TENDER

for

Design, engineering, procurement, fabrication & assembly, testing, packing, supply, erection, commissioning, and O&M

of

40 [Forty] Distributed Grid Interactive Photovoltaic Rooftop Systems (PV Port) at several locations across the cities of Gandhinagar and Dwarka in Gujarat.

Tender Number: 91144656

Date: 11th November'2020

(Single Envelop Bid System)

Particulars	Description
Purpose of Tender	To select an experienced company for the Design, engineering, procurement fabrication & Assembly, Testing, Supply, Erection, Commissioning & O&M of 40 [Forty] Distributed Grid Interactive photovoltaic Rooftop systems (PV Port) at several locations across Gandhinagar and Dwarka in Gujarat.
Tender reference number	**91144656**
Date of tender announcement	**11/11/2020**
Last date to submit pre-bid queries by the interested bidders	**20/11/2020**
Last date to provide clarification to the queries. All the queries will be answered in the form of (Frequently asked question) FAQ and will be uploaded on respective web portal(s).	**24/11/2020**
Last Date and time for submission of bids	**30/11/2020**
Mode of Submission	Techno-commercial proposal must be submitted electronically. Bidders are requested to follow the instructions strictly stipulated at Clause **3.4/3.5/3.6 – Submission of bids**
Validity of Bids/ Offered Price	60 days from the last date of submission of bids The selected supplier shall not be able to vary from their financial bid until the completion of the Order, if awarded by GIZ.
Address for Bid Submission	The techno-commercial bid needs to be submitted electronically – please refer to clause 3.4/3.5/3.6 – Submission of Bids. The bidder must submit documentary evidence against “Annexure J & Clause 3.1” along with the techno-commercial bid.
Location of Site	Several sites (Rooftop +Ground Mount) spread across the cities of Gandhinagar and Dwarka in Gujarat

GIZ Country Office (India) is soliciting the bids from interested suppliers/companies for the Design, engineering, procurement fabrication & Assembly, Testing, Supply, Erection, Commissioning & O&M of 40 [Forty] Distributed Grid Interactive photovoltaic Rooftop systems (PV Port) at several locations across Gandhinagar and Dwarka in Gujarat, through limited tender and as per the terms and condition of tender documents.

Purpose of the Bid

Design, Engineering, Procurement Fabrication & Assembly, Testing, Supply, Erection, Commissioning & O&M of 40 P.V Port.

Process of tender submission

The bid shall be prepared as per the provisions mentioned in the following documents available:

1. Invitation to Tender- Scope of work and bidding conditions
2. Checklist of documents
3. Covering Letter from Bidder – Annexure "A"
4. Declaration by bidder – Annexure "B"
5. Bills of Material for PV Port – Annexure "C"
6. Delivery Schedule – Annexure "D"
7. Design and Specifications for PV Port – Annexure "E"
8. Document Submission – Annexure "J"
9. Financial Bid (Submission of Price) - Annexure "K"

Interested bidders are requested to carefully examine all documents and submit the entire tender proposal as instructed in above mentioned documents. Any deviation/ differentiation from the instruction will lead to disqualification of the tenderer from the bidding process.

The bid must reach to GIZ Country Office **on or before 30th November'2020** in the below mentioned email ID Only.

qn_quotation@giz.de; QN_Quotation@giz.de

addressed to: **Head of Procurement**, GIZ Country Office, German Development Cooperation office, 46 Paschimi Marg, Vasant Vihar, New Delhi- 110057 (India)

Please mark your email

Tender Ref: ***"*Design, engineering, procurement fabrication & Assembly, Testing, Supply, Erection, Commissioning & O&M of 40 P.V Port.**

Bids received in any other manner, ie- hard copies, fax or in any other email ID shall be summarily rejected

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1. Project description

1.1. About GIZ

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is a German Government enterprise that provides services in the field of international cooperation in sustainable development worldwide. GIZ under the project 'Integration of Renewable Energies in the Indian Electricity System (I-RE)' has initiated and executed several technical studies, trainings and pilot project implementation with an objective to support MNRE in the field of renewable energy planning and framework design for the dissemination of renewable energies, specifically distributed grid-connected PV. The project is a part of the International Climate Initiative (IKI) and was commissioned in December 2014 by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMU). Recently, the project has been extended till 01/2022 with an aim of improving climate and energy policy, especially in urban development in India.

1.2. About Project

India had set an ambitious target for installing 100 GW of Solar Systems by the year 2022. Out of this target of 100 GW, 40 GW of Grid Connected Solar Rooftop (GCRT) are proposed to be installed. At present the installed capacity of GCRT in the country is around 5000 MW.

The proliferation of rooftop solar systems is required to achieve the target set by the Indian Govt. Such large capacity addition can occur when the photovoltaic systems are installed through a mass movement. It has also been observed in many countries across the world that the advantage of distributed solar rooftop is when the installations are in the premises of a consumer and when solar is distributed across the network of a distribution company. However, the main reasons for the lower uptake and the lack of interest amongst the consumers stated by the government is the awareness, cumbersome grid interconnection process, and the lack of confidence in the quality of the system installed by the vendors in the country.

Additionally, GIZ has also been requested by MNRE to come out with a standardized GCRT solution which will be able to address the concerns of consumer, DISCOMs and other stakeholders in the country.

In this regard, GIZ has developed the concept of a new type of rooftop solar power plant called "PV Port". A PV Port system is a standard plug-n-play photovoltaic system having a system size of a minimum of **2 kWp** with or without battery storage.

More than 50 prototypes of PV Port & Store are being installed in India for the proof of concept. Under this assignment, it is intended to manage the procurement, installation, and maintenance of a mix of 2 versions of PV port to be installed as demonstration projects at different locations across 2 cities **i.e. Gandhinagar and Dwarka in Gujarat**.

Under this project, 40 [Forty] PV port systems are proposed to be installed in the following ratios:

PV Port Version	Description	Gandhinagar	Dwarka	TOTAL
Version 1	Grid Connected (without storage and benches)	**5**	**5**	10
Version 2	Off - Grid (with storage and benches)	**15**	**15**	30
TOTAL		20	20	40

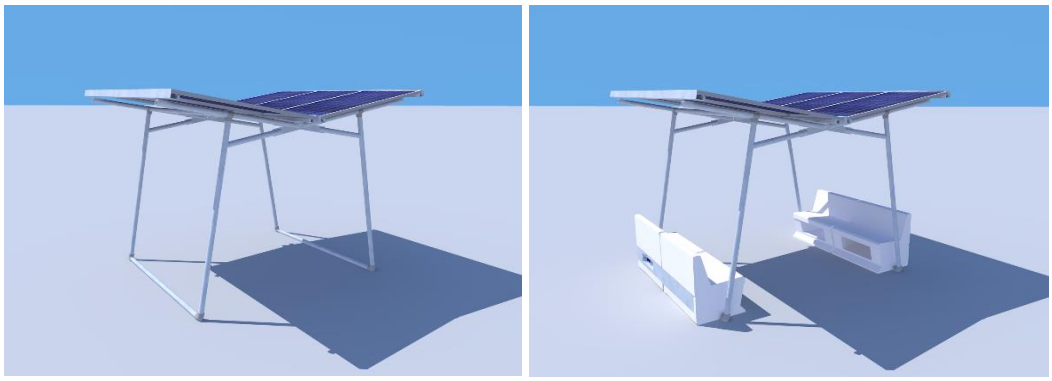


Figure 1 – (Left) PV Port Version 1 (without storage and benches), (Right) PV Port Version 2 (with storage and benches)

The aim of this project is to:

- Demonstrate the features of the system (Plug and Play, Portable, Quality, Grid Interaction etc.) to various stakeholders including SNA/ DISCOM/ Municipal Corporation etc. This would eventually assist and motivate them to move to the next phase i.e. up-scaling and commercialization of the PV port systems in the respective cities.

- Increasing awareness amongst the public by installing the systems across high visibility areas. A few of the proposed sites where the off-grid version of the PV ports may be installed are mentioned below:
    - Parks
    - Hospitals as greeting areas
    - Bus Stops
    - Advertisement hoardings
    - Display boards which showcase the city relevant parameters
    - EV charging stations
    - Any other public spaces

  The Version 2 (off -grid systems) may be utilized by the public for powering/ charging equipment such as mobile phones, laptops, lights, fans etc.

About PV Port

The key characteristics of PV Port in general are as follows:

i. Grid Interaction: PV Port may be synchronized (having grid forming capability) with the grid but is not feeding into it – to be used for self-consumption. The operation of PV Port is in parallel to the distribution grid.

ii. Plug-n-play and portable: The connection is done by plugging/injecting the AC output directly into the socket at household circuit level. Through that and other measures the purchase, connection and installation of those systems can be done by the homeowners themselves. The need of involving outside parties to install the system is reduced to technical support. The system can be installed anywhere i.e. roof, parks, malls and public places.

iii. Good quality: Since the PV-Port is developed and manufactured by experienced agencies under expert supervision; each consumer will receive in the form of a PV port – a reliable and quality PV system. PV port is a product meeting global standard and the technical requirement of CEA, MNRE and DISCOMs at the same time.

iv. Low Cost: PV Port systems would be mass produced through central tendering thus benefitting from economies of scale. Further, these could be installed by in mass numbers.

v. Grid support: The PV port is designed in a manner that it has capability to interact with the DISCOMs network and whenever required, it will be able to support the DISCOM by pumping power stored in the batteries back into the grid.

1.3. Functionalities

PV Port is a standardized system that provides the following functionalities. The following are the main functionalities mentioned depending on the versions installed:

Version 1 of the PV Port System (Grid Connected without storage and benches)

i. In parallel to the grid: All loads are supplied from the PV Port. In case load is more than PV output, the electricity is imported from the grid.

ii. No export to the Grid: The PV Port system does not export any power to the grid after the Discom meter. There is no need to change the existing meter.

iii. Peak shaving: A user can participate in the Time of Day tariff, demand side management schemes of the distribution companies to support them in peak shaving and taking the benefits of the schemes.

Version 2 of the PV Port System (Off - Grid with storage and benches)

i. The PV Port (off grid) supplies electricity from the PV modules and the batteries to the load connected via an AC socket/ USB.

1.4. Product Description

The PV Port System is a standardized solar photovoltaic system with a minimum DC capacity of **2 kWp**. Under this project the following versions of the PV port systems are proposed to be installed.

- Version 1 - Grid Connected PV Port Systems (without storage and benches)
- Version 2 – Off Grid PV ports Systems (with storage and benches)

The PV Port & Store system structure utilizes components which are standardized, and which can be assembled within hours. The structure does not require any welding to assemble and only utilizes a handful of tools.

Figure 2 – Version 2 PV Port (Off Grid) Components

1.5. Major Components of PV Port system

The following section details some of the major components that will be used in the PV port system.

Mechanical structure

The version 1 of the PV Port system has no benches which act as dead loads, hence pre-moulded cement blocks are required for keeping the structure to the roof during high wind speeds. Depending on the wind exposure of the installation site, blocks between 500 and 1000 kg should be placed on each side of the PV-Port.

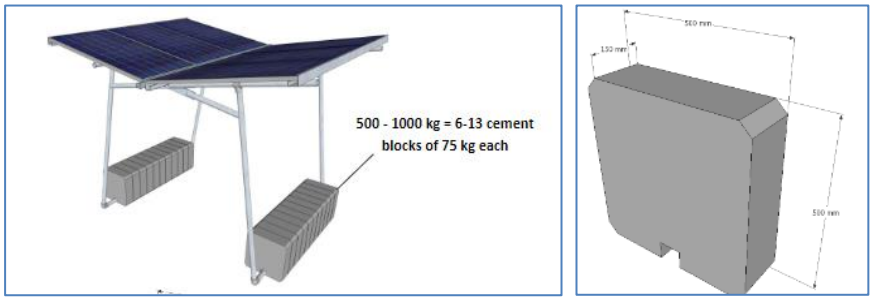


Figure 3 – Cement Blocks used in the Version 1 (Grid Connected) PV Ports system.

The version 1 may also be fixed using 4 brackets. The detailed fixing methodology is mentioned in Annexure N.

The version 2 (off grid) of the PV Port utilizes the water filed benches to hold the structure down. This enables to secure the PV Port without having to clamp the system down.

Based on CFD and solar yield simulations, the optimized east-west orientation of the modules has enabled the design to resists wind load conditions defined by Indian Standard Code requirements (IS875 Part 3) for basic wind speed of 50m/s considering flat terrain for installation on top of buildings with up to 12m height (4 stories). The design also resists to the load at wind speeds of 200 Km/hour including Venturi effects at 1 m from the terrace edge and certified by TUV (India and Germany).

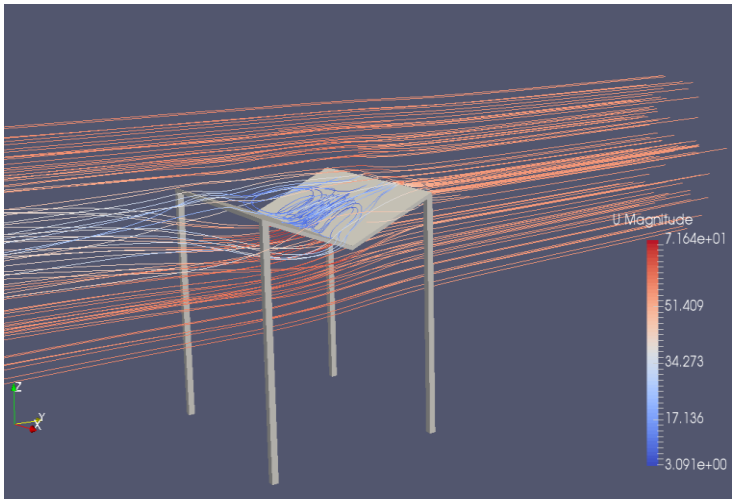


Figure 4 - CFD Analysis at 200 kmph wind speed for East-West orientation

Roto-moulded Bench

The bench (applicable for version 2 – Off Grid PV port systems) contains all the electronics, inverter, batteries in a cavity which is surrounded by water mass. In case of PV Port version 1, all the electronics are mounted to a base plate.

The benches offer room for the installation of batteries with potential capacity increase. The water in both the benches is filled on site, allowing easy transport. The advantages of the water filled benches are two folds:

- The weight of the bench is substantially increased with water and thus acts as counterweight to all the uplift force which may be caused due to wind
- The water surrounding the electronics acts as a fluid cooled heat sink and thermal buffer which improves efficiency and keeps batteries within the permitted temperature range for their 10-year warranty conditions. Prototype systems show a delta of 10 degrees Celsius.

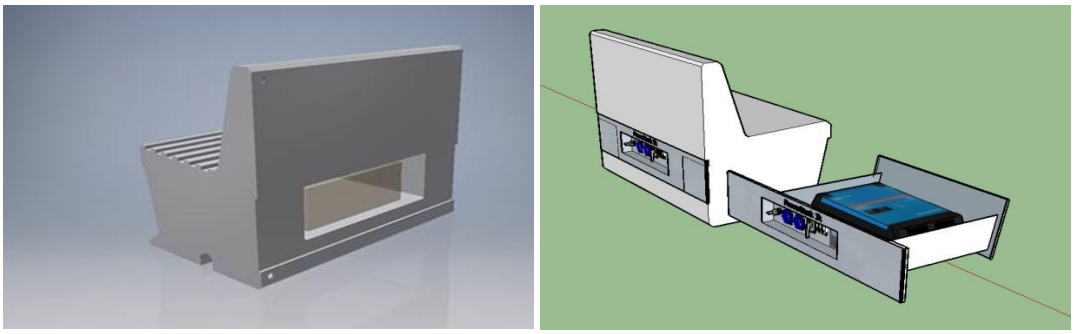


Figure 5 – Roto – moulded bench to be used in the version 2 of the PV Port Systems (Off Grid)

GIZ has empanelled the manufacturer for the manufacturing of the roto-moulded benches as per the specification of GIZ. The contact information of the empanelled manufacturer is provided in the annexure C 'Bills of Material'. The bidders are recommended to procure the benches from the empanelled manufacturers and shall contact directly for obtaining the prices applicable.

Electrical and Electronic components

The current PV Port utilizes high quality components such as a hybrid inverter, charge controller, control unit and protection devices which are all housed within a single tray in the benches. This makes the system compact and provides ease of maintenance as the tray easily slides out from the benches. The batteries are housed within the other benches based on the type of battery utilized. The current version of the PV Port also comes with an energy meter used for preventing back feed of power. It is installed in the distribution board of the premises and communicates wirelessly with the inverter (Applicable for grid connected systems).

Figure 6 – Electrical Component of the PV Port and Store System Version 2

2. Detailed Scope of Work

The scope of work includes Design, engineering, procurement, fabrication, assembly, testing, supply, erection, commissioning & O&M for 1 year of 40 nos. distributed grid interactive photovoltaic rooftop systems (PV Port) as per the specifications and conditions required by GIZ. The PV port will be installed in the across the cities of Gandhinagar and Dwarka in Gujarat in the following ratios:

PV Port Version	Description	Gandhinagar	Dwarka	TOTAL
Version 1	Grid Connected (without storage and benches)	**5**	**5**	10
Version 2	Off - Grid (with storage and benches)	**15**	**15**	30
TOTAL		20	20	40

2.1. Design

2.1.1 The PV Port system consists of 6 PV modules fixed on an elevated structure in east - west orientation. At the bottom, depending upon the version it either consist ballast (for version 1) or a pair of benches (for version 2) on both sides. One of the two benches consists of all the electronics, inverter, and batteries in a cavity which is surrounded by water. The other bench contains only water. The water in both the benches is to be filled on site.

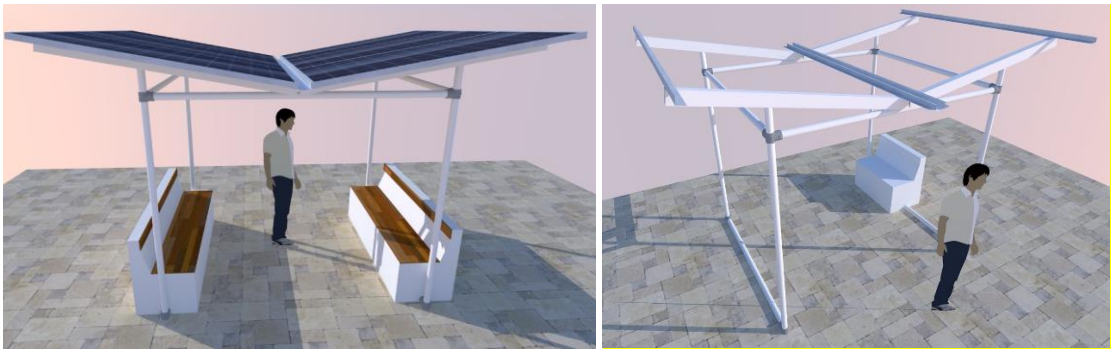


Figure 7 – PV Port (Version 2) off-grid systems

2.1.2 GIZ has provided in this TOR, the design drawings, structural drawings, Bills of Material, etc. to the bidders. The successful bidder shall utilize them for the procurement, manufacturing, design, construction of the 10 [ten] PV port Version 1 (Grid Connected) systems.

2.1.3 **The existing design documents shared with this TOR are designed for a grid interactive PV Port System. However, in this project, 30 [Thirty] PV Port Version 2 (off-grid) systems are proposed to be installed. The selected bidder, considering the design documents shared is required to carry out the re-designing of the version 2 of the PV Port system considering the PV port to be used for off-grid applications.**

2.1.4 **The amendments to the design shall include but not limited to the following:**

- **Incorporation of AC sockets and USB Ports either on the benches or on the structure for the public to charge the mobile phones, laptops etc. The AC socket and USB ports should be designed in a way that it is easily accessible to the consumers and should be preferably placed on both the sides of the benches and for the 2 opposite benches (i.e 4 sets of AC socket/ USB for one PV port system).**

- **Incorporation of the off-grid inverter, battery, charge controller and associated electronics in the cavity provided in the designed roto-moulded benches. The detailed dimensions of the roto-moulded benches are provided in Annexure M.**

2.1.5 The selected bidder should submit the design/ CAD/ shop drawings to support the updates made in the designs of the PV Port Version 2 (Off- Grid) systems to GIZ for technical officer review. The selected bidder may also propose other changes, if necessary. The selected bidder in this case, shall indicate the suggestions in the shop drawings and submit these drawings to GIZ for the technical officer review. The selected bidder should also record drawings for all work provided under this contract for his use. Any changes in the design need to be approved by GIZ or GIZ designated engineering firm before implementation.

2.1.6 Annexure M of this document consists the manufacturing drawings of the structure to be used in the PV port version 1 (grid connected) and Version 2 (off grid) respectively. The major difference in the structure design is the increased length of the crossed tube to be used in the version 2 of the PV port to accommodate the PV module of size 2m x 1 m. Thus in version 1 of the PV port system, modules of size 290 Wp (as provided by GIZ, please refer clause 2.3.6 for more details) will be installed, whereas, for version 2 (off grid), the minimum DC capacity will be 2 kWp or more.

2.1.7 The selected bidder shall consider in design of the system, compliance with all applicable building and electrical codes with a minimum of electrical losses due to wiring, fuses, switches, and inverters and ensure it meets appropriate regulatory compliance of CEA and DISCOMS.

2.1.8 Technical specifications: The detailed specification for the product is provided as Annexure E under this tender. All the components of the system should comply with the applicable technical standards as mandated by MNRE for the use of components under the Off grid/Grid connected solar scheme of MNRE.

2.2 Feasibility Analysis

2.2.1 GIZ will share the list of locations where the proposed 'PV port' systems needs to be installed across the cities of Gandhinagar and Dwarka in Gujarat.

2.2.2 The list of location would contain the address of the location, name, contact information of the nodal person and the version of the PV port proposed to be installed. The selected installer is required to carry out the feasibility analysis of the site which shall include structural, spatial, shading, electrical or any other type of feasibility required to ensure smooth and correct installation and performance at the consumer's site.

2.2.3 The selected bidder will be required to submit the feasibility report for each site as per the format provided in the Annexure F. Based on the feasibility report shared, GIZ will accord written approval for installation of PV Port systems on the feasible sites.

2.3 Procurement

2.3.1 The selected bidder shall procure / manufacture all the material / components such as PV modules, structure, batteries, inverter etc. required to build 'PV Port' as per the required technical specifications and Bills of Material as specified in Annexure E and C respectively.

2.3.2 In Annexure C, the make of the critical components is mentioned respectively based on systems previously installed by GIZ. The bidders may utilize the same make (as mentioned in BOM) or suggest suitable alternatives to reduce the cost applicable or to improve the efficiency. For version 2 (Off- Grid) system, the bidder to use an off-grid inverter and associated electronic components.

2.3.3 The bidder is required to suggest suitable alternatives in the format mentioned in Annexure C during the bid submission. The bidder must note that the make of the components mentioned by the bidder must fulfill the technical specifications and functionalities as mentioned by GIZ.

2.3.4 Bidder in case of version 2 (off- grid system), must ensure that the off- grid inverter, battery, charge controller and associated electronic fixtures are accommodated in the cavity provided in the roto-mould benches. The detailed dimensions of the roto-moulded benches are provided in Annexure M.

2.3.5 A few of the components are marked in the BOM as optional. The bidders in the price bid are required to mention the make, specifications and the price of the optional components. GIZ may later decide to install the optional components on site at the price provided by the bidder. GIZ will communicate the installation of the optional components on site to the installer in writing.

2.3.6 **Under the previous project, GIZ had procured an additional 60 [Sixty] PV modules [Technical details mentioned in Annexure L] of 290Wp each. Presently the modules are stored at a warehouse in New Delhi. The selected bidder is required to utilize these modules under this project for PV Port version 1 (grid connected) systems and will be responsible for the transit insurance, loading, transportation, unloading to the installation site. The bidder while submitting the price bid is required to consider utilizing the available PV modules, which would result in lower costs requirement.**

2.3.7 The selected bidder shall note that GIZ or its nominated expert/agency reserves the right to undertake independent inspection and test the dimension/specification/material procured/used/installed by the bidder for the assembly of PV Port systems any time at the Bidder's premises during manufacturing, assembling, transportation, installations or at the installation site before and after commissioning of the system.

2.4 Assembly and Testing of the Demonstration Project

2.4.1 The selected bidder will be required to assemble the initial 2 (two) PV Port systems under this tender at a location within the consumer premises/ manufacturer premises for demonstration and inspection. GIZ will share the version of the 'PV port' and the locations where the 2 (two) demonstration projects are proposed to be installed. The bidder shall demonstrate all the features of PV Port & Store at the site. A project report with modified drawings, specifications, list of material should be submitted at least 5 working days before the inspection date. The bidder shall arrange for permission from consumer, measurement devices, single line diagrams for testing and inspection purposes.

2.4.2 During the inspection & testing if the PV Port & Store performance is not found as per the provided specifications, the bidder shall rectify the shortcomings and shall again communicate to the designated officer of GIZ the probable date for inspection/testing. GIZ shall undertake inspection & testing of the PV Port system regarding the specifications as provided to the bidders. During such event, GIZ shall not be liable to compensate any additional cost incurred by the bidder and the bidder shall not be permitted to deviate from the time schedule it has proposed at the time of submitting the bid. A maximum of two attempts shall be provided for inspection and testing.

2.4.3 In case the system is not clearing tests and inspection after 2 attempts, the contract with the bidder shall be cancelled. Upon handover of all material of the first PV Port developed to GIZ, only 50% of the cost of 2 unit of PV Port as quoted by the successful bidder shall be provided. The second successful bidder may be asked by GIZ for developing the PV Ports with the same conditions as provided to the first bidder.

The selected bidder must present all test certificate as applicable on relevant IS / IEC standards.

2.4.4 The bidder in no way is relieved from any obligation of this tender.

2.4.5 After receiving a written approval from GIZ on the demonstrated projects, the bidder shall proceed for the procurement, manufacturing, and installations of the other remaining systems. The bidder shall note that GIZ reserves the right to undertake independent inspection regarding quality and dimensions/specifications of the PV ports at any time at the bidder's premises.

2.5 Packing

2.5.1 The successful bidder, wherever applicable shall properly pack and crate all materials in such a manner as to protect them from deterioration and damage during transportation. The successful bidder shall be responsible for all damage due to improper packing. Modules, Structure, Inverter and Batteries should be packed in separate wooden boxes. Each structure item should be safely wrapped for transportation. Only after the erection is done, all packing should be removed. The detailed shipping guidelines will be provided to the selected bidder separately.

2.5.2 At the desired location, the selected bidder shall unpack the box and install as per the installation guidelines.

2.6 Shipment

2.6.1 Only after GIZ's written go ahead for a site based on the feasibility assessment, the bidder shall initiate the shipping of the PV port. Shipping of each PV-Port shall be in coordination with the designated GIZ officer/agency.

2.6.2 The responsibility of transportation / loading / unloading / transit insurance of any component or the entire system up till the consumer's roof shall be with the selected bidder.

2.6.3 The bidder must assure that the system should be transported to the site in one lot.

2.6.4 The Bidder shall be responsible and take an Insurance Policy for transit-cum-storage-cum-erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning.

2.6.5 The Bidder shall also take insurance for Third Party Liability covering loss of human life, engineers and workmen and covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. Before commencement of the work, the Bidder will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract, Liquidation, Death, Bankruptcy etc., shall be the responsibility of bidder.

2.7 Installation

2.7.1 Based on the feasibility analysis and the receipt of the final list of sites from GIZ, the selected bidder would be required to carry out the installation activity. The bidder to ensure the PV Port Version 2 (off grid systems) are to be installed on ground in open spaces only.

2.7.2 GIZ would also share the installation procedure guide with the selected bidder. The entire system should be installed within working hours or as preferred by the consumer on a single day unless delays are caused due to the site owner and preferably on the same day on which material arrives.

2.8 Testing & Commissioning

2.8.1 GIZ shall undertake inspection & testing of the PV Port to verify the specifications as provided to the bidders in Annexure C and E. The draft testing procedures are mentioned in Annexure G.

2.8.2 The selected bidder shall intimate GIZ on completion of the installation of a PV Port plus store system by submitting the project completion report as per the format mentioned in Annexure H for each system installed. The selected bidder is required to submit the project completion reports in group of not less than 5 systems per city. GIZ on receipt of the Project Completion Reports will coordinate with the selected bidder and may undertake the inspection of the installed systems in the presence of the selected bidder.

2.8.3 During the inspection & testing if the PV Port & Store performance is not found as per the provided specifications, the bidder shall rectify the shortcomings and shall again communicate to the designated officer of GIZ the probable date for inspection/testing. GIZ shall undertake inspection & testing of the PV Port system regarding the specifications as provided to the bidders. During such event, GIZ shall not be liable to compensate any additional cost incurred by the bidder and the bidder shall not be permitted to deviate from the time schedule it has proposed at the time of submitting the bid. A maximum of two attempts shall be provided for inspection and testing.

2.8.4 In case the system is not fulfilling the tests and inspection requirements, the selected bidder will have time as per the agreed delivery schedule to rectify the shortcomings. In case the bidder fails to perform the rectifications within the time mentioned in the delivery schedule, liquidated damages as per clause 4.4.1 would apply. A second successful bidder may be asked by GIZ for developing the PV Ports with the same conditions as provided to the first bidder.

2.8.5 The selected bidder must present all test certificate as applicable on relevant IS / IEC standards.

2.8.6 The bidder in no way is relieved from any obligation of this tender.

2.8.7 The test methodology shall be as per the draft methodology proposed in Annexure G.

2.8.8 Once the PV Ports are found satisfactory by GIZ or an expert/agency appointed by GIZ, the commissioning certificate would be signed by GIZ or an expert/agency appointed by GIZ and the selected bidder as per the format mentioned in Annexure I. The commissioning certificate would also mention the commercial operation date of the respective system.

2.9 O&M and Warrantee

2.9.1 The bidder shall be responsible for Operation and Maintenance of the Solar PV Port system for a period of 1 year, during which GIZ or its designated agency will monitor the project for effective performance. The period shall start from the commercial operation date of the plant.

2.9.2 During this period, the bidder shall be responsible for supply of all spare parts as required from time to time for scheduled and preventive maintenance, major overhauling of the system, replacement of defective modules, inverters, battery etc. and maintaining common online monitoring system which contains log for operation detail, deployment of staff for continuous operations and qualified engineer for supervision of O&M work, complaint logging & its attending.

2.9.3 The bidder must also provide a detailed operation and maintenance manual specific to the installed system in English.

2.9.4 The successful bidder shall provide warranties for PV Port & Store for a period not less than 1 years.

2.9.5 After erection of the PV Port system at site, the successful bidder shall ensure satisfactory performance of the equipment for a period of 1 Year.

3 Tender Conditions

3.1 Eligibility Criteria

3.1.1 The bidder shall provide sufficient evidence to support the following criteria,

3.1.1.1 The bidder should have a minimum experience of 03 years as EPC / system integrator of solar rooftop PV power plants including the operation and maintenance. The bidder should have carried out EPC / system integration work for a cumulative of 50 kWp grid connected and 50 kWp off grid PV systems

3.1.1.2 The bidder should have an annual turnover of at least 200% of the quoted amount in the last two financial years.

3.1.1.3 The bidder should have experience in manufacturing and installing PV port systems.

3.1.1.4 It should possess the documents showing registration e.g. GST, PAN, etc. Self-attested copy of the documents should be furnished by the bidder along with the bid.

3.2 Validity of Bids

3.2.1 The bids shall be valid for a term of 60 days from the last date of submission of bids. The bids not accepting the term of validity shall be liable for rejection. The quoted price shall be firm in all respect till the completion period.

3.2.2 In exceptional circumstances, GIZ may solicit the bidder's consent for an extension of the period of validity, without any change in the quoted price. The request and the responses thereto shall be made in writing.

3.3 Preparation of Bids

3.3.1 The bidder is required to independently examine the eligibility criteria, terms & conditions and specifications of PV Port specified at the relevant section of this tender. Failure to furnish all or any of the required information will be at the risk of bidder and may result in the rejection of the bid.

3.3.2 The bids and submission of related document shall be submitted in English language. All correspondence between GIZ, bidder and other party related to the tendering process and common between GIZ and bidder shall also be in English language only.

3.3.3 The financial bids shall be submitted in Indian Rupees only in a prescribed format.

3.3.4 The bid should be submitted with proper binding of documents with no loose paper.

3.3.5 It should be signed with full name and full address should be provided along with contact details (contact number, communication address and email)

3.3.6 Any alteration or corrections shall be treated valid only if they are authenticated by full signature by the person or persons authorized to sign the bid. The bids should be free from overwriting.

3.3.7 Documents to be submitted: ***Signed and stamped***

- Covering letter as per prescribed format (Annexure A)
- Declaration on Company's letter head with complete contact details as per prescribed format (Annexure B)
- Agreement of BOM (Annexure C)
- Delivery Schedule: Total time frame required for supply of PV Ports (Annexure D)
- Agreement of Technical Specification (Annexure E)
- Price bid as per prescribed format (Annexure K)
- Filled checklist (Annexure J)
- Signed copy of the TOR

3.4 Submission of Bids:

3.4.1 One bidder / members of the consortia can submit one bid only.

3.4.2 The bids shall be complete in all respect and the bidder shall submit all the relevant documents as described under this tender. If required, GIZ may solicit in writing further information from the bidder.

3.4.3 All the documents must be duly signed by the authorized signatory and the letter must provide the following information.

- Name and designation of – Authorized Signatory
- Complete address of Company / Firm
- Email id and contact number of the Authorized signatory

3.4.4 The complete techno-commercial bid must be submitted via requested email id only marked with "Bid Offer Against Tender Number "91144656"

3.4.5 The bids received after due Date and Time will be summarily rejected.

3.4.6 The bids should reach to the office of GIZ at address on or before the closing date 30th Nov'2020. The closing time of the tender will be 00:00 of the closing date. GIZ will not be liable or responsible for postal/courier delay, if any

3.4.7 A bid once submitted shall not be permitted to be altered or amended.

3.5 Price Submission

3.5.1 The price bids for version 1 and version 2 of the PV port systems are mentioned in Annexure K separately. The bidder is required to fill both the formats and must ensure that the rate should be quoted for all the components in the prescribed formats as per Annexure – K. If the rates are quoted for partial items or versions as per the Annexure – K, the tender will be liable to be rejected summarily.

3.5.2 The price quoted should be inclusive of taxes (GST), freight, transit insurance, loading / unloading, and any such other levies/ taxes that may be applicable by appropriate authority towards delivery of material at project site specified in the scope of work of this tender document

3.5.3 The tax rates should be clearly mentioned on the Price Sheet (Annexure – K)

3.5.4 If no mention is made regarding taxes in the price bid, it will be presumed that your rate is inclusive of taxes

3.5.5 Price towards insurance and other cost should be clearly indicated. Please write NIL or inclusive, as applicable. Please DO NOT leave any column blank in the price sheet.

3.5.6 The bidder may also in a separate format mention the requirement and price of any additional components required. The bidder will submit this sheet separately during the bid submission. GIZ may decide to use the mentioned components on site at the price provided by the bidder. GIZ will communicate the installation of the additional components on site to the installer in writing

3.6 Clarification to the bidder(s)

a) The bidders must submit the bids/queries on the below mentioned email id's -

Description	Deadline	Email ID	Remarks
Per-bid Queries from Bidders	**20th Nov'20**	**Please send it to:** **sanjay.dhar@giz.de** **and** **johney.reberio@giz.de** **Mandatorily mark queries on both email id's**	**Please mention the subject line as – "QUERIES FOR TENDER** Design, engineering, procurement fabrication & Assembly, Testing, Supply, Erection, Commissioning & O&M of 40 P.V Port., REF : 91144656 *Pre-bid queries received after this deadline shall not be entertained.*
Clarifications given by GIZ	**24th Nov'20**		**The FAQ/Clarifications shall be shared with all bidders on the online portals where the tender has been made live.**
Bid Submission deadline	**30th Nov'20**	**Please send the proposal only on:** **qn_quotation@giz.de**	**Don't send the bids on any other email id apart from qn_quotation@giz.de or else the bids shall be disqualified.**

3.7 Opening of Bids

3.7.1 Bids will be opened on the next working day of last date of submission of bids by the GIZ Tender Committee (GTC).

3.7.2 There will be no public opening of the bids**.**

3.8 Evaluation of Tenders

3.8.1 The technical bids shall be evaluated following the criteria as specified under Section 3.1 and documents submitted as per Annexure C & E.

3.8.2 In case GIZ requires further clarification from the bidders, the same shall be solicited in writing and the bidders shall furnish such information within two (2) working days from the date of such communication.

3.8.3 GIZ will examine the bids to determine whether they are complete, whether the documents have been properly signed, and whether the bids are substantially responsive in confirming to all terms and conditions of the bidding documents without material, quantity and quality deviations.

3.8.4 A bid determined as substantially non-responsive will be rejected by GIZ and may not subsequently be made responsive by the bidder by correction of the non-conformity.

3.8.5 The evaluation of a bid by GIZ will exclude and not take into account any allowance for price adjustment provided in the bid.

3.8.6 The evaluation of a bid by the GIZ will take into account, in addition to the price bid, all relevant factors such as compliance with the following:

3.8.6.1 Technical specification

3.8.6.2 Acceptance to deliver the material at Project Site

3.8.6.3 All further conditions mentioned in the bidding documents

3.8.6.4 Delivery schedule offered in the bid

3.9 Acceptance of Bid

3.9.1 The final acceptance of bid, waiver of any formalities thereof, is entirely vested with GIZ, who reserves the right to accept or reject any or all of the bid in full or in part

3.9.2 GIZ would issue the letter of award only to the successful bidder.

3.9.3 GIZ will not share the evaluation result with any of the bidder. Bidders shall be informed on their request about the reasons why they were not successful. Such information shall be limited and categorized under following:

3.9.3.1 Technically not acceptable

3.9.3.2 Higher price

3.9.3.3 Incomplete bid

3.9.4 After acceptance of the bid, the bidder shall have no right to withdraw/modify its bid.

3.9.5 GIZ at its discretion may call for any additional clarification(s), document(s) from any or all the bidders during the process of evaluation of bids in short notice.

4 General Conditions

4.1 Project Site

4.1.1 The project site(s) shall mean individual location of consumer premises for delivery, installation, and O&M of PV Port across sites in the cities of Gandhinagar and Dwarka in Gujarat.

4.2 Completion Period

4.2.1 The bidder(s), after receipt of award of contract, shall execute the work with good workmanship.

4.2.2 The completion period for the entire work shall be 158 days after the award of contract. The detailed schedule is mentioned in Annexure D. The work as specified under the award of contract shall be binding on the bidder. GIZ reserves the right to extend the timeline only under special circumstances with valid and acceptable justification.

4.3 Delivery Schedule

4.3.1 The bidder shall provide the delivery schedule as per Annexure – D

4.4 Liquidated Damages and Termination of Contract

4.4.1 Except because of force majeure, if the bidder fails to perform the scope of work, to the satisfaction of GIZ, within the time period specified in the delivery schedule or within the extended time period if any, GIZ shall without prejudice to its other remedies under the contract, deduct from the contract price as liquidated damage, a sum equivalent to 1% of the price of the un-performed work/ services for each week of delay until actual completion of work, up to a maximum deduction of 10%. Once the maximum is reached GIZ may consider termination of the contract.

4.5 Delivery of Material

4.5.1 The Bidder should note that it must furnish and agree with GIZ, the delivery of the material at the project site [Annexure D]

4.5.2 The PV Ports to be delivered must be coordinated with GIZ/GIZ designated agency before the dispatch from the workshop to the consumer site.

4.6 Miscellaneous

4.6.1 At any time prior to the submission of bid, GIZ for any reason whatsoever, whether at its own motion or in response to the clarification to the prospective bidder may amend the conditions of the bid document through announcement of a notice. The responses to the clarifications of the bidders, if any, shall be made available at the respective web portals. The bidders are advised to visit the website to get the responses for their queries.

4.6.2 The bidder in no circumstances transfer its obligation or sublet the work to any other party without prior consent of GIZ

4.6.3 The bidder must refer to general terms and conditions of GIZ

Annexure A: Covering letter

Covering Letter
(To be submitted along with the Proposal/bid on company's Letter Head)

M/s …..……..
……
……
……
……

To,
The Head of Procurement
GIZ Office, 46, Paschimi Marg
Vasant Vihar, New Delhi – 110 057

Subject: Offer in response to Bid No. 91144656 (Design, engineering, procurement, fabrication & assembly, testing, packing, supply, erection, commissioning and O&M of 40 [Forty] Distributed Grid Interactive Photovoltaic Rooftop Systems (PV Port) at several locations across the cities of Gandhinagar and Dwarka in Gujarat)

Dear Sir/ Madam,

I/We the undersigned hereby offer to execute the scope of work and accordingly submit our offer in full compliance with terms & conditions of the bid.

The bid is being submitted as per the instructions mentioned in the tender documents.

(Signature of Bidder)

Name of the Contact Person	
Mobile Number	
Email Id	
Land line Number if any	
Office address	

Annexure B: Declaration by the bidder

Declaration by the bidder (to be submitted along with the bid)

I/We the undersigned (herein after referred to as manufacturer) having fully understood the nature of the work and having carefully noted design, specification, terms and conditions, etc. as mentioned in the bid document do hereby declare that,

1. All the requirements of the bid document have been understood properly and accordingly agree with all provisions of the bid document and accept all risks, responsibilities and obligations directly or indirectly connected with the performance of the bid.
2. All the relevant information with regard to proper execution of the proposed work have been understood, with respect to the proposed specifications, its intended end use, availability of required materials and labour etc.
3. Are capable of executing and completing the work as required in the bid and is financially sound to execute the scope of work as per the work execution schedule. We have sufficient experience and are competent enough to perform the contract up to the satisfaction of GIZ. We also give the assurance to execute the scope of work as per the specifications, terms and conditions on award of order.
4. We have no collusion with other bidders, any employee of GIZ or team engaged in executing the scope of work.
5. We have not been influenced by any statement or promises by any employee of GIZ or anyone from the team engaged by GIZ but only by the bid document.
6. We are familiar with all general and special laws, acts, ordinances, rules and regulations of the Municipal, District, State and Central Government that may affect the work, its performance or personnel employed therein.
7. We have never been debarred to undertake similar work by any Government undertaking/department.
8. The submitted offer shall remain valid for acceptance for 30 days from the last date of submission of bid.
9. All the information and the statements submitted with the bid are true to the best of knowledge.

(Signature of Bidder)

Name:

Seal/Stamp:

Date:

Annexure C: Bills of Material

Version 1 – Grid Connected PV Port System (Without Benches and Battery Storage)

PV-Port	Position	Quantity	**Make/ Description** Based on the previous installations undertaken by GIZ	**Make/ Description** By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ'
Electronics				
	1	6	**ACM- Enphase IQ7+ ACM Micro-Inverter**, compatible with 60-and 72 cell PV modules, 295VA Peak Power, **ACM mount**. Part Code/Model no: I*Q7PLUS-72-ACM-INT*	
	2	6	**Q-Cable** (Q Cable for 60/72 cell 1.0m portrait module pitch. Connector pitch is 1.3m. 240 Male connectors plus 2 bonus link connectors). Part Code/Model no: Q-12-10-240	
	3	6	Q- Cable DC Adaptor to MC4	
	4	2	**Q-Term** Terminator Cap for Q Cable ends. Part Code/Model no: Q-TERM-10	
	5	1	**Q-DISC-10** (Disconnect tool for Q Cable connectors, MC and Amphenol DC connectors, and AC module mount.	
	8	1	**Envoy-S Metered:** APAC, Single and multi-phase metering with 1% accuracy. 2 split-core CTs included. CT-200-SPLIT Part Code/Model no: ENV-S-WM-230	
	9	1	Outdoor Junction Box	
	10	25 m	3 wire, 16A, 220Vac outdoor Cable (real length as per requirement to connect to the electric grid	
	11	1	Earthing terminal	
	12	2	Surge protection device AC, Type 1+2 for L and N, 1Ph 275VAC	
	13	3	MCB 2 Pole 6A (MCB 2 POLE 10A BA20100C L&T) PART NO RATING CHANGED .	
	14	1	MCB 2 Pole 20A (MCB 2 POLE 20A BA20200C)	

PV-Port	Position	Quantity	Make/ Description Based on the previous installations undertaken by GIZ	Make/ Description By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ'
	15	1	DIN rail 250 mm with 2 x 60 mm spacer and 2 x M6 x 80 mm nuts and bolts	
	16	6	Cable glands	
Lightning arrestor (optional)			Lightning arrestor pole with isolated support bracket and 8 mm grounding conductor	
	17	1	Lightning arrestor D15 L29 ZG, Dehn, Nr. 110 000	
	18	1	Bracket NIRO f. Rd 8-10/Rd 16mm, Dehn, Nr. 380 029	
	19	1	Cement socket Set C45/55 17kg D337mm, Dehn, Nr. 102 002	
	20	1	Wire AlMgSi semi-flexible 8mm, dehn, Nr. 840 108	
	21	1	lightning rod D16 L2000 Al, Dehn, Nr. 104 200	
	22	1	lightning rod D16 L2000, Dehn, Nr. 103 220	
	23	1	Distance holder f.Rd 16mm L1015mm Bef.D40-60mm, Dehn, Nr. 106 228	
Solar modules				
	24	6	290 Wp high Efficiency ,L max 1676mm, W max 1004 mm Voc -39.7V max	Will be provided by GIZ. Datasheet as per annexure L
Mounting Structure				
	25	8	GI Tube D60.3 x 3.25 x 2200, hot dip galvanized + drillings see drawings	
	26	4	GI Tube D60.3 x 3.25 x 2600, hot dip galvanized + drillings see drawings	
	27	2	Lateral PV rail 2 mm GI sheet, 3000 mm; Custom made profile (see drawings)	
	28	1	Central PV rail 2 mm GI sheet, 3000 mm; Custom made profile (see drawings)	
	29	1	Central PV rail cover 2 mm GI sheet, 3000 mm; Custom made profile (see drawings)	
	30	4	Three-way tube connector 60.5 mm, TÜV certified, Article nr. 101020F	
	31	4	90deg ELBOW tube connector 60.5 mm, TÜV certified Article nr. 101006F	

PV-Port	Position	Quantity	**Make/ Description** Based on the previous installations undertaken by GIZ	**Make/ Description** By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ'
	32	4	Flexible joint tube connector 60.5 mm, TÜV certified, Article nr. 101042F	
	33	4	Flexible joint tube connector 60.5 mm, TÜV certified, Article nr. 101036F	
	34	2	Central PV rail connectors; Custom made (see drawings)	
	35	6	Nut and bolt M12 x 80	
	36	7	Nut and bolt M12 x 30	
	37	4	Tube fixing clamps with 2 screw anchors each for fixing to slab; Custom made (see drawings)	
Ballast				
	38		Pre moulded cement blocks – 75 Kg each	
Sprinkler (Optional)				
	39	1	Gardena sprinkler S80	
	40	1	Cable gland	

Version 2 – Off Grid PV Port System (With Benches and Battery Storage)

The make and description mentioned below is based on the previous installations undertaken by GIZ for PV Port Version 2 - **grid interactive** systems. The bidders are required to suggest suitable alternatives considering that the PV Port version 2 systems under this project will be installed for off-grid applications (eg: off grid inverter and associated components, provision of USB ports and AC sockets)

PV-Port	Position	Quantity	**Make/ Description** Based on the previous grid interactive installations undertaken by GIZ	**Make/ Description** By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ' or N/A when not applicable
Electronics				
	1	1	MultiPlus-II 48/3000/35-32 230V	
	2	1	BlueSolar MPPT 150/35	
	3	1	Energy Meter ET112 - 1 phase - max 100A	
	4	1	Zigbee to USB converter (ZIGBEE DRF2618A/ DTK ELECTRONICS/RS232/70*50*24mmASS300 400200)	

PV-Port	Position	Quantity	**Make/ Description** Based on the previous grid interactive installations undertaken by GIZ	**Make/ Description** By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ' or N/A when not applicable
	5	1	External Zigbee antenna	
	6	1	Zigbee to RS485 converter (ASS300400100)	
	7	1	Venus GX Colorcontrol (CCGX)	
	8	1	Wifi USB Dongle with external antenna plug	
	9	1	External Wifi antenna	
	10	1	**Alternative:** Venus GX instead of Pos. 7 **in this case the cabinet cut out for CCGX has to be omitted**	
	11	1	VE.direct cable 0.3m	
	12	1	Victron Energy RJ45 UTP Cable 0.9 m - ASS030064920	
	13	25 m	3 wire, 16A, 220Vac outdoor Cable	
	14	10 m	Red DC cable 4 mm² for PV, UV resistant, Tin-plated copper (electrolytic copper), fine wire acc. IEC 60228 Class 5	
	15	10 m	Black DC cables 4 mm², UV resistant, Tin-plated copper (electrolytic copper), fine wire acc. IEC 60228 Class 6	
	16	7	male MC4 connectors	
	17	7	female MC4 connectors	
	18	1	male MC4 split connector 2 to 1	
	19	1	female MC4 split connector 2 to 1	
	20	1	Earthing terminal	
	21	2	Surge protection device DC Typ 2 - VAL-SEC-T2-2+0-120VDC-FM-2907874	
	22	2	Surge protection device AC, Type 1+2 FOR L and N (DS250VG-300)	
	23	3	MCB 16A for grid connection, critical load and non critical load at PV-Port	
	24	1	MCB 16A switch board side	

PV-Port	Position	Quantity	**Make/ Description** Based on the previous grid interactive installations undertaken by GIZ	**Make/ Description** By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ' or N/A when not applicable
	25	1	DIN rail 250 mm with 2 x 60 mm spacer and 2 x M6 x 80 mm nuts and bolts	
	26	2	AC Mounting Sockets 16A	
	27	6	Cable glands	
		4	AC Socket and USB socket	
Lightning arrestor (optional)			Lightning arrestor pole with isolated support bracket and 8 mm grounding conductor	
	28	1	Lightning arrestor D15 L29 ZG, Dehn, Nr. 110 000	
	29	1	Bracket NIRO f. Rd 8-10/Rd 16mm, Dehn, Nr. 380 029	
	30	1	Cement socket Set C45/55 17kg D337mm, Dehn, Nr. 102 002	
	31	1	Wire AlMgSi semi-flexible 8mm, dehn, Nr. 840 108	
	32	1	lightning rod D16 L2000 Al, Dehn, Nr. 104 200	
	33	1	lightning rod D16 L2000, Dehn, Nr. 103 220	
	34	1	Distance holder f.Rd 16mm L1015mm Bef.D40-60mm, Dehn, Nr. 106 228	
Battery				
	35	6	Solar Lead Acid battery, 12V 50Ah, 5 years warranty (2.4kWh)	
	36	2 x 2m	cable set (plus and minus), 25 mm²	
	37	1	Fuse socket	
	38	1	Fuse 200A	
Solar modules				
	39	6	330Wp high Efficiency, L max 1720mm, W max 1760 mm Frame Height 38-40mm Voc - 41V max	Bidder to suggest module capacity for higher capacity considering the revised structure design.
Mounting Structure				
	40	8	GI Tube D60.3 x 3.25 x 2200, hot dip galvanized + drillings see drawings	
	41	4	GI Tube D60.3 x 3.25 x 3000, hot dip galvanized + drillings see drawings	
	42	2	Lateral PV rail 2 mm GI sheet, 3000 mm	

PV-Port	Position	Quantity	**Make/ Description** Based on the previous grid interactive installations undertaken by GIZ	**Make/ Description** By the bidder, in case the bidder foresees to use the same make as used in previous versions of PV port, please mention 'same as mentioned by GIZ' or N/A when not applicable
	43	1	Central PV rail 2 mm GI sheet, 3000 mm	
	44	1	Central PV rail cover 2 mm GI sheet, 3000 mm	
	45	4	Three way tube connector 60.5 mm, TÜV certified, Article nr. 101020F	
	46	4	90deg ELBOW tube connector 60.5 mm, TÜV certified, Article nr. 101006F	
	47	4	Flexible joint tube connector 60.5 mm, TÜV certified, Article nr. 101042F	
	48	4	Flexible joint tube connector 60.5 mm, TÜV certified, Article nr. 101036F	
	49	2	Central PV rail connectors	
	50	6	Nut and bolt M12 x 80	
	51	7	Nut and bolt M12 x 30	
Benches			**Empanlled Vendor- Opti Engineering Name of the Contact Person- Manish Naik Email Id – enquiry@optiengineering.com Phone Number - +91-9727070542**	
	52	4	Rotomoulded Bench (270L each), Polyethylen, stone look, 6mm wall thickness, Weight filled 1136 kg, with plugs for watertight sealing	
	53	1	Electronics drawer base sheet	
	54	1	Battery drawer base sheet	
	55	2	Drawer front sheet	
	56	2	Drawer back sheet	
	57	2	Drawer drip off profile	
	58	4	Threaded rod M10 x 550 mm	
	59	12	Nuts M10	
	60	4	distance holder tube 14 x 11 x 455	
Sprinkler (Optional)				
	61	1	Gardena sprinkler S80	
	62	1	Cable gland	
Tools (only for production)				
	63	1	Victron Interface MK3 - USB adapter for MultiPlus / Quattro	

Annexure D: Delivery Schedule

Overview

Sl. No	Description	Expected Plan (GIZ)	Plan Proposed by the bidder
1.	Date of Purchase Order / Award of Contract	D0 (Day 0)	
2.	Complete Assembly, testing and commissioning of All PV Ports	D0 + 158 days	

Detailed Schedule

Sl. No	Tentative Delivery Schedule	Responsibility	Expected Plan (GIZ)	Plan Proposed by the bidder (with respect to the preceding date)
1.	Date of Purchase Order / Award of Contract	GIZ	D0	NA
2.	Re- Designing the Version 2 of the PV Port (off grid) system. The bidder to submit the design/ CAD/ shop drawings for the technical officer review.	Selected Bidder	D(2) = D0 + 10 days	
3.	Approval/ comments to the design drawings shared by the selected bidder	GIZ	D(3) = D(2) +10 days	NA
4.	List of locations where the systems are proposed to be installed, the list would also indicate the locations where the 2 (two) demonstration project are to be installed.	GIZ	D(4) = D(3) + 3 days	NA
5.	Feasibility assessment of the locations shared	Selected Bidder	D(5) = D(4) + 10 days	
6.	Approval on the feasibility assessment and agreement on the list of final locations	GIZ	D(6) = D(5) +5 days	NA

7.	**Assembly of first 2 Demonstration PV Port**	**Selected Bidder**	**D(7) = D(6) +30 days**	
8.	**Testing of demonstration PV Port and providing approval (The timeline may vary because of any re-testing required)**	**GIZ/ Selected Bidder**	**D(8) = D(7) +10 days**	**NA**
9.	**Assembly of remaining PV ports on the feasible sites and submission of PCRs** **Note: The selected bidder shall start submitting the PCRs in groups of not less than 5 PV port systems per city.**	**Selected Bidder**	**D(9) = D(8) +60 days**	
10.	**Inspection and Commissioning of the PV ports**	**GIZ/ Selected Bidder**	**D(10) = D(09) +20 days**	

Name of the Supplier:

Signature & Stamp

Date

Annexure E - Design and Specifications for PV – Port

5.1 PV Modules

5.1.1 For PV Port version 1 (Grid connected) system, the bidder to utilize the 60 modules of capacity 290 Wp each as provided by GIZ. The technical datasheet is provided in annexure L.

5.1.2 The PV Port version 2 (off grid) system needs to be built for accommodating total 6 commercially available PV modules each of rated capacity greater or equal to 350 Wp.

5.1.3 The PV modules must conform to the applicable IEC / equivalent BIS Standards for PV module design qualification and type approval. Crystalline Silicon terrestrial PV modules IEC 61215 / IS14286 Equivalent IS (Under Dev.). In addition, the modules must confirm to IEC 61730 Part-2- requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS. For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701/IS 61701.

5.1.4 Identification and Traceability

Each PV module must use a RF identification tag (RFID), which must contain the following information (This can be inside or outside the laminate but must be able to withstand harsh environmental conditions):

i. Name of the manufacturer of the PV module & Solar Cells.
ii. Month & year of the manufacturing (separate for solar cells and modules).
iii. Country of origin (separately for solar cells and module)
iv. I-V curve for the module Wattage, Im, Vm and FF for the module
v. Serial No and Model No of the module.
vi. Date and year of obtaining IEC PV module qualification certificate.
vii. Name of the test lab issuing IEC certificate.
viii. Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001.

5.1.5 PV modules must be tested and approved by one of the IEC authorized test centres.

5.1.6 The module frame shall be made of corrosion resistant materials, preferably having anodized aluminium.

5.1.7 Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.

5.1.8 The bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his bid. GIZ shall allow only minor changes at the time of execution.

5.1.9 Other general requirement for the PV modules and subsystems shall be the following:

i. The rated output power of any supplied module shall have tolerance of +/- 3%.
ii. The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
iii. The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weatherproof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.

5.1.10 Warranties:

5.1.10.1 Material Warranty:

i. Material Warranty is defined as: The manufacturer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (05) years from the date of sale to the original customer ("Customer")
ii. Defects and/or failures due to manufacturing
iii. Defects and/or failures due to quality of materials
iv. Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owners sole option

5.1.10.2 Performance Warranty:

The predicted electrical degradation of power generated not exceeding 20% of the minimum rated power over the 25-year period and not more than 10% after ten years period of the full rated original output.

5.2 Array Structure

5.2.1 Hot dip galvanized MS mounting structures round/square/rectangle shall be used for mounting the modules/ panels/arrays as per the design drawings provided by GIZ or revised drawings approved by GIZ.

5.2.2 The mounting structure shall be so designed to withstand the speed of 180 km/hr. The design GIZ will provide has been certified to withstand such windspeeds. If there are changes in the design, the bidder needs to get the design (approved by GIZ) certified by recognized Lab/ Institution in this regard and submit wind loading calculation sheet.

5.2.3 No fastening arrangement such as grouting and calming is permitted to secure the installation against the specific wind speed.

5.2.4 The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall comply of latest IS 4759.

5.2.5 Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Necessary protection towards rusting need to be provided either by coating or anodization.

5.2.6 The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module.

5.2.7 The wires and cables should run inside the hollow tubes, ducts and conduits and the visibility of wires and electronic devices should be as low as possible.

5.3 **Roto-moulded Bench** (Applicable for Version 2- Off Grid PV Port System)

5.3.1 The bidder shall provide 2 benches to be placed on each side as shown in the figure above.

5.3.2 Each bench is made in two parts (sub-benches) and assembled on the roof.

5.3.3 One of the two benches contains all the electronics, inverter, batteries in a cavity which is surrounded by water. This bench comes pre-assembled with all the electronics from the factory.

5.3.4 The other bench contains only water. The water in both the benches is to be filled on site.

5.3.5 The benches are made up of UV stabilized plastics and should carry the weight of adults siting on the bench and the cavity which consists of the electronics and the batteries.

5.3.6 The electronics shall be placed over a metal plate which is further fixed in a cassette / drawer and could be easily inserted inside the cavity.

5.3.7 The benches come with a water inlet and a drain opening provided with suitable leak proof cap / corks (Plastic/Metal) which is rust free and of good quality and can last the whole life of the system.

5.3.8 The benches along with AC/ USB Socket shall have protection of IP65 or better.

5.4 Junction Boxes (JBs)

5.4.1 The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands.

5.4.2 Copper bus bars/terminal blocks housed in the junction box with suitable termination threads Conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. Provision of earthings. It should be placed at 5 feet height or above for ease of accessibility.

5.4.3 Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.

5.4.4 Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification

5.5 DC distribution board:

5.5.1 DC Distribution panel to receive the DC output from the array field.

5.5.2 DC DBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

5.6 Ac distribution panel board:

5.6.1 AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.

5.6.2 All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III.

5.6.3 The changeover switches, cabling work should be undertaken by the bidder as part of the project.

5.6.4 All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz

5.6.5 The panels shall be designed for minimum expected ambient temperature of 65 degree Celsius, 80 percent humidity and dusty weather.

5.6.6 All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.

5.6.7 Should conform to Indian Electricity Act and rules (till last amendment).

5.6.8 All the 415 AC or 230 volts devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

Variation in supply voltage	+/- 10 %
Variation in supply frequency	+/- 3 Hz

5.7 PCU/Array Size Ratio:

5.7.1 The wattage of the inverter should not be less than DC rated capacity of power plant under STC.

5.7.2 Maximum power point tracker shall be integrated in the PCU/inverter to maximize energy drawn from the array.

5.7.3 PCU/ Inverter:

i. As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter. Further the PCU shall be required to communicate with the battery / diesel generator. The PCU should be capable of supplying electricity during power outages. Inverter output should be compatible with the grid frequency. Following functionalities are desired from the PCU:

- At no point in time, PV Port & Store should supply electricity after the meter from the distribution company.
- In case batteries are full, and still there is no load, the PV should be curtailed/cutoff.
- During day time, loads are served in conjunction with grid supply. In case the loads are less than the PV supply, the PV charges batteries.
- During night time and at peak times (pre-defined), the loads are served simultaneously with both battery and grid (Peak shaving).
- During night time and at non-peak times, the loads are served with grid only
- Option to charge the batteries from the grid needs to be provided to the user.
- During the event of no supply from the grid, the inverter should isolate itself from the mains connection but continue to supply to the critical load with PV (during day time) and batteries (UPS mode)

ii. Typical technical features of the inverter shall be as follows:

- Switching devices: IGBT/MOSFET
- Control: Microprocessor /DSP
- Nominal AC output voltage and frequency: 415V, 3 Phase, 50 Hz (In case single phase inverters are offered, suitable arrangement for balancing the phases must be made.)
- Output frequency: 50 Hz
- Grid Frequency Synchronization range: + 3 Hz or more
- Ambient temperature considered: -20^{o} C to 50^{o} C
- Humidity: 95 % Non-condensing
- Protection of Enclosure: IP-20 (Minimum) for indoor.
- IP-65 (Minimum) for outdoor
- Grid Frequency Tolerance range: + 3 or more
- Grid Voltage tolerance: - 20% & + 15 %
- No-load losses: Less than 1% of rated power
- Inverter efficiency(minimum): >93%
- THD : < 3%
- PF : > 0.9

iii. PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.

iv. The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.

v. Built-in meter and data logger to monitor plant performance through external computer shall be provided.

vi. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068- 2(1,2,14,30) /Equivalent BIS Std.

vii. The charge controller (if any) / MPPT units environmental testing should qualify IEC 60068-2(1, 2, 14, 30)/Equivalent BIS std. The junction boxes/ enclosures should be IP 65(for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.

viii. The PCU/ inverters should be tested from the MNRE approved test centres / NABL /BIS /IEC accredited testing- calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

5.8 Battery Storage:

5.8.1 Solar Lead Acid battery, as per as per the relevant BIS standards & MNRE specifications can be used. Storage batteries should conform IEC 61427 / IS1651 / IS 13369 as per specifications.

5.8.2 The batteries shall be suitable for recharging by means of solar modules via incremental / open circuit regulators. The batteries shall be designed for operating in ambient temperature of site in the state of Gujarat.

5.8.3 The self-discharge of batteries shall be less than 3% per month at 20 deg. C and less than 6% per month at 30 deg. C.

5.8.4 Offered batteries shall comply to the following:

- 10% of DOD: 7200 cycles
- 50% of DOD: 3000 cycles
- 80% of DOD: 1200 cycles

5.8.5 The charge efficiency shall be more than 90 % up to 70 % state of charge. The topping up frequency shall be 12-18 months

5.9 Monitoring and communication

5.9.1 Monitoring of the system should be provided immediately after the commissioning of the plants. Preferably monitoring should be done via point to point communication between the inverter and a smart phone via an APP. The APP should be provided by the inverter supplier. Use of wifi or sim card-based communication should be used only in case the point to point communication is not feasible. The supplier should provide the data from all the systems on a single web-based platform and an APP.

5.9.2 Additional sensors / data points required to be monitored

5.10 Protections

5.10.1 The system should be provided with all necessary protections like earthing, Lightning as follows:

5.10.2 Lightning Protection

The PV Port shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc The entire space occupying PV Port & Store shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IEC 62305 standard. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

5.10.3 Surge Protection

Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and –ve terminals to earth (via Y arrangement)

5.10.4 Earthing Protection

i. The PV module structure components shall be electrically interconnected and shall be grounded.
ii. Earthing shall be done in accordance with IS 3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm2 copper, 10 mm2 aluminium or 70 mm2 hot dip galvanised steel.

Unprotected aluminium or copper-clad aluminium conductors shall not be used for final underground connections to earth electrodes.

iii. A minimum of two separate dedicated and interconnected earth electrodes must be used for the earthing of the solar PV system support structure with a total earth resistance not exceeding 5Ohm.

iv. The earth electrodes shall have a precast concrete enclosure with a removable lid for inspection and maintenance. The entire earthing system shall comprise non-corrosive components.

5.11 Cables

5.11.1 Cables of appropriate size to be used in the system shall have the following characteristics:

i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
ii. Temp. Range: –10^{o}C to +80^{o}C.
iii. Voltage rating 660/1000V
iv. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
v. Flexible
vi. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.
vii. Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified.
viii. The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25years.
ix. The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant provided by the bidder. Any change in cabling sizes if desired by the bidder/approved after citing appropriate reasons. All cable schedules/layout drawings approved prior to installation.
x. Multi Strand, Annealed high conductivity copper conductor PVC type ‘A’ pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.
xi. The size of each type of DC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 1%.
xii. The size of each type of AC cable selected shall be based on minimum voltage drop however; the maximum drop shall be limited to 2 %.

5.12 Drawings & manuals

5.12.1 Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied. Bidders shall provide complete technical data sheets for each equipment giving details of the specifications along with make/makes in their bid along with basic design of the power plant and power evacuation, synchronization along with protection equipment.

5.12.2 Approved ISI and reputed makes for equipment be used.

5.12.3 For complete electro-mechanical works, bidders shall supply complete design, details and drawings for approval to [NAME OF THE ORGANISATION]/owners before progressing with the installation work

5.13 System performance

5.13.1 The bidder shall ensure that the electrical losses in the system are not more than 10%. The bidder shall demonstrate electrical conversion efficiency of >85% (Switch of the grid, UPS load = 2kW, measure Pbat,

Declaration by the bidder:

I/ We hereby confirm that all the specification given above has been properly understood and agree to supply the PV Ports conforming to the required standard / specification.

(Signature of Bidder)

Seal/ Stamp and Date:

Annexure F – Site Feasibility Report

- Date of the Inspection:
- Name of the Installer:
- PV Port Version proposed to be installed: Version 1/2

Site details

- Site Address:
- Nodal person name and contact information
- Connected Load of the Consumer (KVA):
- Shadow free area available: Yes/ No
- Is the proposed site located in an enclosed/ guarded compound: Yes/ No
- The site is present on: Ground/ Rooftop
- Access to Site: Yes/ No
- Pictures of the Site (minimum 2) attached

Signature, Name, Designation
(Installer)

Annexure G – Sample inspection methodology and checklist

5.14 Test setup

- All material for PV Port Store is placed at the Site in the similar way as it would arrive at the house of the consumer for installation. The pre-assembled electronics should be already installed at designated place. Unpacking of individual components in front of GIZ representative is preferred but not mandatory.
- The installation should be carried out in front of GIZ representative. Water in the benches should be filled at the site.
- Any component not included / installed should be reported separately.
- All tools are available at the site for installation. A detailed list of the tools required to install the system along with photographs of each tool should be enclosed / provided prior to the test
- A detailed list of components is made available
- Preferably the installation should be carried out by two people.
- An installation manual with step by step procedure shall be provided later
- If possible, the installation should be filmed using a basic camera / phone camera stationed at an appropriate location.
- Appropriate meters / measurement devices should be installed at suitable locations to finish the electrical tests.
- Battery may be 50-60% charged.

5.15 Mechanical design

Completed	Task	Notes
Pre-installation steps / observations (for demonstration projects)		
¨	Installation is carried out by how many people?	_____
¨	List of components with details (Name, Make, dimensions, weight, material type, Certification) is matched with the components available at the installation site. Any component missing is recorded. Broad list as per TOR is enclosed in Annex 1	_____(List matched (Y/N) _____(missing components
¨	List of tools required is cross checked with the tools used for the installation	_____(List matched (Y/N)
During / After installation observations		
¨	Time required to install the system both electrically and mechanically (in hours and mins) considering that all material is available at the place of installation.	_____ (hrs)
¨	The system is physically stable and rigidly sits on the floor (yes / no)	_____
¨	The benches are stable to sit for adults in the following conditions: 1. With water filled	1. _____ 2. _____

	2. Without water filled	
¨	Basic design principles are employed	Look & Feel: Multiple assembly/collapsible: Mobility: Min and Max height below the PV Port roof: Easy access for human beings for utilizing the benches:
¨	All the components comply with standards applicable in Germany IEC/equivalent	Specify the standard for each individual component Charge controller: Battery: Inverter: Modules: Protection Devices: Others:
¨	Specify the ingress protection achieved for the critical components (Inverter/Batteries) of the system	Mention ____
¨	The bench enclosure is safe and capable for housing batteries (Lithium Ion and Lead Acid batteries)	
¨	The cabling from the bench are well established in a safe and clean manner.	
¨	The output cable route from the cube to the socket is established in a safe manner	
¨	The sprinkler system is implemented and is functional	
¨	Channeling of rain water from modules to the floor is established and tested	

5.16 ELECTRICAL SAFETY AND FUNCTIONALITY

Nomenclature

Pgrid	Power Exchange with Grid
Ppv	Output Power of PV System
Pbattery	Power Output from the battery system
Pcritical Load	Power Exchange with the UPS line
Pac Load	Power Exchange with the Heavy load line or AC loads
Load	Total Load demand
Ibat	Battery Output Current
Vbat	Battery Voltage
Iac	Grid Output Grid
Vac	Grid Output Voltage
Ipv	PV Output Current
Vpv	PV Output Voltage

For PV Port Version 1

Completed	Task	Action	Measurement/Observations
¨	***Normal Operation (Generation) till date***		
¨	***Normal Operation (Generation) for a particular day***		
¨	***Peak Power of PV Module*** *(Note: For Variation in Load i.e. increase or decrease in Load, the inverter automatically configures to produce power from both PV & Grid. In each case, it takes power from the Grid for catering the load demand.)*	Scenario 1 – Increase in Load (Load>PV output	
		Scenario 2 – Decrease in Load (Load < PV output)	
¨	***Grid Islanding*** *(Note: In case of disconnection from the Grid, the system would automatically cut off PV Output Generation)*	Scenario 1 – Normal Operation	
		Scenario 2 – Grid Islanding	

For PV Port Version 2

Completed	Task	Action	Measurement/Observations
¨	UPS operations (Islanding) For all cases: Pgrid = 0 (cut off from Grid) Pac load = 0	Start with normal operation P_{PV} = 0 Critical and non-critical loads online Open grid breaker	Check whether: Pgrid = 0 *PUMD* = 0 Pheavy load= 0 Pups > 0 Power should be taken from battery. Pbat = Pups
		Start with normal operation Pups,load > P_{PV} > 0 Open grid breaker	Pgrid =0 Pheavy load= 0 Pups > 0 Power should be taken from battery and PV. Pups = P_{PV} + Pbat

Completed	Task	Action	Measurement/Observations
		Start with normal operation P_{PV} > Pups,load > 0 Open grid breaker	Pgrid =0 Pheavy load= 0 Pups > 0 Surplus Ppv is used for charging battery Pbat
¨	No export and self-consumption testing	Consumption of the connected load is increased 3 times in steps of >500 W but stays below max output of PV port	$P_{heavyload}$ is increased. Pgrid ~ 0 (<100 W) after 1-2 minutes This proves maximizing self-consumption capability.
		Consumption of the connected load is decreased 3 times in steps of >500 W	$P_{heavyload}$ is reduced. Pgrid > 0 latest after 4 seconds This proves no export conditions. Pgrid >= 0 (<150 W) after 90 seconds This proves maximizing self-consumption capability.
		Maximize output of PV Port (~2kW) Switch off load of 2 kW	$P_{heavyload}$ is reduced. Pgrid > 0 latest after 4 seconds This proves no export conditions.
¨	Line Protection (alleviate MCB blinding)	Case 1- Increase load to 5kW (21 A) (to be determined based on MCB rating used) with no Ppv port supply	MCB should trip
		Case 2 – Connect PV port and increase load to 5kW	MCB doesn't trip
		Case 3 – Connect Pv Port with controller	Ppv port should reduce and MCB trips off
¨	Peak shaving is demonstrated (day & night) (Serving of loads in parallel to grid/mains availability is tested)	Ppv = 0 Set the peak shaving time for few minutes ahead and demonstrate peak shaving from the battery	$P_{heavyloads}$ >0 P_{Li}>0
¨	Battery charging by Grid/mains power is demonstration	Ppv = 0	P_{bat} charging >0
¨	Electrical conversion efficiency	Switch off the grid Pups =2kW Measure Pbat, Ppv, P	

Completed	Task	Action	Measurement/Observations
¨	Controllability of charging and discharging of the battery for DISCOMs is proven		Uploading a load characteristic for peaks shaving possible?
¨	All aspects related to safety of lives are tested		List the protection devices employed and their functionality test Surge protection: Overcurrent protection: (Others)_____:
¨	Electrical performance monitoring concept is established and demonstrated		Is mobile APP established: Yes/no Performance: Specific yield measurement: Yes/no Energy from PV: Energy from Grid: PV curtailed:
¨	Remote monitoring is established, and details shared		
¨	Point to Point communication protocol between the phone APP and the inverter is demonstrated		
¨	Established and demonstrated the metering of electricity yield by Solar in AC		

5.17 Documentation (relevant copies are handed over to giz)

Completed	Task	Notes
¨	Manufacturer warranties for replacement in case of defect or malfunctioning of any component shall be passed to GIZ	
¨	Mechanical and electrical drawings - CAD/CAM drawings for fabricated components and entire system including associated electrical drawings	
¨	Technical specifications (including material, dimensions, standards and other details) of the individual components used in building the prototype	
¨	Testing reports for Safety, design qualification, performance	

Completed	Task	Notes
¨	Installation guide – a specification booklet with detailed instructions in graphical/pictorial manner for assembling, installing, commissioning and maintenance of the system	
¨	List of tools required to install the system	
¨	Others _____	

Annexure H – Project Completion Report

- Name of the Installer:
- PV Port Version Installed: Version 1/2
- Site Address:
- Nodal person name and contact information:
- Brief specifications of the components

Sr. No	Component	Make	Quantity
	Modules		
	Inverter and associated electronics		
	Mounting Structure		
	Battery and associated accessories		
	Benches		
	Junction Boxes		
	Cables		
	Surge Protection Device		
	Lightning Arrestor		
	Others		

- Date of Installation Completion:
- Pictures of the site (min 2), attached

Signature, Name, Designation
(Installer)

Annexure I – Joint Inspection Report

Certified that the PV Port SPV Rooftop System Version [1/2] has been installed and quality inspected according to the BOM and technical specifications at the site _____ on dd/mm/yyyy (Date) in the presence of Installer. The system is as per IES/BIS standard specifications according to BOM. The plug n play grid interactive system has been inspected and checked for its performance and it is working satisfactorily.

Place:
Date:

Signature, Name, Designation
(Installer)

Signature, Name, Designation
(German Cooperation - GIZ)

Annexure J : Document Submissions

Document Submission

1. Checklist

Bidder should confirm that following documents has been submitted along with the bid.

Sl. No	Documents	Yes	No
1.	Covering letter as per prescribed format (Annexure A)		
2.	Declaration on Company's letter head with complete contact details as per prescribed format (Annexure B)		
3.	Agreement of BOM (Annexure C) Signed and stamped		
4.	Agreement of Technical Specification (Annexure E) Signed and stamped		
5.	Price bid as per prescribed format (Annexure K)		
6.	Delivery Schedule: Total time frame required for supply of PV Ports (Annexure D)		
7.	Filled checklist (Annexure J)		
8.	Further documents required as per section 2 below		
9.	Signed copy of the TOR		

2. Bidders to provide following information and need to attach documentary evidence in support of each of them

Sl. No	Description	Relevant document to be submitted	Documents Submitted	
			Yes	No
1.	Minimum experience of 03 years as EPC / system integrator of solar rooftop PV power plants.	- Certificate of Incorporation or any other document for registration or partnership deed - 3 or more years old Purchase orders / Work contracts / commissioning certificates of solar rooftop PV plants in the name of the bidder		
2.	The bidder should have carried out EPC / system integration work for a cumulative of 50 kWp grid connected and 50 kWp off grid PV systems.	Project completion certificates for a cumulative of a cumulative of 50 kWp grid connected and 50 kWp off grid PV systems.		

3.	The bidder should have experience in manufacturing and installing PV port systems.	Relevant documents		
4.	Annual turnover of at least 200% of the quoted amount in the last two financial years.	Copy of audited statement by CA.		
5.	It should possess the documents showing registration e.g. GST, PAN, etc. Self-attested copy of the documents should be furnished by the bidder along with the bid.	Copy of Pan card Copy of GST number		

Signature of the bidder

Name:

Seal / Stamp

Annexure K: Price bid submission

The price bids for version 1 and version 2 of the PV port systems are attached separately. The bidder is required to fill both the formats and must ensure that the rate should be quoted for all the components in the prescribed formats. If the rates are quoted for partial items or versions, the tender will be liable to be rejected summarily.

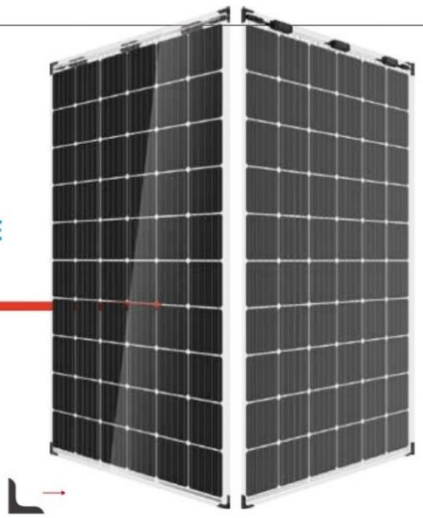
Annexure L: Datasheet of PV module available with GIZ for utilization.

Mono Multi Solutions

THE

DUOMAX twin

BIFACIAL DUAL GLASS 60-CELL MODULE



60 CELL
MONOCRYSTALLINE MODULE

290-310W
POWER OUTPUT RANGE

18.6%
MAXIMUM EFFICIENCY

0~+5W
POSITIVE POWER TOLERANCE

As a leading global manufacturer of next generation photovoltaic products, we believe close cooperation with our partners is critical to success. With local presence around the globe, Trina is able to provide exceptional service to each customer in each market and supplement our innovative, reliable products with the backing of Trina as a strong, bankable partner. We are committed to building strategic, mutually beneficial collaboration with installers, developers, distributors and other partners as the backbone of our shared success in driving Smart Energy Together.

Comprehensive Products And System Certificates

IEC61215/IEC61730/UL1703/IEC61701/IEC62716
ISO 9001: Quality Management System
ISO 14001: Environmental Management System
ISO14064: Greenhouse gases Emissions Verification
OHSAS 18001: Occupation Health and Safety Management System

Trinasolar

High power output
- Increased total power output through generation from front and back side
- Backside power gain up to 25% depending on albedo
- Unique J-box design and installation method to avoid shading on the back side

Low LCOE
- Maximize limited space, savings in BOS and labour cost
- Higher power from same installation footprint as standard modules

Wide application
- Deployable for ground mounted utility, greenhouse and agricultural projects
- Special application like sound barriers on expressways
- Compatible with major tracker systems

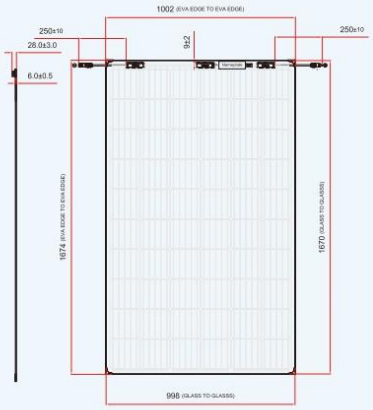
Environmental conditions
- Resistant to sand, acid, alkaline

Trina Solar's DUOMAX-Twin Linear Performance Warranty

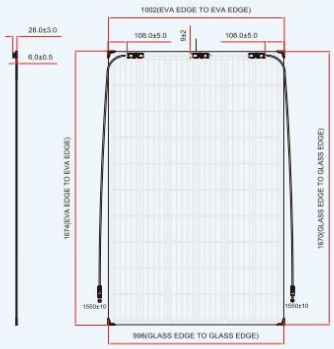
DUOMAX twin

BIFACIAL DUAL GLASS 60-CELL MODULE

PRODUCTS	INSTALLATION METHODS	POWER RANGE
TSM-DEG5C.07(II)	CLAMP	290-310W

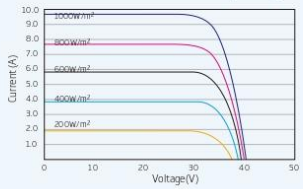


Back View (Portrait)

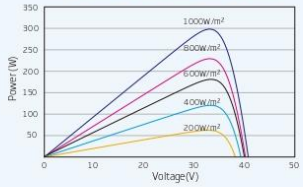


Back View (Landscape)

I-V CURVES OF PV MODULE(300W)



P-V CURVES OF PV MODULE(300W)



ELECTRICAL DATA (STC)

Peak Power Watts-P_{MAX} (Wp)*	290	295	300	305	310
Power Output Tolerance-P_{MAX} (W)			0 ~ +5		
Maximum Power Voltage-V_{MPP} (V)	32.7	32.9	33.1	33.3	33.5
Maximum Power Current-I_{MPP} (A)	8.87	8.97	9.07	9.16	9.26
Open Circuit Voltage-V_{OC} (V)	39.7	39.9	40.1	40.3	40.5
Short Circuit Current-I_{SC} (A)	9.48	9.58	9.68	9.78	9.88
Module Efficiency η_m (%)	17.4	17.7	18.0	18.3	18.6

STC: Irradiance 1000W/m², Cell Temperature 25℃, Air Mass AM1.5.
*Measurement tolerance: ±3%.

BI-FACIAL OUTPUT - Backside Power Gain

10%	Power Output(W)	319	325	330	336	341
	Module Efficiency(%)	19.1	19.5	19.8	20.1	20.5
15%	Power Output(W)	334	339	345	351	357
	Module Efficiency(%)	20.0	20.4	20.7	21.0	21.4
25%	Power Output(W)	363	369	375	381	387
	Module Efficiency(%)	21.8	22.1	22.5	22.9	23.3

ELECTRICAL DATA (NOCT)

Maximum Power-P_{MAX} (Wp)	215	219	222	226	230
Maximum Power Voltage-V_{MPP} (V)	30.3	30.5	30.6	30.8	31.0
Maximum Power Current-I_{MPP} (A)	7.09	7.17	7.25	7.32	7.40
Open Circuit Voltage-V_{OC} (V)	37.5	37.7	37.9	38.1	38.3
Short Circuit Current-I_{SC} (A)	7.66	7.74	7.82	7.90	7.98

NOCT: Irradiance at 800W/m², Ambient Temperature 20℃, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline 156.75 × 156.75 mm (6 inches)
Cell Orientation	60 cells (6 × 10)
Module Dimensions	1670 × 998 × 6 mm , 1674 × 1002 × 6 mm with edge banding 1676 × 1004 × 7.6 mm with corner protector(Std)*
Weight	23.5 kg (51.8 lb)
Front Glass	2.5 mm (0.10 inches), High Transmission, AR Coated Heat Strengthened Glass
EVA	Transparent
Back Glass	2.5 mm (0.10 inches), High Transmission,low iron ,Heat Strengthened Glass
Frame	Frameless
J-Box	IP 67 or IP 68 rated
Cables	Photovoltaic Technology Cable 4.0 mm² (0.006 inches²) Portrait: 250/250 mm, Landscape: 1550/1550 mm
Connector	UTX/MC4 EVO2**

*Not apply to slide-in solution project. **Please refer to regional datasheet for specified connector.

TEMPERATURE RATINGS

NOCT(Nominal Operating Cell Temperature)	44°C (±2°C)
Temperature Coefficient of P_{MAX}	- 0.39%/°C
Temperature Coefficient of V_{OC}	- 0.29%/°C
Temperature Coefficient of I_{SC}	0.05%/°C

MAXIMUM RATINGS

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC (IEC) 1000V DC (UL)
Max Series Fuse Rating	20A

(DO NOT connect Fuse in Combiner Box with two or more strings in parallel connection)

WARRANTY

10 year Product Workmanship Warranty
30 year Linear Power Warranty
(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 30 pieces
Modules per 40' container: 780 pieces

MORE OPTIONS

Installation Methods	☐ Add frame

Trinasolar

CAUTION: READ SAFETY AND INSTALLATION INSTRUCTIONS BEFORE USING THE PRODUCT.

Version number: TSM_EN_2017_B
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Annexure M: PV Port Manufacturing Documents

Annexure M is divided into the following documents and attached separately.

- Annexure M1 – Manufacturing documents for the structure to be used in the version 1 (grid connected) PV Port systems.
- Annexure M2 – Manufacturing documents for the structure to be used in the version 2 (off- grid) PV Port systems.
- Annexure M3 – Manufacturing documents for the rotomould benches to be used in the version 2 (off- grid) PV Port systems.

Annexure N: PV Port fixing methods

Separate document enclosed with the tender document