**Annex-C**

**LOT3: Technical Specification for Solar Lanterns for Emergency Response**

1. **Background**

As a humanitarian support for refugee and Internally Displaced People (IDP), UNDP Sudan provide support for basic service facilities to provide basic lighting facility in the refugee camps and temporary shelters. Solar Photovoltaic Lanterns are intended to provide basic clean lighting facility for the individual families in such settlements. The location of the installation and supply and delivery will depend upon the projects that support is being provided in any of the states in Sudan.

This technical specification is prepared for supply and delivery of the LED based Solar Photovoltaic Lantern for the projects that are being supported by UNDP Sudan, Government and other UN agencies partners.

1. **General Description**

* Solar Photovoltaic Lantern system comprises of lamp, batteries, and associated electronics all of the items placed in suitable housing that are made up of metal, plastic, fiber glass, and a PV module either isolated or integrated in the housing.
* The overall system should have minimum of 2 years life span for daily usage.
* The lantern is portable lighting device that is suitable for indoor or outdoor lighting covering a full range of 360 degrees.
* Solar Irradiance of 6 kWh/m2/day should be used to calculate solar PV output for Solar Module.
* Clear instructions on its cleaning, operation and maintenance of the solar PV lantern components shall be provided in the form of user manual.
* Technical specification for the entire system needs to be provided along with the bid document.

1. **Specifications of the Core Component of Solar Photovoltaic System (SPVS)**
2. **Photovoltaic Module**

* Mono or Poly Crystalline Silicon solar cells should be used in the solar module that are used for Solar Photovoltaic systems.
* The size of solar panel ranges from for package1: (3 Wp - 5 Wp) and Package 2 (6Wp- 10Wp) and are either mounted in the lamp housing or provided with an arrangement with stand for mounting at the optimal angle in direction facing the sun.
* In case of separately provided PV module, it should be provided with at least 3 m cord to charge the battery and its the terminal box should have provision for opening and replacing the cables, if required.
* Following details needs to be provided for the module:

Name of the manufacturer with logo, model, size in Wp, year of make, and any testing certifications.

The PV module should have warranty for at least 10 years from the date of manufacturing.

1. **Battery and electronics**

* Batteries used in the Solar Lantern should either be Sealed Maintenance free or Li-ion batteries or Nicket Metal Hydride (NiMH).
* Battery performance certificate from a reliable testing institution shall be provided along with the bid offer.
* The battery capacity in Ampere Hour (Ah) and its rated voltage should be provided. The battery voltage must match the solar module output voltage.
* The capacity of the batteries should be provided such that it can provide lighting for at least 6 hrs after full charge for the given configuration.
* The solar charge controller shall be inbuilt in the portable Solar PV lighting system.
* Plug and Play connector shall be provided for charging battery through solar panel. Mobile charging USB port shall be provided in the Package 2 system.
* Battery state of charging indicator light should be inbuilt with green light to indicate charging in progress and red light for deep discharge conditions to suggest that the load should be switched off and battery to be charged.
* The battery should have automatic protection against deep discharge and over charging, and reverse polarity. A fuse should be provided to protect against short circuit conditions.

1. **Lamps**

* The lamp should be White Light Emitting Diode (WLED).
* The solar lamp should be provided with the foldable handle, or hook to carry or clamp in any surface.
* The luminous performance of the LED lamp should be provided and should not be less than 70 lumens/watt. Ultraviolet (UV) emitting LEDs are not acceptable.
* The luminous intensity and its working hours for each configuration of supplied items needs to be provided.
* The make, model number, country of origin and technical sheet for the lamp should be provided.

**Important Note: The selected vendor/s make sure that all imported solar item into Sudan has to be certified by Sudanese Standards and Meteorology Organization (SSMO)”**