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مَقْرُورٌ 2: مَطَابِقَاتُ مَوَازِينِ السُّورِ

1. Photovoltaic (PV) module

- ✓ The PV module must qualify the latest edition of any of the following.
- ✓ IEC PV module qualification OR equivalent to BS standards.
- ✓ The PV module must qualify to IEC 61730-1 photovoltaic (PV) module.
- ✓ Safety qualification – part.

2. Requirements for construction and (IEC 61730-2 1 photovoltaic (PV) module safety qualification – part 2: requirements for Testing)

- ✓ PV modules to be used in highly corrosive atmosphere throughout their lifetime and must qualify to IEC 61701 (photovoltaic (PV) modules – Salt mist corrosive testing).
- ✓ The total power shall be obtained by streams of PV modules.
- ✓ PV modules shall be either monocrystalline OR polycrystalline.
- ✓ PV modules shall be 1/3-cut cell layout Mono PERC technology.
- ✓ PV modules shall be PID resistant.
- ✓ PV modules shall be aluminum framed with hard face covers.
- ✓ PV module selection shall be made from state of the art of the PV technology with the best relation space / production as possible.
- ✓ PV module brands should be declared with datasheet and justified.
- ✓ Stream voltages should be average voltage to avoid losses on low voltage transfer which increases the length of wiring and not too high to avoid magnetic field production with relevant thunder shot possibility.
- ✓ PV modules shall come to site properly tested and in good packaging to avoid any damage.
- ✓ PV modules shall guarantee 20 years power performance with not more than 2% power degradation in the first year and 0.55% annual power attenuation.
- ✓ PV modules shall guarantee 10 years against any kind of production defect.
- ✓ PV modules shall have a rated power between 450-600 (to better utilize the roof area)
- ✓ PV modules shall have MC4 compatible connectors

3. Hybrid Grid Inverter

- ✓ The contractor shall supply all necessary Hybrid inverters for the correct operation of the system, which allow for future expansion of the PV power plant in phases.
- ✓ The Contractor shall install a PV array Combiner box (for circuit breaker protection and lightning protection) minimum 3 inverters
- ✓ The inverter must be battery ready
- ✓ The inverter must have programmable multiple operation modes as follows: Grid-tie, Off Grid and Grid-tie with Backup
- ✓ The council expects the contractor to propose robust, reliable and low failure rate proven inverters which can work efficiently for more than 10 years without any major failure in hot and humid environments.
- ✓ The contractor shall provide details of the following characteristics for each inverter.

4. Standards and certifications

- ✓ The inverters shall have an efficiency of 97% and above.
- ✓ The inverters shall have an inbuilt DC isolation switch.
- ✓ The inverters shall have the function of Voltage charge controlling
- ✓ The inverters shall have Auto Synchronizing (pairable with another inverter)
- ✓ The inverters shall have lightning and surge protection.
- ✓ The inverter must have the capability to monitor online.

- ✓ The inverters brand preferably from one of the brands.
 - ABB
 - Enphase Energy
 - Huawei
 - Fronius International GmbH
 - Gin long Solis
 - Yangtze Solar
 - SMA Solara Technology AG
 - Growatt

5. Warranty

- ✓ The inverter must have a minimum of 5 years manufacturer backed warranty. PV modules used must be warranted by manufacture for output voltage, which should not be less than 90% within the first 10 years and 80% at the end of 20 years.
- ✓ The contractor must be responsible for service warranty at least 2 years from the date of PV panel commissioning date.

مَقْرُوْعُو 3: نَاوَرَسِيْمُو رَاكْرَمُو دَرْمُوْدُو مَوْج

