code". However, if there is an inconsistency between this clause and the clause entitled "Compliance with NT Procurement Code" or with the NT Procurement Code itself, this clause will prevail to the extent of the inconsistency.
 - (b) The Principal reserves the right, at its discretion, to report suspected collusive or anti-competitive conduct by Respondents to the appropriate regulatory authority and to provide that authority with any relevant Respondent information.
 - (c) Any obligation on the Principal to keep a Respondent or Quotation information confidential will not be breached if the information is disclosed by the Principal to the appropriate regulatory authority because of suspected collusive or anti-competitive behaviour.
 - (d) The Respondent warrants that their Quotation has not been prepared with any consultation, communication, contract, arrangement or understanding with any competitor, other than:
 - i. where certain joint venture arrangements exist between the Respondent and a competitor; or
 - ii. where the Respondent and a competitor have an agreement that has been authorised by the Australian Competition and Consumer Commission;
 - iii. where the Respondent has communicated with a competitor for the purpose of subcontracting a portion of the Quotation, and where the communication with that competitor is limited to the information required to facilitate that particular subcontract.
 - (e) In such a situation the Respondent agrees to fully disclose the full nature and extent of any agreements with competitors to the Principal.

- (f) In the event that no such disclosure is made, the Respondent warrants that their Quotation has not been prepared with any consultation, communication, contract, arrangement or understanding with any competitor regarding:
- i. prices;
 - ii. methods, factors or formulas used to calculate prices;
 - iii. the intention or decision to submit, or not submit, a Quotation;
 - iv. the submission of a Quotation that is non-conforming or inadmissible;
 - v. the quality, quantity, specifications or delivery particulars of the products or services to which this RFQ relates; and
 - vi. the terms of the Quotation.
- (g) The Respondent acknowledges that if the Principal accepts the Respondent's Quotation and enters into a contract with the Respondent, the Principal will do so on reliance of the warranty provided in this clause.
- iii. the clause entitled '**Local Development**' and all sub-clauses under that clause are deleted in its entirety;
- iv. the clause entitled '**Assessment Criteria**' is amended by deleting the second paragraph and by deleting sub-paragraphs (a) through to (g)(iii) (inclusive);
- v. the following new clause is added after the clause entitled "**Negotiations**":

"Best and Final Offer

Following negotiations with one or more Respondent's, the Principal may, in its absolute discretion, request one or more of those Respondents to submit a best and final offer.

Where a Respondent receives such a request from the Principal:

- (h) the Respondent must provide a best and final offer within the time requested by the Principal in its request;
- (i) the offer submitted by the Respondent must be the Respondent's best and final offer and no further negotiation will occur in respect of the best and final offer submitted; and
- (j) the best and final offer submitted by a Respondent is capable of acceptance by the Principal.";
- vi. the clause entitled "**Notification of Acceptance**" is amended by deleting the last paragraph and replacing it with the following paragraphs:

"The Principal may, at its absolute discretion, publish details of the successful Quotation or successful Quotations on its website, the Northern Territory Government website, or in other publications produced by the Principal.

The publication may include the contract reference number, a brief description of the goods, works or services and the location where they will be performed, the successful Respondent's name and address and the total value or total estimate value of each contract awarded to a successful Respondent.

By submitting a Quotation, the Respondent agrees to the Principal publishing and disclosing information contained in its Quotation, in accordance with and for the purposes of this clause."

4. SPECIAL CONDITIONS OF CONTRACT

4.1 GENERAL

- d) The special conditions set out in this section of the RFQ are alterations, omissions, additions and amendments to the standard conditions of contract applicable to this RFQ, as referenced in part 2 of the RFQ (the "Conditions of Contract").
- e) Words and phrases used in these special conditions that are defined in the Conditions of Contract have the meanings given to them in the Conditions of Contract.
- f) In the event of any inconsistency between the Conditions of Contract and these special conditions, these special conditions prevail to the extent of the inconsistency.

4.2 SPECIAL CONDITIONS OF CONTRACT

- a) The Conditions of Contract are amended as follows:
 - i. the clause entitled '**Local Development**' is deleted in its entirety;
 - ii. the following new clauses are added to the end of the Conditions of Contract:

"CONTINUOUS IMPROVEMENT

The Principal and the Contractor/Consultant acknowledge that the Principal is committed to improving the manner in which it procures supplies and manages contracts.

The Contractor/Consultant is encouraged to approach the Principal with innovative or alternative ideas regarding the manner in which the supplies can be delivered, or the manner in which the Contract is managed.

NOVATION

The Principal may assign or novate its rights and obligations pursuant to this Contract to another Government Owned Corporation (as that term is defined by the Government Owned Corporations Act (NT)) or government agency upon notice to the Contractor/Consultant."

5. SCOPE OF REQUIREMENTS

The supplied Sky Camera Solar Forecasting Systems (SkyCam) must be able to make an accurate estimate of the effect of clouds on solar output from the time the image is taken for two minutes into the future. The two minute period is based on starting times for PWC Diesel Generators.

This project specifies a 3 phase plan ending with the deployment of 1 up to 10 SkyCams across the PWC Medium Penetration PV site (total 35 sites). The SkyCam supply will consist of:

1. Whole of sky camera along with mounting equipment.
2. Image processor interfacing to the camera and providing a MODBUS-TCP interface suitable for logging predictions and for communication with the Power Station Controller (PSC). PWC will supply the network connection and a single GPO.

The outline plan is:

- Phase 1 – Initial Trial: trial of up to 3 systems competing systems at Bulman for a period of 3-6 months. At the end of this trial a single system will be selected based on the test protocol defined below.

As part of this response each supplier must give a fixed rate quotation for the supply of either 1, 3, 5 or 10 units for use in phases 2 and 3. For phase 1, a target price and set budget limit is \$15,000 per supplier.

The selected system will be purchased at the price for a single unit in the previous paragraph if it is found fit for purpose.

All other equipment will be returned to the suppliers at the end of Phase 1.

- Phase 2 – System Test: test of the single selected system in a PWC Power Station with active control of the generators based on the systems output. This test will run for a period of 6-12 months. During this time the supplier will have access data from the system.
- Phase 3 – Optional rollout of 1, 3, 5 or 10 units over the next two year period.

5.1 BACKGROUND

A reliable short term (2 minute) solar forecast will allow PWC to switch down to a smaller diesel generator which will in turn

1. Reduce fuel consumption by running a smaller set, e.g. switching down from a 640kW set to a 320kW set would save around 12L/h.
2. Reduce spill of PV by reducing the minimum diesel loading constraint, e.g. switching down from a 640kW at 40% minimum loading to a 320kW set at 40% loading would allow us to reduce PV spill by 128kW (say 36L/h).

Both of these benefits only occur if there is enough solar output available but as an extremely rough estimate:

$20L/h \text{ for } 6h/d \text{ for } 250d/y \text{ at } 1\$/L = 30000\$/y$

Whilst this technology has been proposed many times it is not currently available off the shelf and is not proven within a medium penetration context. The purpose of this ARENA SETuP funded work is to:

1. Prove the technology
2. Measure the real savings
3. If successful deploy the technology

Initial data collection and analysis has been completed and a data set is available from PWC which includes:

1. Low resolution sky camera images using a MoonGlowTech camera.
2. Time series data for both available PV power and a 2 minute drop estimate.

All successful suppliers will have access to this data set.

Finally we should note that ARENA has funded a number of studies in this area and we will cooperate with other groups where appropriate.

5.1.1 IP Ownership and Information Sharing

Any IP developed by the suppliers during the course of this project will remain with the supplier.

Results from the testing will be shared between all the participants at the discretion of the PWC project manager.

5.2 TECHNICAL SPECIFICATIONS

5.2.1 System Overview

The system consists of:

1. Camera
2. Image Processor
3. Network connection to a local MODBUS-TCP to OSIsoft PI gateway (provided by PWC)
4. A 150kBps satellite network which can be used to move data to/from the site. Note that this network (PWC RO SCADA) is not externally accessible. It is expected that the supplier will provide a batch method to upload data from site to a supplied storage device which will then be passed onto the supplier. For example ftp upload images to our control room drive followed by an upload to dropbox via the PWC corporate network. PWC will also provide support for updating software and parameters as required. Note that a monthly download of around 6Gib may be provided by PWC in order to avoid disturbing other users of the network.
5. PWC will also provide a Network Time Protocol (NTP) Server for time synchronisation of all of the system components.

5.2.2 Assessment of Trial Results

It is expected that a series of assessments will be conducted during the trial and will be reported back to the suppliers. The key assessable prediction will be:

Skycam2mOk – indicates the system predicts no significant drop in PV over the next 2 minutes.

A significant drop is defined by:

$PvAvailP$ = current estimated available power from the PV system for a 300kW system.

$PvDropP$ = if drop < 30 then 0 else drop where

drop = ramp($PvAvailP$,0.1,1) – $PvAvailP$

ramp(v,down kW/s, up kW/s) – ramp or gradient filter

An example of this calculation is available in the PWC data set but the principles are:

1. Ramp filter the estimate to values that the generators can handle.
2. Any drop of less than station spinning reserve (30) can be ignored

It is expected that as part of the trial we will improve and change the assessment methods and values.

The key requirements are:

1. System reliability: no cloud events should occur without 2 minutes warning
2. False detections of cloud events have an effect on the economics but are less critical

In addition to the prediction reliability all devices will be assessed on:

1. Suitability for Remote Power Station Operations.
2. Size
3. Cost

5.2.3 Camera

The camera will typically be mounted on small mast on a vertical wall of a power station or a small sea container.

The supplier should provide a basic mounting system which PWC will if necessary modify for site.

The camera must:

1. Weatherproof including suitably a remote tropical or desert environment in the NT
2. Have a mounting system suitable for wind speeds up to 40m/s
3. Not require any local support.
4. Suitable for a 5 year life time without failure
5. Have suitable cabling to the Image Processor which can be sealed since the image processing component will typically be inside the power house or container

5.2.4 Image Processor/Computer

The image processor will be located inside the power house or container. The image processor must:

1. Interface with the Camera
2. AC powered with PWC providing the GPO if required.
3. Suitable for a power station environment including dust and temperature tolerance
4. Provide a MODBUS-TCP Interface as described in the next section.

5.2.5 MODBUS-TCP Interface

The Sky camera must provide the following interface.

1. Physical: Ethernet RJ45 copper 10/100Mbps
2. Protocol: MODBUS-TCP
3. SkyCam will be the slave with a programmable address, port and netmask.
4. SkyCam must be able to have 2 connections running at the same time: one from the Power Station Controller and the second from the OSIsoft PI gateway.
5. The registers in the next table must be provided.
6. Other registers and value may be provided by the supplier and may be logged via the PWC SCADA Network.

All registers will be signed 16 bit quantities accessed as holding registers (function code 3).

The first table describes data that will be sent from the Power Station Controller to the SkyCam.

SCOPE OF REQUIREMENTS

Address	Name	Description
40000	PvAvailP	Estimate of Pv available in kW
40001	PvP	Actual PV output in kW
40002	PvSetP	PV Setpoint limitation in kW
40003	StatSpinP	Station Spinning Reserve in kW
40004	GenP	Generator Load in kW
40005	GenMaxP	Generator Maximum Capacity in kW

The next table describes the values that will be read by the OSIsoft PI gateway in the initial trial

Address	Name	Description
40010	SkycamWatchdog	A watchdog counter based on second modulo 60 (0,1,..59,0,1...)
40011	SkycamAlarm	0 is ok, 1... indicates a particular problem as specified by the supplier
40012	Skycam2mOk	1 if Skycam predicts no significant drops for the next 2 minutes. 0 if there is a possibility of a significant drop.
40013	Skycam2mEstPct	Estimate of the maximum percentage drop over the next 2 minutes
40014	Skycam10mOk	10 minute prediction similar to Skycam2mOk
40015	Skycam10mEstPct	10 minute estimate similar to SkyCam2mEstPct
40016	Skycam30mOk	30 minute prediction
40017	Skycam30mEstPct	30 minute estimate
40018	Skycam2m1Ok	Optionally: Skycam2m prediction using method/parameter #1
40019..40027	Skycam2m2..10Ok	Optionally: 9 other prediction method/parameter pairs
40028	SkyCamCloudPct	Percentage of sky classified as Cloud (0=blue sky)
40029..	Supplier spec	A set of estimates specified by the supplier

5.2.6 MODBUS TCP Interface for the Integration Test

The integration into the power system will require an update of the interface specified which will:

1. Be developed between the supplier and PWC based on the trial results.
2. Ensure a suitable system for the medium penetration rollout.
3. This interface will be developed by the supplier at their cost
4. This interface may be used by the supplier for other projects

5.3 PACKAGING AND DELIVERY REQUIREMENTS

All equipment will be delivered to Darwin and must be suitably packed for movement to a remote territory site via vehicle or light aircraft.

5.4 WARRANTY / INSTALLATION / COMMISSIONING / SERVICING

There will be no onsite commissioning required by the supplier.

In the event of equipment damage not due to negligence by PWC staff the cost will be borne by the supplier.

5.5 OTHER

The supplier at their own cost may offer to visit the site during the initial installation or when local tuning is required.