

**REQUEST FOR INFORMATION FOR PROCUREMENT OF
FUEL CELL ABOVE 50 AHC**

1. NSG, Ministry of Home Affairs intends to procure Fuel Cell above 50 AHC.
2. Eligible Firms/OEMs are requested to provide all details pertaining to Fuel Cell above 50 AHC to include technical details, product brochure/literature and total cost. Technical parameters for the information sought are at **Part –II**. Respondents are also requested to furnish compliance statement of technical parameters in **Part-III** and other details about their firms /companies in accordance with the Performa at **Part-V**.
3. Beside above, the OEMs/Vendors are requested to forward information of the product, which they can offer and also forward correct specifications of their system against each parameter. Only complied or not complied remarks will not be accepted. The firms are also requested to furnish the following details:-
 - (a) Whether you are OEM/Vendors?
 - (b) If vendor details of OEM.
 - (c) Authorization certificate from OEM.
4. The response to RFI should be clearly labelled as RFI Response – Fuel Cell above 50 AHC and dispatch to following address within 15 days :-

Communication Branch
HQ National Security Guard
Mehram Nagar, Palam
New Delhi-110037
Fax No-011-25663177
25663249
E-mail: sc.eqpt@nsg.gov.in

PART-II TECHNICAL PARAMETERS OF FUEL CELL ABOVE 50 AHC

1. It is being a NSG specific case which involves high security scenario, it is mandatory to process it on specialized requirements basis. NSG has been authorized Central Control Room for HQ NSG under Mod Plan III vide MHA letter No **IV-24011/37/2020-Prov-I/302 dt 25 May 2022**.

2. Technical Parameters of Fuel Cell above 50 AHC:-

S/No (a)	Description/ Specification (b)	Technical Parameters (c)
A.	<u>FUEL CELL SYSTEM.</u>	
1.	<u>Electrical Parameters.</u>	
(a)	Fuel Cell capacity	350W
(b)	Operating Principle	Natural Gas (LPG/CNG)
(c)	Control unit	Control button to control the charger
(d)	Max Charging Current	28/ 14/ 7A \pm 10 % continuous
(e)	Nominal Output Voltage	12/24/48V DC (Working)
2.	<u>Physical Parameters.</u>	
(a)	Weight	\leq 10 Kg (fuel cell)
(b)	Dimensions	\leq 470 x 210 x 340 mm (L x W x H) (18"L x 8" W x 14"H)
(c)	Ports	(i) Connection for Battery charging cable (ii) Battery Temperature sensor (iii) Communication port/ remote-control connection (RS232) (iv) Fuel cartridge connection
(d)	Protection against	(i) Over Current (ii) Over voltage (iii) Short circuit (iii) Reverse polarity (iv) Over temp (v) No fluctuation/ In-surges
(e)	Reliability	Design offers must built-in redundancy to increase the reliability of system.
3.	<u>Special Requirement.</u>	
(a)	Button	Enable button/ LED Ring, Status button
(b)	Status	Charge status display and Power status display is available
(c)	Display: The LED display should show following information	
	(i) The system status	
	(ii) The state of operating mode	
	(iii) The warning for errors	
4.	<u>Charging Mode.</u>	
(a)	Manual / Auto	The unit should switch On Manually or Automatically and have the capability to only charge the battery if it needs charging (Need/ Demand Based Charging)
(b)	Running time	Min 40 hrs at peak load with one fuel container

(a)	(b)	(c)
(c)	Hot SWAP facility	The Product should allow changing the fuel cartridge without shutting down the fuel cell system
(d)	Intelligent Antifreeze mode	Must be no water content inside the sys to freeze.
5.	<u>Environmental parameters.</u>	
(a)	Operating Temperature	-40 °C to +55 °C
(b)	Storage Temperature	-50 °C to + 70 °C
(c)	Humidity	0 to 99% RH
(d)	Deployment Altitude & power loss	Operate Up to 18000 fit without power loss
(e)	Noise emission	Less than 40 dB (A) at 3 mtr
6.	<u>Network Support and Firmware Update.</u>	
(a)	Firmware	System should be capable to update firmware in order to benefit from latest improvements
(b)	Data Interface Port	It should support for standard RS-232 interface for hyper terminal support
(c)	Service and fault reports	System should provide the visual and text error messages display
(d)	<u>Fuel and Fuel Cartridge.</u>	
	(i) General	Max capacity of one fuel cartridge should be 5 kg. Cartridge should be sealed and leak proof. Cartridge should have an invisible and should be UN 1075 compliant.
	(ii) Fuel	As per user requirement but should be commercially available.
	(iii) Refillable fuel cartridge	Must be unlimited time refillable
(e)	<u>Environmental conditions of complete system.</u>	
	Transportation	System must be provided in pelican suitable carrying case for transportation.
B.	<u>HYBRID POWER SOURCE.</u>	
1.	<u>General.</u>	A Compact Hybrid Energy System for mobile & static use and ideal backup power source for critical applications, integrates seamlessly with fuel cell, grid, generator, wind (optional) or solar energy & Rectiverter fitted in a rugged box which is movable & light weight. It must design to provide reliable backup power to new or existing communication system. Must operate with locally fuel available in market in each city.
2.	<u>Electrical Parameters.</u>	
(a)	Nominal Power	Min 50AH or more as per user requirement
(b)	Nominal output Voltage	12 V DC, ± 5% 24 V DC, ± 5% 230 V AC, ± 5%
(c)	Input Voltage	220V AC for internal charger 24 V DC Solar Energy 24 V DC Fuel Cell Energy
(d)	Charging option	Fuel Cell System, Solar energy, DG Sets and grid
(e)	Enable Switch	Must be with enable switch to energise the whole system and ON/Off switch for each port

(a)	(b)	(c)
(f)	Display	Display must be with following facility:- wirit to info of all ports:- (i) voltage, current & level display of battery (ii) Level & percentage of battery (iii) Screen on/off facility to black out the system (iv) Overload indicator.
3.	<u>Solar Panel, and MPPT.</u> (Optional)	(a) 300 Wp, 24V <u>mono crystalline perc technology</u> (b) Max. PV short circuit current of MPPT: 15 Amp inbuilt (c) Charge algorithm of MPPT: Multi stage charging (d) Protection: Output short circuit, Overload, Over Battery voltage, Low Battery voltage and Over temperature.
4.	Rectiverter	800W pure sine wave Rectiverter. Must programmable with software:- (a) Input: 187-265V, 45 - 55 Hz single phase power supply and DC Voltage range 21 - 31 V DC (b) Output: Output voltage: 220 VAC \pm 2% Frequency: 50 Hz \pm 0.1% (c) Efficiency: >90% (d) Firmware: Must be firmware upgradation facility available online and off line. (e) Virtual Switch facility (PLC): The Virtual Switch (VS) must be an imaginary on/off switch in the software. The VS is "switched" by the software when certain conditions are met. The conditions which will cause the VS to switch on and off can be configured by the user. Switching the VS ON has priority over switching it off. (f) Load Condition: Must be add or ignore the load conditions in software (g) Remote Control: Must be Remote on-off facility for charger. (h) Communication port: For parallel, remote monitoring and system integration (RJ45-spliter). (j) Protection: (i) Output short circuit (ii) Overload (iii) Battery voltage too high (iv) Battery voltage too low (v) Temperature too high (vi) Input voltage ripple too high

(a)	(b)	(c)
5.	<u>Physical Parameters.</u>	
(a)	Weight	≤25 Kg with battery (weight of Power Source will be decided by user organisation during procurement)
(b)	Dimensions	Dimensions of Hybrid Power Source can be customised as user requirement
6.	<u>Environmental parameters.</u>	
(a)	Operating Temperature	-30 to 55° C
(b)	Storage Temperature	-45 to 70° C
(c)	Operating Altitude	Up to 18,000 ft
7.	<u>Output and Input Ports.</u>	
	Port Type	Max Load Capacity
(a)	Output 12 VDC Port (10.0V to 13.0V)	240W (working)
(b)	Output 24 VDC Port (21.5V to 29.4V)	350W (working)
(c)	Output 220 VAC Port	800W (working)
(d)	Input 24V DC Port (21.5V to 29.4V)	24V DC, up to 700W Fuel Cell 24V DC, 300W Solar Energy
(e)	Input 220 V AC for charging	220V AC, 800 W AC
8.	<u>Back-up Duration in Different Load Conditions.</u>	
	Load Conditions	Backup Durations
(a)	Only 12V Max Load	05 to 06 Hrs
(b)	Only 24V Max Load	05 to 06 Hrs
(c)	Only Inverter 800 W Max Load	02 to 03 Hrs
(d)	12V & 24V Full load together	03 to 04 Hrs
(e)	12V & Inverter load together	02 to 03 Hrs
(f)	24V & Inverter load together	02 to 03 Hrs
(g)	All three at Full Load together	02 to 03 Hrs

PART –III COMPLIANCE STATEMENT

The technical requirements of the clip on night sights for Fuel Cell above 50 AHC mentioned in Part-II to be given in tabular format along with compliance and remarks by firms/ OEM.

1. Compliance of Technical parameters for Fuel Cell above 50 AHC:-

S/No (a)	Description/ Specification (b)	Technical Parameters (c)	Compliance (Yes/ No) (d)
A.	<u>FUEL CELL SYSTEM.</u>		
1.	<u>Electrical Parameters.</u>		
(a)	Fuel Cell capacity	350W	
(b)	Operating Principle	Natural Gas (LPG/CNG)	
(c)	Control unit	Control button to control the charger	
(d)	Max Charging Current	28/ 14/ 7A ± 10 % continuous	
(e)	Nominal Output Voltage	12/24/48V DC (Working)	
2.	<u>Physical Parameters.</u>		
(a)	Weight	≤10 Kg (fuel cell)	
(b)	Dimensions	≤ 470 x 210 x 340 mm (L x W x H) (18"L x 8" W x 14"H)	
(c)	Ports	(i) Connection for Battery charging cable (ii) Battery Temperature sensor (iii) Communication port/ remote-control connection (RS232) (iv) Fuel cartridge connection	
(d)	Protection against	(i) Over Current (ii) Over voltage (iii) Short circuit (iii) Reverse polarity (iv) Over temp (v) No fluctuation/ In-surges	
(e)	Reliability	Design offers must built-in redundancy to increase the reliability of system.	
3.	<u>Special Requirement.</u>		
(a)	Button	Enable button/ LED Ring, Status button	
(b)	Status	Charge status display and Power status display is available	
(c)	Display: The LED display should show following information		
	(i) The system status		
	(ii) The state of operating mode		
	(iii) The warning for errors		
4.	<u>Charging Mode.</u>		
(a)	Manual / Auto	The unit should switch On Manually or Automatically and have the capability to only charge the battery if it needs charging (Need/ Demand Based Charging)	
(b)	Running time	Min 40 hrs at peak load with one fuel container	
(c)	Hot SWAP facility	The Product should allow changing the fuel cartridge without shutting down the fuel cell system	

(a)	(b)	(c)	(d)
(d)	Intelligent Antifreeze mode	Must be no water content inside the sys to freeze.	
5.	<u>Environmental parameters.</u>		
(a)	Operating Temperature	-40 °C to +55 °C	
(b)	Storage Temperature	-50 °C to + 70 °C	
(c)	Humidity	0 to 99% RH	
(d)	Deployment Altitude & power loss	Operate Up to 18000 fit without power loss	
(e)	Noise emission	Less than 40 dB (A) at 3 mtr	
6.	<u>Network Support and Firmware Update.</u>		
(a)	Firmware	System should be capable to update firmware in order to benefit from latest improvements	
(b)	Data Interface Port	It should support for standard RS-232 interface for hyper terminal support	
(c)	Service and fault reports	System should provide the visual and text error messages display	
(d)	<u>Fuel and Fuel Cartridge</u>		
	(i) General	Max capacity of one fuel cartridge should be 5 kg. Cartridge should be sealed and leak proof. Cartridge should have an invisible and should be UN 1075 compliant.	
	(ii) Fuel	As per user requirement but should be commercially available.	
	(iii) Refillable fuel cartridge	Must be unlimited time refillable	
(e)	<u>Environmental conditions of complete system.</u>		
	Transportation	System must be provided in pelican suitable carrying case for transportation.	
B.	<u>HYBRID POWER SOURCE.</u>		
1.	<u>General.</u>	A Compact Hybrid Energy System for mobile & static use and ideal backup power source for critical applications, integrates seamlessly with fuel cell, grid, generator, wind (optional) or solar energy & Rectiverter fitted in a rugged box which is movable & light weight. It must design to provide reliable backup power to new or existing communication system. Must operate with locally fuel available in market in each city.	
2.	<u>Electrical Parameters.</u>		
(a)	Nominal Power	Min 50AH or more as per user requirement	
(b)	Nominal output Voltage	12 V DC, ± 5% 24 V DC, ± 5% 230 V AC, ± 5%	
(c)	Input Voltage	220V AC for internal charger 24 V DC Solar Energy 24 V DC Fuel Cell Energy	
(d)	Charging option	Fuel Cell System, Solar energy, DG Sets and grid	
(e)	Enable Switch	Must be with enable switch to energise the whole system and ON/Off switch for each port	

(a)	(b)	(c)	(d)
(f)	Display	Display must be with following facility:- wirit to info of all ports:- (i) voltage, current & level display of battery (ii) Level & percentage of battery (iii) Screen on/off facility to black out the system. (iv) Overload indicator.	
3.	<u>Solar Panel and MPPT.</u> (Optional)	(a) 300 Wp, 24V <u>mono crystalline perc technology</u> (b) Max. PV short circuit current of MPPT: 15 Amp inbuilt (c) Charge algorithm of MPPT: Multi stage charging (d) Protection: Output short circuit, Overload, Over Battery voltage, Low Battery voltage and Over temperature.	
4.	Rectiverter	800W pure sine wave Rectiverter. Must programmable with software:- (a) Input: 187-265V, 45 - 55 Hz single phase power supply and DC Voltage range 21 - 31 V DC (b) Output: Output voltage: 220 VAC \pm 2% Frequency: 50 Hz \pm 0.1% (c) Efficiency: >90% (d) Firmware: Must be firmware upgradation facility available online and off line. (e) Virtual Switch facility (PLC): The Virtual Switch (VS) must be an imaginary on/off switch in the software. The VS is "switched" by the software when certain conditions are met. The conditions which will cause the VS to switch on and off can be configured by the user. Switching the VS ON has priority over switching it off. (f) Load Condition: Must be add or ignore the load conditions in software (g) Remote Control: Must be Remote on-off facility for charger. (h) Communication port: For parallel, remote monitoring and system integration (RJ45-spliter). (j) Protection: (i) Output short circuit (ii) Overload (iii) Battery voltage too high (iv) Battery voltage too low (v) Temperature too high (vi) Input voltage ripple too high	

(a)	(b)	(c)	(d)
5.	<u>Physical Parameters.</u>		
(a)	Weight	≤25 Kg with battery (weight of Power Source will be decided by user organisation during procurement)	
(b)	Dimensions	Dimensions of Hybrid Power Source can be customised as user requirement	
6.	<u>Environmental parameters.</u>		
(a)	Operating Temperature	-30 to 55° C	
(b)	Storage Temperature	-45 to 70° C	
(c)	Operating Altitude	Up to 18,000 ft	
7.	<u>Output and Input Ports.</u>		
	Port Type	Max Load Capacity	
(a)	Output 12 VDC Port (10.0V to 13.0V)	240W (working)	
(b)	Output 24 VDC Port (21.5V to 29.4V)	350W (working)	
(c)	Output 220 VAC Port	800W (working)	
(d)	Input 24V DC Port (21.5V to 29.4V)	24V DC, up to 700W Fuel Cell 24V DC,300W Solar Energy	
(e)	Input 220 V AC for charging	220V AC, 800 W AC	
8.	<u>Back-up Duration in Different Load Conditions.</u>		
	Load Conditions	Backup Durations	
(a)	Only 12V Max Load	05 to 06 Hrs	
(b)	Only 24V Max Load	05 to 06 Hrs	
(c)	Only Inverter 800 W Max Load	02 to 03 Hrs	
(d)	12V & 24V Full load together	03 to 04 Hrs	
(e)	12V & Inverter load together	02 to 03 Hrs	
(f)	24V & Inverter load together	02 to 03 Hrs	
(g)	All three at Full Load together	02 to 03 Hrs	

PART-IV : ADDITIONAL INFORMATION

Any other additional information about the products which is necessary to be mentioned in the RFI. Respondents are requested to specify all such information.

INFORMATION PROFORMA

1. Name of the Vendor/Company/Firm.

(Company profile, in brief, to be attached)

2. **Type (Tick the Relevant Category).**

- | | | | | | |
|-----|---|-----|----|--------------------------|--------------------------|
| (a) | Original Equipment Manufacturer (OEM) | Yes | No | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) | Government sponsored Export Agency
(Details of Registration be provided) | Yes | No | <input type="checkbox"/> | <input type="checkbox"/> |
| (c) | Authorized Representative of OEM | Yes | No | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) | Other (give specific details) | | | | |

3. **Contact Details.**

Postal Address.

City : _____ Province : _____

Country : _____ PIN/ZIP Code : _____

Tele : _____ Fax : _____

URL/Website : _____

4. **Local Branch/Liaison Officer/Authorised Representatives in Delhi (if any).**

Name and Address.

City : _____ Province : _____

Country : _____ PIN/ZIP Code : _____

Tele : _____ Fax : _____

5. **Financial Details.**

- (a) Category of Industry (Large/Medium/Small scale).
- (b) Annual turnover : _____ (in INR).
- (c) Number of employees in firm.
- (d) Earlier contracts with Indian Ministry of Defence/Government agencies :-

Contract Number	Equipment	Quantity	Cost

- (e) Details of manufacturing infrastructure available : _____.

6. **Certification by Quality Assurance Organization (If Applicable).**

Agency	Certificate	Applicable from (Date & Year)	Valid till (Date & Year)

7. **Equipment/Product Profile (to be submitted for each product separately).**

- (a) Name of the Product : _____
(Should be given category wise for e.g. all products under night vision devices to be mentioned together).
- (b) Description (attach technical literature) : _____
- (c) Whether OEM or Integrator : _____
- (d) Status (in service/Design development state) : _____
- (e) Production capacity per annum : _____
- (f) Countries where equipment is in service : _____
- (g) Whether export clearance is required from respective government (Foreign Vendors only).
- (h) In case of equipment and ammunition JV/MoU compliance to be specified.

(j) Details of any collaboration/Joint Venture/co production/authorized dealer with Indian Industry (Foreign Vendors only).

Name & Address :

Tele : _____ Fax : _____

8. (a) Are you making the full equipment or is it being integrated by you ? Give details.

(b) What are the components, sub system or sub-assemblies of the equipment which are not manufactured by you ? Please give details.

9. Details of participation in similar procurement cases in India in the past.

10. **Alternatives for meeting the objects of the equipment set forth in RFP.**

11. **Any other Relevant Information.**

12. **Declaration.**

It is certified that the above information is true and any changes will be intimated within five (05) working days of occurrence.

TRIAL DIRECTIVES FOR FUEL CELL ABOVE 50 AHC

1. Trial of the equipment will be conducted by a Board of Officers in the presence of vendors or representatives of firms to assess the actual performance of the equipment.
2. All parameters/specifications mentioned in the QRs will be checked by board of officers by ascertaining/verifying following checks:-
 - (a) Physical Check:-In this category specifications of the equipment will be checked physical as per QRs.
 - (b) Functional Check:- The vendors will show all features/configuration of the equipment to the board of officers during technical evaluation.
 - (c) Submission of certificates:-Specification which can not be checked due to lack of testing facilities/expertise a certificate of test shown against each will be provide by vendors/firm during physical trial of the equipment.

S/No (a)	Description/Specification (b)	Parameters (c)	Trial Procedure (d)	
A.	<u>FUEL CELL SYSTEM.</u>			
1.	<u>Electrical Parameters.</u>			
(a)	Fuel Cell capacity	350W	The BOO will check practically.	
(b)	Operating Principle	Natural Gas (LPG/CNG)		
(c)	Control unit	Control button to control the charger		
(d)	Max Charging Current	28/ 14/ 7A \pm 10 % continuous		
(e)	Nominal Output Voltage	12/24/48V DC (Working)		
2.	<u>Physical Parameters.</u>			
(a)	Weight	\leq 10 Kg (fuel cell)		
(b)	Dimensions	\leq 470 x 210 x 340 mm (L x W x H) (18"L x 8" W x 14"H)		
(c)	Ports	(i) Connection for Battery charging cable (ii) Battery Temperature sensor (iii) Communication port/ remote-control connection (RS232) (iv) Fuel cartridge connection		

(a)	(b)	(c)	(d)
(d)	Protection against	(i) Over Current (ii) Over voltage (iii) Short circuit (iii) Reverse polarity (iv) Over temp (v) No fluctuation/ In-surges	The BOO will check practically.
(e)	Reliability	Design offers must built-in redundancy to increase the reliability of system.	
3.	<u>Special Requirement.</u>		
(a)	Button	Enable button/ LED Ring, Status button	The BOO will check practically.
(b)	Status	Charge status display and Power status display is available	
(c)	Display: The LED display should show following information:-		The BOO will check practically.
	(i) The system status		
	(ii) The state of operating mode		
	(iii) The warning for errors		
4.	<u>Charging Mode.</u>		
(a)	Manual / Auto	The unit should switch On Manually or Automatically and have the capability to only charge the battery if it needs charging (Need/ Demand Based Charging)	The BOO will check practically/ physically.
(b)	Running time	Min 40 hrs at peak load with one fuel container	
(c)	Hot SWAP facility	The Product should allow changing the fuel cartridge without shutting down the fuel cell system	
(d)	Intelligent Antifreeze mode	Must be no water content inside the sys to freeze.	
5.	<u>Environmental parameters.</u>		
(a)	Operating Temperature	-40 °C to +55 °C	Firm will submit certificate of any Govt. Lab or NABL or (ILAC) accredited laboratory.
(b)	Storage Temperature	-50 °C to + 70 °C	
(c)	Humidity	0 to 99% RH	
(d)	Deployment Altitude & power loss	Operate Up to 18000 fit without power loss	
(e)	Noise emission	Less than 40 dB (A) at 3 mtr	

(a)	(b)	(c)	(d)
6.	<u>Network Support and Firmware Update.</u>		
(a)	Firmware	System should be capable to update firmware in order to benefit from latest improvements	.Firm will submit OEM certificate.
(b)	Data Interface Port	It should support for standard RS-232 interface for hyper terminal support	The BOO will check practically.
(c)	Service and fault reports	System should provide the visual and text error messages display	
(d)	<u>Fuel and Fuel Cartridge</u>		
	(i) General	Max capacity of one fuel cartridge should be 5 kg. Cartridge should be sealed and leak proof. Cartridge should have an invisible and should be UN 1075 compliant.	The BOO will check practically.
	(ii) Fuel	As per user requirement but should be commercially available.	
	(iii) Refillable fuel cartridge	Must be unlimited time refillable	The BOO will check practically.
(e)	<u>Environmental conditions of complete system.</u>		
	Transportation	System must be provided in pelican suitable carrying case for transportation.	The BOO will check practically.
B.	<u>HYBRID POWER SOURCE.</u>		
1.	<u>General.</u>		
		A Compact Hybrid Energy System for mobile & static use and ideal backup power source for critical applications, integrates seamlessly with fuel cell, grid, generator, wind (optional) or solar energy & Rectiverter fitted in a rugged box which is movable & light weight. It must design to provide reliable backup power to new or existing communication system. Must operate with locally fuel available in market in each city.	The BOO will physically check and ascertain that the product can practically fully comply and ensure that DC Hybrid Energy System is as per requirement.

(a)	(b)	(c)	(d)
2.	<u>Electrical Parameters.</u>		
(a)	Nominal Power	Min 50AH or more as per user requirement	The BOO will check practically.
(b)	Nominal output Voltage	12 V DC, ± 5% 24 V DC, ± 5% 230 V AC, ± 5%	
(c)	Input Voltage	220V AC for internal charger 24 V DC Solar Energy 24 V DC Fuel Cell Energy	
(d)	Charging option	Fuel Cell System, Solar energy, DG Sets and grid	
(e)	Enable Switch	Must be with enable switch to energise the whole system and ON/Off switch for each port	
(f)	Display	Display must be with following facility:- wirit to info of all ports:- (i) voltage, current & level display of battery. (ii) Level & percentage of battery. (iii) Screen on/off facility to black out the system. (iv) Overload indicator.	
3.	<u>Solar Panel, and MPPT.</u> (Optional)	(a) 300 Wp, 24V <u>mono crystalline perc technology.</u> (b) Max. PV short circuit current of MPPT: 15 Amp inbuilt. (c) Charge algorithm of MPPT: Multi stage charging. (d) Protection: Output short circuit, Overload, Over Battery voltage, Low Battery voltage and Over temperature.	The BOO will check practically.

(a)	(b)	(c)	(d)
4.	Rectiverter	<p>800W pure sine wave Rectiverter. Must programmable with software:-</p> <p>(a) Input: 187-265V, 45 - 55 Hz single phase power supply and DC Voltage range 21 - 31 V DC.</p> <p>(b) Output: Output voltage: 220 VAC \pm 2% Frequency: 50 Hz \pm 0.1%</p> <p>(c) Efficiency: >90%</p> <p>(d) Firmware: Must be firmware upgradation facility available online and off line.</p> <p>(e) Virtual Switch facility (PLC): The Virtual Switch (VS) must be an imaginary on/off switch in the software. The VS is "switched" by the software when certain conditions are met. The conditions which will cause the VS to switch on and off can be configured by the user. Switching the VS ON has priority over switching it off.</p> <p>(f) Load Condition: Must be add or ignore the load conditions in software</p> <p>(g) Remote Control: Must be Remote on-off facility for charger.</p> <p>(h) Communication port: For parallel, remote monitoring and system integration (RJ45-splitter):-</p> <ul style="list-style-type: none"> (j) Protection. (i) Output short circuit (ii) Overload (iii) Battery voltage too high (iv) Battery voltage too low (v) Temperature too high (vi) Input voltage ripple too high 	The BOO will check practically.

(a)	(b)	(c)	(d)
5.	Physical Parameters.		
(a)	Weight	≤25 Kg with battery (weight of Power Source will be decided by user organisation during procurement)	The BOO will check practically.
(b)	Dimensions	Dimensions of Hybrid Power Source can be customised as user requirement	
6.	Environmental parameters.		
(a)	Operating Temperature	-30 to 55° C	The BOO will check practically.
(b)	Storage Temperature	-45 to 70° C	
(c)	Operating Altitude	Up to 18,000 ft	
7.	Output and Input Ports.		
	Port Type	Max Load Capacity	The BOO will check practically.
(a)	Output 12 VDC Port (10.0V to 13.0V)	240W (working)	
(b)	Output 24 VDC Port (21.5V to 29.4V)	350W (working)	
(c)	Output 220 VAC Port	800W (working)	
(d)	Input 24V DC Port (21.5V to 29.4V)	24V DC, up to 700W Fuel Cell 24V DC,300W Solar Energy	
(e)	Input 220 V AC for charging	220V AC, 800 W AC	
8.	Back-up Duration in Different Load Conditions.		
	Load Conditions	Backup Durations	The BOO will check practically.
(a)	Only 12V Max Load	05 to 06 Hrs	
(b)	Only 24V Max Load	05 to 06 Hrs	
(c)	Only Inverter 800 W Max Load	02 to 03 Hrs	
(d)	12V & 24V Full load together	03 to 04 Hrs	
(e)	12V & Inverter load together	02 to 03 Hrs	
(f)	24V & Inverter load together	02 to 03 Hrs	
(g)	All three at Full Load together	02 to 03 Hrs	