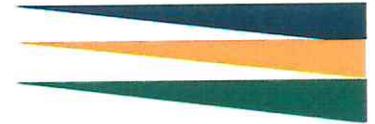




Kigali, **21 OCT 2022**  
No: ...../RAC/MD/PRO/GR/2022



To:

All interested bidders

Re: Response to the request for clarification

Reference is made to the tender for Supply, Installation and Commissioning of Diesel generator sets and Digital voltage regulators at Kigali International Airport, tender reference NO: 002/NCB/G/2022-2023

This is to inform you that, we have received your request for clarifications raised by some of the prospective bidders on the above-mentioned tender; Rwanda Airport Company would like to provide the following clarifications, additional BoQ and equipment to be controlled by SCADA for your consideration:

**I. Response to Clarifications;**

S/N0.	Clarification requested	Response
1	Can you please assist the us with providing Clarification on the Requested Digital AVR?  Is it <b>SERVO</b> Motor Stabilizer or <b>STATIC</b> Stabilizer?	We need an Electronic/ IGBT voltage regulator.
2	Technical drawing of the generator (to be replaced) electrical marshalling box	Refer to the Drawing number SD002 here attached.
3	Single Line Diagram (SLD), which shows connection of the 3 generators plus the one to be replaced.	There are 3 generators feed one single busbar through their identical/independent ATS. One of them (G01) shall be replaced with the new one and be connected on the upgraded ATS from the existing 630A to 800A (CD3). See the Drawing SD002 here attached.



4	Single Line Diagram (SLD) and drawing of the LV switchgear where AVR going to be connected.	Refer to the schematic drawing SD002 here attached the DVR connectivity. It will be connected to the common busbar of CD1 and CD2.
5	SLD and drawing of the LV switchgear where faulty generator is currently connected.	It is a replacement of the existing and shall be connected where the existing G1 was connected. Refer to the drawing SD002 here attached.
6	Single Line Diagram (SLDs) and drawings of existing system where this Genset going to be connected	Hope here you are talking about the new generator for Technical Block (150kVA). This is an automatic generator, which will be installed together with the AMF and then from the AMF to the main LV Board for the building. Refer to the SD003 (Technical Block) here attached.
7	Communication architecture showing the PLCs and SCADA of this section.	Find it in the attached SD 001.
8	We are writing to ask for clarifications about the "Service Conditions" of the generators. We have noticed that at 1000m above sea level, you want a generator that can work up to 55 degrees Celsius.	Here we referred to our existing indoor machines. The reference you made that in Rwanda the temperature does not surpass 33 degrees; it is not the same as what manufacturers refer too. Manufacturers refer to the worst-case scenario, where a running generator can get heat up to 55 degrees excluding the environmental ambient temperature.
9	<b>Design, Supplying, installation, testing and commissioning of silent type 450 kVA D.G.</b> a) We would like to know whether it's necessary to supply an AMF (Automatic Mains failure) panel while at the same time on item A.4 below indicates modification of existing changeover, meaning that existing automatic transfer switch will be used	a) The Generator shall use an upgraded changeover and the existing mode of control, which is through the PLC. No need of additional AMF. Contractor shall ensure, a proper adaptation and modification is well done.
10	<b>Upgrade the existing termination cables from the generator to the main LV board/cabinet.</b> b) Following site visit and having observed the existing cable trench and taking into consideration of addition of 4 cable runs (3 per Phase + 1 Neutral) that you will provide alternative route, trenching or bus ways whenever it will not be possible to lay the cables during implementation.	b) Whenever there is a change in the bills of quantity during the execution, the responsible party shall hold accountable. This shall be discussed during the site progressive meetings with the successful bidder, to address the responsible party based on the contract provisions.



11	<p><b>Upgrade of the existing changeover from 630A to 800A (800A 4P MCCB type NSX800F)</b></p> <p>c) Whether the rating of the existing copper bars is 800A or it shall require an upgrade as well.</p>	<p>c) The existing busbar is enough to carry 800A, only modification during the connection.</p>
12	<p><b>Design, Supplying, installation, testing and commissioning of silent type 150 kVA D.G. Set.</b></p> <p>d) Following the site and reference to technical specifications that: -  • "...the build in fuel tank shall be supplied from the existing external tank by an automatic fuel pump..."</p> <p>We would like your clarification that this does not apply to the 150 KVA generator set.</p> <p>e) On ATS panel, whether Motorized MCCBs are to be used or Contactors.</p> <p>f) Whether the ATS shall be controlled by existing PLC at Bloc technique or new M340 PLC or the ATS shall be supplied with its own microprocessor controller. If existing PLC is to be used, is there available capacity on existing digital input/ Outputs or capacity for expansion?</p> <p>g) Whether the ATS is required to be connected to SCADA System.</p>	<p>d) Does not apply on this specific generator.</p> <p>e) Motorized changeovers shall be used not contactors</p> <p>f) ATS shall be controller and monitored by using the existing PLC. It has enough space for digital inputs/outputs.</p> <p>g) It will requires to be connected on the control system for monitoring purposes.</p>
13	<p><b>Design, Supplying, installation, testing and commissioning of Digital and Automatic Voltage Stabilizer 400kVA and 1250kVA with integrated Manual Bypass. Entry: 3PH+N 400V ±10%, 50/60Hz ±5%.</b></p> <p>h) Following clarifications on-site, we would like to inquire on cable specifications and dimensions, as they are not provided yet.</p> <p>i) We would like to know whether you require an electronic/ IGBT voltage regulator OR electro-mechanical/ servo-motor voltage regulator. The specifications provided are achievable by the two; however, what are your expectations in the following aspects: Controllability, accuracy, and performance. These are achievable by electronic voltage regulator but with higher cost.</p>	<p>h) It now provided in additional BOQ in the annex.</p> <p>i) Refer to the response above (Q1)</p>
14	<p>A) The upgrade shall include of the development of the new software management and provide a permanent license. During this upgrade, the contractor shall refer to the</p>	<p>j) Both options are acceptable, but make sure will not interrupt the existing system's functionality otherwise you will need to do a re-programing</p>



existing functionality of the existing SCADA platform and develop a software management without changing the related hardware. The main items to be controlled is found in annex 001.

B) the upgrade shall include the following:

- Supply and installation of addition PLC M340 for the Digital voltage regulator (DVR) and its connection to the existing communication network. The contractor shall estimate quantity of the additional accessories require for the integration.

- Re-use of the existing PLC M340 to control the new 450KVA Generator to be supplied.

- The contractor shall include it his offer all necessary accessories for the proper integration.

The contractor shall include in his offer the necessary expertise to ensure the integration is done properly.

- The contractor shall include in his offer all necessary accessories to ensure all existing and new equipment are compatible with the upgraded SCADA system.

- The contractor shall include in his offer all-necessary modifications on the existing control cabinets to ensure all the information of the items listed in annex 001 are reachable to the HMI. A Proposal shall be discussed and approved by the Engineer prior to the implementation.

- The contractor shall include in his offer the cost for testing, commissioning, and training of the upgraded SCADA system

j) Whether a newer version of the existing system from the same vendor can be considered or whether upgrade of existing software by replacing it with any software from any vendor.

- Whether redundancy is required by having standby system

k) What features do you require to be met by the new SCADA software management

- Monitoring only

depending on the functionality of each individual system under monitoring.

k) SCADA System software management:

- Monitoring with alarm in the abnormal condition of each specific monitored equipment.

- Remote controls, commands to start or stop genset ON and OFF load

- Historical Reports, including sinusoidal graph on power variation.

l) Then you need to do re-programming

m) Whatever required has to be done. What do you mean by budgetary phase? We want a system that respond to our requirement as in the terms of references. Quote according to the functional requirement of SCADA system as requested in the terms of references.

n) The contractor shall include in his offer all necessary accessories for the proper connection and proper integration. Refer to the additional BOQ (point B).

o) As long as is the microprocessor based, a direct connection will be applied. However, depending on control and monitoring modality, any contractor may choose to use it. In this case shall be paid, otherwise will be removed whenever it is not used.

p) 1250kVA but not applicable on 400kVA

q) To be provided together with the responses to the clarifications.

r) Onsite training for all the supplied equipment (Generator, AVR



- Remote controls for example issue commands to start or stop genset ON and OFF load
- Reports
- Redundancy
- Etc.

l) On hardware, do you mean the PC hosting the software? - If that is the case, then the software requirements will supersede this.

- We would like to obtain hardware specifications of the existing PC.

m) We observe that it will be complicated to re-use existing M340 PLC to control the new groups. Correcting the programming faults or modifying of the M340 PLCs requires a study of the existing program as well as its associated interface wiring which is difficult to do during the budgetary phase.

n) Whether existing Ethernet to fiber optic converter has capacity for connection of more than one equipment (150 KVA genset and in respect to item f) above.

o) What is the purpose of the M340 PLC assigned to the voltage stabilizer? It is possible to connect the DVR to the SCADA network without the additional PLC.

p) Are the two DVRs (1250 and 400 KVA) to be connected to the SCADA system? If yes, is there provision for connection of the 400KVA DVR to the fiber optic network?

q) The item annex 001 has not been published. In case there are items or equipment or information as listed in annex001 that cannot be executed due to either hardware or software or incompatibility considering that we do not have the list yet. We therefore request that communication protocols for the equipment or items be provided and where they are hardwired to PLCs, they be clarified.

r) Whether the training means on-site training on use and operation of the new supervision system only? Does this include other supplied equipment such as AVR and gensets?

and SCADA system functionality of both hardware and software

s) • For the 450kVA, there is an existing fuel pump for the replaced generator. This must be reused to supply fuel to the newly installed generator. Depending on the generator model you are supplying, the contractor shall make the modification and be able to meet the refuelling requirement.

- For 150 kVA, the generator must come with an integrated fuel tank and will be refuelled manually as there is no bulk tank (external fuel tank).



	<p>s) Will the hand pump mentioned be with an option to be operated manual in case of emergency? How then will it be integrated into the existing fuel flow system from fuel depot to the Genset room?</p> <p>Regarding the automatic fuel pump capable of sensing fuel level, shall it be inbuilt in the generator to be supplied or will it be separately installed at the existing external fuel tank and connected to a sensor at the genset for auto operation. Kindly clarify on how existing fuel refilling system works for compatibility purpose.</p>	
15	<p>We need to know for the installed generator the control board model and type to check compatibility.</p>	<ul style="list-style-type: none"> <li>The existing generator does not have an integrated control panel. It is controlled via two options. Automation using PLCs and the manual control desk as I showed you during the site visit in the control room. However, modification of this to suit your generator model, it has been given as an extra item and you must quote for it. It is in the additional bills of quantity here below.</li> </ul>
16	<p>Which communication protocol is currently used between the gensets and SCADA? Is it Modbus TCP/IP protocol or Modbus RTU?</p>	<ul style="list-style-type: none"> <li>It is Modbus TCP/IP protocol.</li> </ul>
17	<p>During the previous site visit, it was revealed that the 3 gensets do not run in parallel; Kindly let us know how they are prioritized in terms of Auto starting since one runs at a time.</p>	<ul style="list-style-type: none"> <li>All three generators operate independently; they are prioritized using a selectable button on the control panel. Depending on what is selected as the priority, it will run first whenever the primary fails, and go to the second when the priority failed to start. All these instructions are programmed into the PLC.</li> </ul>



## II. Additional BoQ

S/No.	Description of Item	Qty	Unit	Rate RWF	Amount RWF
A	LOT1: DIESEL GENERATOR Set				
A.1	Allow for the modification of manual control table, to allow the integrate the new 450kVA functions. This will go with the replacement of all 4 digital meter displays	Nos.	01		
	LOT2: DIGITAL VOLTAGE REGULATORS				
A.3	Supply, installation, testing and commissioning of Cable 400mm sq. Single core XLPE Insulated Aluminium to connect the 1250kVA	M	400		
A.4	Supply, installation, testing and commissioning of Cable 240 mm sq. Single core XLPE Insulated Aluminium to connect the 400Kva	M	200		

## III. SCADA SYSTEM CONTROLLED EQUIPMENT

### a) Main powerhouse

#### Existing equipment

1. 2xGenerators (350kVA) including their fuel tanks and cooling systems
2. 5xUninterruptable power supply (UPS-300kVA each)
3. Main Low Voltage Distribution board (TGBT/ BT01, 02,03,04,05,06,07,08,09,10 and extended BT05)
4. Sub-boards (BT1C, BT2C and BT11C)
5. DC Chargers
6. MV Switchgears
7. 2xStep down transformers (1250kVA)
8. 2xStep up transformers (400kVA)
9. 3xAutomation cabinets for 350kVA generators
10. Repartiteur central électrique
11. 2xControl tables
12. 1xMain PLC cabinet/ Armoire automate de gestion
13. 2xGenerators (700kVA)
14. Automatic Changeover Cabinet
15. 2xUPS bypass cabinets
16. Input cabinet for 3x300kVA UPS
17. Output cabinet for 3x300kVA UPS
18. Automatic panel Generator 01&02



**b) Substation 01**

1. Main Low voltage distribution board
2. MV Switchgear
3. Step down Transformer (160kVA)
4. DC Charger
5. Repartiteur sous-station 01
6. Sub-boards
- 7.

**c) Substation 02**

8. Main Low voltage distribution board
9. MV Switchgear
10. Step down Transformer (160kVA)
11. DC Charger
12. Repartiteur sous-station 01
13. Sub-boards

**d) Technical block (substation 03)**

14. Main Low voltage distribution board
15. MV Switchgear
16. Step down Transformer (160kVA)
17. DC Charger
18. Repartiteur sous-station 01
19. Sub-boards

**e) New equipment**

1. Digital voltage regulator and its bypass cabinet
2. New installed generator (450kVA) for Powerhouse
3. New generator and its AMF for Technical block

**NB:** All the information gathered from the above-mentioned items should display the information acquired to HMI. These are but not limited to:

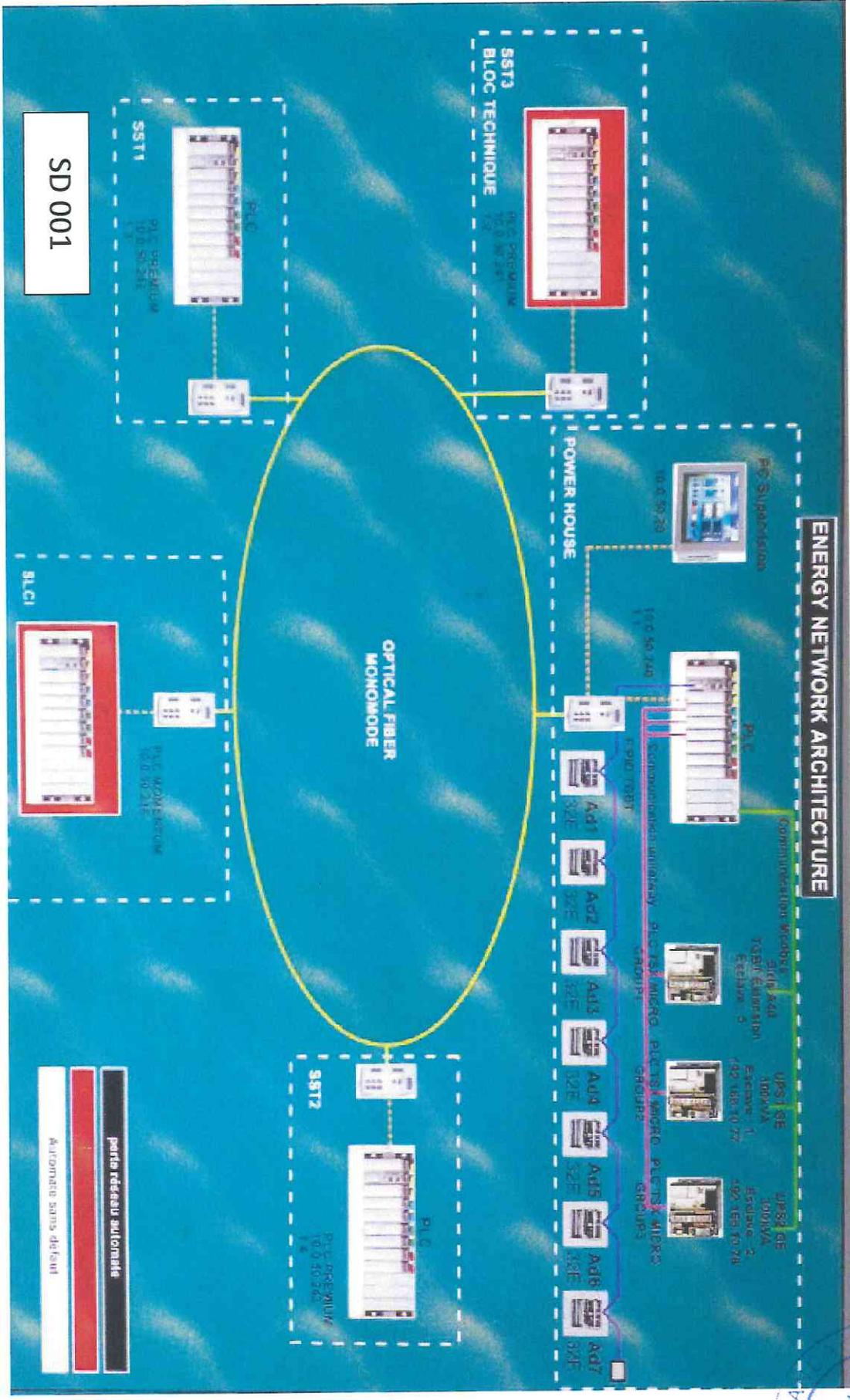
- Fault alarms
- Status
- Measurements
- ON/OFF Positions of Breakers.

Sincerely,

*for*  
  
**Charles HABONIMANA**  
Managing Director



# ENERGY NETWORK ARCHITECTURE



# CENTRALE ELECTRIQUE SD 002

