DAKSHIN HARYANA BIJLI VITRAN NIGAM

Sales Circular No. D-06/2020

From

Chief Engineer /Commercial,
DHBVN Hisar.

To

All CEs/SEs/XENs/SDOs/OP,
JEs-I, Incharge Sub office, in DHBVN.

Memo No. Ch-06/SE/C/R-16/67/06/2018/Vol-II
Dated: 28**/03/2020**

Subject:- Guidelines for implementation of MNRE Phase-II of Grid Connected Rooftop Solar (RTS) Programme.

I. **Introduction**

As you are aware that Solar Programmes (subsidized/non subsidized) in the State are being implemented through Deptt. of NRE and HAREDA and DISCOMs are limited to providing net metering connections only. However, Govt. of India has now decided that DISCOMs shall come at forefront and become the nodal agencies for implementation of Phase-II of GCRTS Programme which has been launched through Ministry of New and Renewable Energy, GoI with a vision to promote grid connected Rooftop Solar in the country.

i) Component-A of the programme envisages setting up of 4,000 MW (in country) of Grid Connected Rooftop Solar Programme in the residential sector with Central Financial Assistance (CFA) (subsidy). CFA is provided for the household owner and Group Housing Societies to set-up RTS on the Rooftop of their residence/residential complex which shall be provided through MNRE to DISCOMs for further disbursement which is detailed hereinafter.

ii) Operational guidelines issued by MNRE, in this regard, are attached herewith as Annexure-I which be gone through minutely

II. **Central Financial Assistance (CFA)**

Component-A of the Phase II of Grid Connected Rooftop Solar Programme is only applicable to residential sector and Group Housing Societies/Residential Welfare Associations with CFA for installation of Grid Connected Rooftop Solar Power Plant of the capacity 1 kWp to 500 kWp. The residential sector users may install RTS plant of even higher capacity as per their requirement and as per net metering regulation. However, the

CFA shall be limited for the first 10 kWp capacity only for individual residential sector users. For GHS and RWA the CFA shall be limited upto 500 kW RTS capacity for common utilities @10 kWp per house. The solar power system may be installed mainly on the roof of a residential building or GHS and RWA having an active residential power connection and would also include installations on open contiguous land within the premises.

The applicable Central Financial Assistance (CFA) shall be as follows:

Type of residential sector* **	**Subsidy (as percentage of benchmark cost or cost discovered through competitive process whichever is lower)**
Maximum up to 3 kW capacity	40 % of benchmark cost**
Above 3 kW capacity and up to 10 kW capacity*	40 % up to 3 kW plus 20% for RTS system above 3 kW and up to 10 kW
Group Housing Societies / Residential Welfare Associations (GHS/RWA) etc. for common facilities up to 500 kWp @ 10 kWp per house), with the upper limit being inclusive of individual rooftop plants already installed by individual residents in that GHS/RWA at the time of installation of RTS for common activity.	20% of benchmark cost

The CFA will be based on the scheme guidelines of Ministry of New and Renewable Energy (MNRE) which are amended from time to time.

* The residential sector users may install RTS plant of even higher capacity as provisioned by respective HERC Regulations; however, the subsidy will be limited up to 10 kWp capacity of RTS plant.

** The subsidy shall be on benchmark cost of MNRE or lowest of the costs discovered in the tenders floated by DISCOMs, whichever is lower (may change without notice- Benchmark cost at the time of installation of system will apply).

*** No CFA will be admissible for consumers other than residential sector.

III. Empanelment of Agencies

To implement the programme in DHBVN, UHBVN has empanelled the firms and for both utilities discovered rates through open competitive tendering. The list of empanelled firms, their eligible category and discovered rates are as under: -

i) Category: - 1 kWp to 10 kWp

Sr. No.	Name of Firm	Unit rate in Rs/ (inclusive of all taxes) Category (1 to 10 kWp)
1	M/s Nexa Solar Private Limited Karnal	Rs.45.78 (Rupees Forty Five and Seventy Eight paisa only)
2	M/s Xpanz Energy Solutions LLP Noida	
3	M/s Sungrid Electric Pvt. Ltd Gurugram	
4	M/s Rodex Solar Energy Pvt. Ltd Gurugram	
5	M/s Sach Collection Point Gurugram	
6	M/s Fidus Energy Gurugram	
7	M/s Sun Switch India Pvt. Limited Gurugram	
8	M/s Verde Solaire Private limited Noida	
9	M/s Maven Solar Private Ltd. Rohtak	
10	M/s Shri Mahavir Enterprises Rohtak	
11	M/s Oneindig Technologies Pvt Ltd New Delhi	
12	M/s JK Solar Private Limited Gurugram	
13	M/s ZunRoof Tech Private Limited Gurugram	
14	M/s ARC RENEWABLES PVT LTD. Gurugram	

ii) (Category :- Above 10 kWp to 100 kWp

Sr. No.	Name of Firm	Unit rate in Rs/ (inclusive of all taxes) Category (Above 10 to 100 kWp)
1	M/s Sun Switch India Pvt. Limited Gurugram	Rs. 41.00 (Rupees Forty One only)
2	M/s Xpanz Energy Solutions LLP Noida	
3	M/s Oakridge Energy Pvt. Ltd Noida	
4	M/s Ritika Systems Pvt Limited Noida	
5	M/s Fidus Energy Gurugram	
6	M/s ARC RENEWABLES PVT LTD Gurugram	

iii) Category Above 100 kWp to 500 kWp

Sr. No.	Name of Firm	Unit rate in Rs/Wp (inclusive of all taxes) Category (Above 100 l to 500 kWp)
1	M/s Sun Switch India Pvt. Limited Gurugram	Rs.36.95 (Rupees Thirty Six and Ninety Five paisa only)
2	M/s Fidus Energy Gurugram	
3	M/s Oakridge Energy Pvt. Ltd Noida	
4	M/s Xpanz Energy Solutions LLP Noida	
5	M/s Neochlorus Energy Solutions Pvt Ltd. Gurugrarn	

The CFA shall be admissible only if, consumer installs RTS plants on residential/GHS premises through these empanelled firms.

i) The main terms and conditions of the tender documents are attached

herewith as **Annexure-II.**

ii) Technical Specifications of the RTS plants are attached as **Annexure-III.**

iii) The benchmark cost of MNRE for FY 2019-20 and cost discovered through competitive bidding by DHBVN is as under: -

Project capacity	**Benchmark cost of MNRE for FY 2019-20 (Rs/Wp)**	**Cost discovered through competitive bidding (Rs/Wp)**
1 kWp to 10 kW	54	45.78
Above 10 kWp to 100 KW	48	41.00
Above 100 kWp to 500 kW	45	36.95

"The eligible subsidy shall be based on the benchmark cost of MNRE or lowest of the costs discovered in the tenders, whichever is lower (May change without notice- Benchmark cost at the time of installation of system will apply)."

IV. Use of Indigenous manufactured Solar Panels (both cells and modules) (Mandatory Condition)

The CFA for residential sector as stated above shall be permissible only if domestic manufactured Solar Panels (using domestic manufactured solar cells and modules) are used by the beneficiary. Further, the same should be approved by MNRE.

i) It is the responsibility of SDO 'OP' to obtain a Certificate **(As per Annexure-IV)** from the empanelled firm for every RTS system installed which is issued by the Manufacturer on its letter head certifying that the Modules supplied with system (with Sr. Nos.) are domestically manufactured in which domestic manufactured solar cells are used. This certificate shall be re-checked by XEN before approving/releasing subsidy to the vendor.

ii) If at any stage, it is found that the firm has misused the policy of using domestic manufactured solar PV Cells and Modules by way of mis-declaration and imported solar cells and modules have been used instead of domestic then following action shall be taken against the firm: -

a) Filing of criminal case under IPC 420 and related sections.

b) Immediate intimation to CE/Commercial, DHBVN for following actions:-

i) Blacklisting for a period of 10 years.

ii) Forfeiting of relevant Bank Guarantees.

iii) Immediate de-empanelment.

V. **Payment by customer and release of CFA**

The beneficiary will have the option of installing RTS system through any of these empanelled vendors at net of CFA amount i.e., making payment to vendors after deducting the eligible CFA amount. The vendor will claim the CFA from the Nigam. It is reiterated that CFA for residential sector as stated above shall be permissible only if domestic manufactured Solar Panels (using domestic manufactured solar cells and modules) are used by the beneficiary. However, CFA will be limited up to 20%/40% (as the case may be) of the project cost mentioned above.

i) The CFA will be released by the Nigam to the empanelled vendor through XEN(OP) concerned directly into the account of vendor through RTGS after commissioning and inspection of RTS plant.

VI. Implementation procedure.

i) The applicant/user interested to install RTS plants shall apply and submit the requisite documents/details/fees on the DHBVN website www.dhbvn.org.in.

ii) The entire process of receiving proposals, processing them and giving approvals are IT enabled. For this purpose, user id's and passwords for XENs (OP) and SDOs(OP).have been created by SE/IT, DHBVN, Hisar.

iii) After the site verification and checking of technical feasibility by RTS cell and sanction of the project by Executive Engineer (XEN/OP), letter of approval will be issued to the applicants / consumer. Thereafter, Consumer will install the RTS of approved capacity, which shall not exceed the sanctioned load. The CFA, however, shall only be admissible for capacity upto 10 kW for residential consumer and upto 500 kW for GHS and RWA.

iv) List of documents are as under: -

- ID proof - Aadhar Card and PAN No. 'Mobile Number
- Residential/Address proof - Aadhar Card or any other document if address differs from the Aadhar Card.
- Land ownership proof

- Site photo
- Self photo
- Copy of last paid electricity bill
- Name of the empanelled firm

v) Metering: The metering shall be provided as per HERC RTS Net Metering Regulations.

vi) **Other than residential sector:** CFA will not be available for other categories i.e., institutional, educational, social, government, commercial and industrial sectors.

vii) A separate RTS Cell at each Divisional level headed by Executive Engineer has been created, Respective SDO shall act as Nodal Officer for implementation of the RTS Project in his area. The other members of the RTS Cell are as under: -

a) Junior Engineer of the sub-division

b) Lower Divisional Clerk

c) Data Entry Operator

viii) For efficient and smooth implementation of the programme, it should be ensured that all necessary approvals/connectivity be provided in time bound manner detailed herein below:

Activity	**Responsibility**	**Timeline (Max. working days)**
Submission of application online on DHBVN website along with token fee of Rs. 1000/-	Consumer	Zero date
Acknowledgement of the application by DISCOM	SDO/JE	Same day
Site verification/technical feasibility/ estimate and issuance of letter of approval / termination	SDO/JE	10
In principle Approval for CFA, if eligible. Aadhar seeding of the beneficiary and handing over/ mailing of metering /agreement form to consumer	Executive Engineer (XEN)	10
Execution of metering agreement	SDO and consumer	5

Installation of RTS System, submit work completion report/certificate and intimation of meter procurement if not provided by DISCOMs	Empanelled vendor and Consumer	30-90 (depending upon the capacity)
Inspection by Chief Electrical Inspector (CEI/Chartered Engineer (if, application)*	CEI/Chartered Engineer (if applicable)	15
Issuance of Safety Certificate	CEI/Chartered Engineer (if applicable)	5
Inspection by DISCOMs installation of meter & commissioning and synchronization of the system with grid.	SDO	15 (after CEI approval, if required or after submission of the completion report if CEI inspection not required)
Submission of Project Completion Report (PCR)	Vendor/ Consumer	10
Inspection for release of CEA	SDO/JE	7-10
Release of CFA to vendor after Aadhar authentication of the consumer and after receipt of subsidy from MNRE	XEN	30
Billing process	JE	30 days (after synchronization with Grid)

*No. inspection of CEI/ Chartered Electrical Safety Engineer is required for a capacity upto 100 KVA as per Sales Circular No. D-36/2017.

**Max Time required for the whole process: 75 to 150 days (2.5 to 5 months) after the consumer submits his request.

***Payment of CFA to the vendor by DISCOM can be made from the advance receive from MNRE. MNRE will release advance/ subsequent payment within 21 days receipt of request from the DISCOM with requisite papers.

ix) Joint Inspection by CEI (if applicable) and DISCOM can reduce the timeline substantially. If DISCOM has no stock of meters, Consumer shall purchase the same upon intimation by DISCOM. Inspection dates to be provided within 7 days by CEI (if applicable) and DISCOM from the date of receipt of request for inspection sent by Consumer.

x) The officers of DHBVN or MNRE officials or designated agency may inspect the ongoing installation or installed plants. In case the systems are not as per standards

non-functional on account of poor quality of installation, or no compliance of AMC, DHBVN/MNRE reserves the right to blacklist the vendor. Blacklisting may inter-alia include the following: -

a) The Vendor/Firm will not be eligible to participate in tenders for Government supported projects).

b) In case, the concerned Director(s) of the firm/company joins another existing or starts/ joins a new firm/company, the company will automatically be blacklisted.

VII. **Warranty Period**

i) The Solar power projects shall be warranted for five years after the date of commissioning of the project for replacement in case of any manufacturing, operation failure, non-performance as per design standards.

ii) The PV module(s) shall be warranted for its performance for a minimum period of 25 years from the date of commissioning of the project. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

iii) The Warranty Card to be supplied to the beneficiary/consumer with the system must contain the details of the system. The bidder will have to furnish a warranty certificate of the system.

VIII. SDO 'OP' shall ensure that the warranty certificate as per Annexure-V is provided by the empanelled firm to the consumer.

The above instructions may be brought to the notice of all concerned for careful and meticulous compliance with immediate effect.

DA/As above

Superintending Engineer /Commercial
For Chief Engineer /Commercial,
DHBVN, Hisar.

ANNEXURE-I

No. 318/331/2017-Grid Connected Rooftop
Government of India
Ministry of New and Renewable Energy
***

Block no. 14, CGO Complex,
Lodi Road, New Delhi.
Dated 20th August 2019

Office Memorandum

Subject: Operational Guidelines for implementation of Phase - II of Grid Connected Rooftop Solar Programme for achieving cumulative capacity of 40,000 MW from Rooftop Solar (RTS) Projects by the year 2022

This refers Ministry's Order No 318/331/2017-GCRT Division dated 8th March 2019 vide which sanction was issued for launch of Phase - II of Grid Connected Rooftop Solar Programme for achieving cumulative capacity of 40,000 MW from Rooftop Solar (RTS) Projects by the year 2022 covering following components: -

(i) Component- A: Setting up of 4000 MW of Grid Connected Rooftop plants in residential sector with Central Financial Assistance (CFA)

(ii) Component- B: Incentives to Discoms based on achievement for installing additional grid connected rooftop capacity in all sectors over and above the base level, with the incentive being limited to the first additional 18000 MW of rooftop capacity added in the country. Achievement above this level will not be eligible for any incentive.

2. The Operational Guidelines for implementation of Phase II of the Grid Connected Rooftop Solar Programme programme are enclosed.

3. This issues with the approval of Competent Authority.

20/8/19

(Aujender Singh)
Deputy Secretary to the Govt. of India

To,

1. All central Ministries and Departments
2. ACS/Principal Secretaries/Secretaries (Renewable Energy/Energy/Power) of States/UTs
3. DISCOMs/ State Nodal Agencies of all States/UTs
4. Principal Director of Audit, Scientific Audit-II, DGACR Building, I.P. Estate, Delhi
5. Pay and Account Officer, MNRE, New Delhi

Copy to:

1. PS to Hon'ble Minister of State (I/C) for Power, NRE and Skill Development and Entrepreneurship
2. PPS to Secretary/AS/AS&FA, MNRE
3. All Advisers & Group Heads
4. Director(NIC) to upload this on the Ministry's website
5. Sanction folder

20/8/19

(Aujender Singh)
Deputy Secretary to the Govt. of India

Guidelines on implementation of Phase – II of Grid Connected Rooftop Solar Programme for achieving 40 GW capacity from Rooftop Solar by the year 2022

1.0 Background

1.1 As a part of Intended Nationally Determined Contributions (INDCs), India has committed to increase the share of installed capacity of electric power from non-fossil-fuel sources to 40% by 2030. Solar energy is one of the main source to accomplish the target of 40% of electric power from non-fossil-fuel. Government of India has set the target of achieving 100 GW of solar power capacity in the country by the year 2022 of which 40 GW to be achieved from rooftop solar (RTS).

1.2 The rooftop solar (RTS) plant is a system installed mainly on the roof of a building and includes installations on open contiguous land within the area of premises wherein valid and live electricity connection has been provided by the concern Distribution utilities/companies (DISCOMS). Typically, 1(one) kWp RTS plant requires about 10 sq. m area. The Solar power so generated can then be used either for captive consumption of the premises or can be fed into the grid and be adjusted in the electricity bill. Net-metering regulations notified by respective State Electricity Regulatory Commissions (SERCs) provide a legal framework for such adjustment. RTS plants help DISCOMs in reducing transmission and distribution losses as power consumption and generation are co-located. These Plants are also useful in tackling day time peak load as solar generation profile matches such peak loads during the day.

1.3 The Government, on 30th December 2015, approved a program 'Grid Connected Rooftop and Small Solar Power Plants Programme' for installation of 4,200 MW RTS plants in the country by year 2019-20, of which 2,100 MW was through CFA and balance 2,100 MW was without CFA. The RTS projects sanctioned under this Program are under implementation by State Nodal Agencies (SNA's), Solar Energy Corporation of India (SECI), Public Sector Undertakings (PSUs) and other Government Agencies (GAs).

2.0 The Government, on 19th February 2019 approved Phase-II of 'Grid Connected Rooftop and Small Solar Power Plants Programme' for achieving cumulative capacity of 40 GW RTS plants by 2022. In Phase-II, it has been decided to implement the programme by making the DISCOMs and its local offices as the nodal points for implementation of the RTS programme. DISCOMs will play a key role in expansion of RTS as DISCOMs are having a direct contact with end user and they provide approval for installation, manage the distribution network and also have billing interface with rooftop owner.

3 Aim and Objectives of Phase-II of Grid Connected Rooftop Solar Programme

The key objectives of the programme are:

a. To promote grid connected RTS in all consumer segments, viz., residential, institutional, social, Govt., commercial, industrial etc.
b. To bring DISCOMs at forefront as key drivers for rapid deployment of RTS.
c. To create awareness, capacity building, human resource development, etc.
d. To promote sustainable business models.
e. To create additional RTS capacity of 38000 MW in the country by 31.12.2022 out of which a capacity of 4000 MW in residential sector with Central Financial Assistance and 34000 MW in other sectors (i.e., Social, Government, educational, PSUs,

Statutory /Autonomous bodies, Private Commercial, Industrial Sectors etc.) by suitably incentivizing DISCOMs

f. To promote domestic manufacturing of solar cells and module

4 Strategy

The programme will be implemented through DISCOMs. This will lead to ease of access for the consumers. The programme provides for Central Financial Assistance (CFA) for the household owner and Group Housing Societies to set up RTS on the rooftop of their residence/residential campus. DISCOMs should create customer friendly environment by making enabling provisions in their regulations and smooth approval process required for RTS. Since the requisite expertise on solar energy for implementation of this Programme may not be available with DISCOMs, they will be at liberty to use the services of State Nodal Agencies (SNAs) engaged in the promotion of Renewable Energy of the respective States/UTs.

5. Implementation arrangement

The following major issues have been identified during the Phase-I of RTS programme: -

- Multiple tenders by different agencies and subsequently considerable delay in tendering.
- Involvement of multiple stakeholder viz. SNAs, DISCOMs, PSUs, Developers etc.
- Lack of uniform regulation/mandatory notification for rooftop solar
- Lack of uniform regulations.
- Lack of awareness among the prospective beneficiaries.

To address the above issues, and especially the fact that the consumer had to approach multiple agencies for getting a RTS plant installed, it has been decided to implement the programme by making the DISCOMs and its local offices as the nodal points for implementation of the RTS programme. The major components of this phase II of the programme are: -

- Component A: Setting up of 4000 MW of grid connected rooftop solar projects in residential sector with Central Financial Assistance (CFA)
- Component B: Incentives to Electricity Distribution Companies (DISCOMs) based on achievement towards initial 18000 MW of grid connected rooftop solar plants

5.1.1 Component A: Setting up of 4000 MW of grid connected rooftop solar projects in residential sector with Central Financial Assistance (CFA): In most of the States/UTs the residential sector enjoys benefit of subsidized electricity; therefore, beneficiaries of this sector would not be inclined to adopt rooftop solar until some capital CFA mechanism is put in place to reduce the cost of rooftop solar. Further, considering the fact that lower consumption slab pays lower tariff and vice versa, the CFA for RTS is also required to be restructured.

5.1.2 The CFA has been restructured and higher CFA up to 40 % will be given for RTS systems up to 3 kW capacity. For RTS systems of capacity above 3 kW and up to 10 kW, the CFA of 40% would be applicable only for the first 3 kW capacity and for capacity above 3 kW the CFA would be limited to 20 %. The residential sectors users may install RTS plant of

even higher capacity as per their requirement and the respective SERC regulation; however, the CFA would be limited for first 10 kWp capacity RTS plant as mentioned above.

5.1.3 For Group Housing Societies/Residential Welfare Associations (GHS/RWA) CFA will be limited to 20% for installation of RTS plant for supply of power to common facilities. The capacity eligible for CFA for GHS/ RWA will be limited to 10 kWp per house and total not more than 500 kWp, inclusive of RTS already installed on individual houses in that GHS/ RWA at the time of installation of RTS for common activity.

5.1.4 For the purpose of this component of the programme, Residential RTS plant would be the solar power system installed mainly on the roof of a residential building having an active residential power connection from the local DISCOM, and would also include installations on open contiguous land within the premises of the Residential building. The CFA pattern for the residential sector will be as follows: -

Type of residential sector	CFA (as percentage of benchmark cost or cost discovered through competitive process whichever is lower)
Residential sector (maximum up to 3 kW capacity)	40 % of benchmark cost**
Residential sector (above 3 kW capacity and up to 10 kW capacity)*	40 % up to 3 KW Plus 20% for RTS system above 3 kW and up to 10 kW
Group Housing Societies/Residential Welfare Associations (GHS/RWA) etc. for common facilities up to 500 kWp (@ 10 kWp per house), with the upper limit being inclusive of individual rooftop plants already installed by individual residents in that GHS/RWA at the time of installation of RTS for common activity.	20 %

**The residential sector users may install RTS plant of even higher capacity as provisioned by respective State electricity regulations; however, the CFA will be limited up to 10 kWp capacity of RTS plant.*

*** Benchmark cost may be different in General Category States/UTs and Special Category States/UTs i.e., North Eastern States including Sikkim, Uttarakhand, Himachal Pradesh, Jammu & Kashmir, Lakshadweep, and Andaman & Nicobar Islands. CFA shall be on benchmark cost of MNRE for the state/ UT or lowest of the costs discovered in the tenders for that state/ UT, whichever is lower*

5.1.5 MNRE will allocate capacity for installation of RTS System in residential sector by DISCOMS in the ensuing year. One of the parameters for allocating the capacity will be the demand raised by the DISCOM and capacity required for fulfilment of solar RPO of the State as notified by Ministry of Power. For this, DISCOMs will be required to submit yearly online proposal, in MNRE's SPIN portal (www.solarrooftop.gov.in) by the month of March. However, for the Year 2019-20, the DISCOMs shall be permitted to submit proposals in MNRE's SPIN portal within one month from the date of publication of these operational guidelines. Further, MNRE may ask for demand from DISCOMs directly to the Ministry, instead of going through the SPIN portal. In addition, preference would be given to

States/UTs who provide an additional subsidy/benefit over and above the CFA being given by the Central Government.

5.1.6 The implementing agency i.e. Discoms or its authorised agency shall invite Expression of Interest for empanelment of agencies for supply, installation, testing & commissioning of RTS system in residential premises. To ensure quality and post installation services only manufacturers of solar panels and system integrators fulfilling pre-determined technical and financial criteria would be allowed to participate in the bidding process. The selected bidders shall follow the quality control orders and standards for all components of RTS system and its installation procedure, if any, issued by MNRE from time to time. All the bidders within the price bracket of (L1 + X% of L1) shall be empanelled. The digit "X" may be decided by the agency and should be clearly indicated while inviting Expression of Interest. The digit "X" shall not be more than 25. Further, if total no. of empanelled agencies are found to be less than 5 in the acceptable band, then the DISCOM may also include those agencies who fall in L1+(X+5)% of L1, provided they agree to match L1.

5.1.7 The beneficiary will have option of installing RTS system through any of these empanelled vendors at net of CFA amount i.e. making payment to the vendors after deducting the eligible CFA amount. The vendor will claim the CFA from the implementing agency. The CFA for residential sector as stated above shall be permissible only if domestic manufactured Solar Panels (using domestic manufactured Solar cells) are used by the beneficiary. However, CFA will be limited up to 20% / 40% (as the case may be) of the benchmark cost of RTS system as defined by MNRE from time to time or the rate discovered through transparent bidding by the implementing agency, whichever is lower. In case of RESCO model the benefit of the CFA should be passed on to the customer in the form of reduced tariff by factoring in the CFA through competitive process. Provisions of GFR shall be applicable for projects where Ministry is providing financial support.

5.1.8 The Implementing agency or Ministry officials or designated agency may inspect the ongoing installation or installed plants. In case the systems are not as per standards, non-functional on account of poor quality of installation, or non-compliance of AMC, the implementing agency/Ministry reserves the right to blacklist the vendor. Blacklisting may inter-alia include the following: -

a. The Vendor/Firm will not be eligible to participate in tenders for Government supported projects.

b. In case, the concerned Director(s) of the firm/company joins another existing or starts/ joins a new firm/company, the company will automatically be blacklisted.

5.1.9 The participating Government owned DISCOMs will be eligible to avail advance CFA up to 30% of the total CFA amount for the project. For private DISCOMs, CFA will be disbursed on reimbursement basis. However, if required private DISCOMS will be eligible to avail advance CFA upon submission of bank guarantee of an equivalent amount. More details on release of CFA slabs is given in para 11 of these guidelines. For settlement of project account, the implementing agency will have to submit the UC, Audited SoE, project completion certificate and online Project Completion reports in SPIN portal of MNRE. Implementing Agency will get service charges @ 3% of eligible CFA for implementing the programme for the various tasks as detailed in para 10 of these Guidelines. The service charges will be given only after completion of the project. The fund allocated in the

programme under the capacity building head would be retained by MNRE and would be utilized for carrying out capacity building activities only.

5.1.10 The beneficiary interested to install RTS plants will submit their application online or to the local office of the concerned DISCOM wherever the Online Portal is not developed, DISCOM will assist the consumer in all the activities related to sanction of CFA and commissioning and connectivity of the RTS plants through transparently enlisted vendors/manufacture/system integrators.

5.1.11 The entire process of receiving proposals, processing them and giving approvals would be IT enabled except in those DISCOMs where the Online Portal is not developed. Such DISCOMs shall avail the services of multilateral agencies nominated for each State for development of Online Portal for them during 2019-20. The SPIN portal will be made available to the DISCOMs to aggregate/register the demand of consumers in their operational area.

5.1.12 The consumer will pay only the balance amount, after excluding CFA portion, to the empanelled vendor. The CFA will be released through DISCOMs to the empanelled vendor after commissioning and inspection of RTS plant. DISCOMs shall adhere to the suggestive timelines for all such processes as defined in Annexure and ensure strict compliance of the same.

5.1.13 **Other than residential sector:** CFA will not be available for other categories i.e. institutional, educational, social, government, commercial and industrial sectors as the beneficiaries in these sectors are high tariff paying consumers and adoption of solar would be economically beneficial for them even without CFA. The power generated through RTS plant would result in significant reduction of the electricity bill paid by them to the DISCOMs, hence making it an economically viable solution. Although CFA is not admissible for non-residential sectors, the DISCOMs will be incentivized for addition of RTS capacity in these sectors too as described under para 5.2 below.

5.1.14 The capacity eligible for incentive to DISCOMs would cover the entire RTS capacity installed including the capacity installed without CFA and with CFA. DISCOMs are required to create enabling ecosystem for all such customers. DISCOMs shall notify guidelines for providing time bound approvals/connectivity. The various forms/formats/procedures, required for project implementation, shall be standardised by MNRE in consultation with Stakeholders.

5.1.15 **Method of metering:** While almost all States have approved regulations of net metering, for the purpose of this programme, the States may follow the metering method prescribed in the Tariff policy or as approved by the respective Electricity Regulator.

5.2 Component B: Incentives to Electricity Distribution Companies (DISCOMs) based on achievement towards initial 18000 MW of grid connected rooftop solar plants

5.2.1 Since DISCOMs are required to incur additional expenditure for implementation of programme in terms of additional man-power, creating infrastructure, capacity building, awareness, etc., these will be compensated by providing performance linked incentives. The incentives may be provided for each MWp capacity of solar rooftop, added by them in their distribution area over and above 10% of **base capacity installed at the end of previous**

year. However, such incentives will not be applicable with retrospective effect. These incentives will be provided to enable DISCOMs to create an enabling ecosystem for expeditious implementation of RTS projects in their area.

5.2.2 The tasks taken by DISCOMs shall include but not be limited to providing dedicated manpower for RTS implementation, rooftop assessment, bid process management to empanel system integrators along with rates, technical studies, up gradation in ERP system/components, providing time bound services to RTS consumers, inspection and online monitoring of RTS plants, online database management of commissioned capacity, consumer awareness and publicity, ensuring availability of net-meters, providing grid connectivity, capacity building of its officers/staff etc.

5.2.3 The DISCOMs will submit the cumulative capacity of grid connected RTS plants (in MWp) installed in their distribution area as on 31st March 2019. **This will be taken as the installed base capacity** for the first year of participating DISCOMs.

5.2.4 The incentives will be given on incremental RTS capacity installed by the DISCOMs in their distribution area from the installed base capacity (at the end of previous financial year) within the time line of 12 months (financial year-wise, i.e. 01.04.2019 to 31.03.2020 and so on till the duration of the programme). The incentive pattern would be a progressive one with higher incentive rates for higher levels of achievement. This is elaborated in the following table: -

S. No.	Parameter	Incentive to be Provided
1.	For installed capacity achieved above 10 % and up to 15 % over and above of the installed base capacity* within a financial year	5% of the applicable cost** for capacity achieved above 10 % of the installed base capacity
2.	For installed capacity achieved beyond 15 % over and above of the installed base capacity* within one financial year	5% of the applicable cost** for capacity achieved above 10 % and up to 15 % of the installed base capacity PLUS 10 % of the applicable cost** for capacity achieved beyond 15 % of the installed base capacity

**Installed base capacity shall mean the cumulative RTS capacity installed within the jurisdiction of DISCOM at the end of previous financial year. This will include total RTS capacity installed under residential, Institutional, Social, Govt., PSU, Statutory/ Autonomous bodies, Private Commercial, Industrial Sectors etc.*

*** Applicable Cost is the applicable benchmark cost of MNRE for the state/ UT for mid-range RTS capacity of above 10 kW and upto 100 kW or lowest of the costs discovered in the tenders for that state/ UT in that year, whichever is lower*

5.2.5 The incentive mechanism has been illustrated in the following table

Discoms	Installed base capacity (MW)	Achievement under programme (MW)	Percentage Achievement of installed base capacity (%)	Capacity eligible for 5% incentives (MW)	Capacity eligible for 10% incentives (MW)
A	100 MW	10 MW	10%	Nil	Nil
B	100 MW	12 MW	12%	2 MW	Nil
C	100 MW	20 MW	20%	5 MW	5 MW
D	100 MW	30 MW	30%	5 MW	15 MW

Note: The capacity eligible for incentives by DISCOMs would cover the entire capacity installed including the capacity installed without CFA and with CFA

5.2.6 The Incentives to the DISCOMs would be available only for the addition of initial 18000 MW RTS capacity in the country after launch of this programme. In case, higher capacity is achieved by the DISCOMs leading to entitlement for higher incentive slab of 10%, the total incentives to the DISCOMs would be limited to the financial outlay available for incentive under the programme, irrespective of the total capacity achieved under the programme by any particular DISCOM.

5.2.7 As the incentives are proposed for various reasons mentioned in 5.2.1 and 5.2.2, the above incentives proposed may not be a part of Tariff Determination & Tariff Rationalisation process of SERC /JERC.

6.0 Technology

6.1 The solar photovoltaic technology (including all forms of photo voltaic) based RTS projects for generation of electricity will be deployed under the Programme. Project proponents to adhere to the national/ international standards specified by MNRE from time to time. For subsidized projects (i.e. for residential projects detailed in para 5.1 above) only indigenously manufactured PV panels (both cells and modules) should be used.

6.2 Grid interactive SPV power plants, inverters, meters, cables, mounting structures and other balance of systems etc. should have the minimal technical requirements and quality control standards as prescribed by MNRE from time to time. The mechanical structures, electrical works including power conditioners/inverters/charge controllers/maximum power point tracker units/distribution boards/digital meters/switch gear/net-meters/storage batteries, etc. and over all workmanship of the RTS plants/ systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 5 years. Fulfilment of the warranty obligations of the complete Solar system shall rest with System integrator who in turn may claim the same from the component manufacturers.

6.3 Online monitoring system shall be provided by DISCOMs to ensure satisfactory functioning of all the RTS plants**.**

7 Management

7.1 The primarily responsibility of monitoring and reporting will be with the implementing agencies i.e. DISCOMs and they may carryout 3rd party inspection through National Monitors/Consultants, for ground verification/performance evaluation on random basis.

7.2 MNRE will hold regular review meetings to assess the implementation of the programme. MNRE will also do the physical sample inspection of the installed RTS plants for which CFA or Incentive has been claimed by the DISCOMs. Sample Inspection may be done by the officials of MNRE or any other designed Central Government agency.

7.3 The Ministry has developed the SPIN portal for uploading all details of RTS projects. Key features of installed plants, including geographical location, latitude- longitude, installed capacity, name & contact details of developer, project cost, etc. shall be uploaded by DISCOMs on this Portal. Ministry has also initiated process for geo-tagging of these projects with assistance of ISRO. Implementation Agencies have to submit progress reports from time to time to MNRE through SPIN.

8 Roles and responsibilities of stakeholders

8.1 Ministry of New and Renewable Energy: -

i. MNRE shall allocate capacity for the ensuing year to different DISCOMs on the basis of demand, capacity required for fulfilment of solar RPO, any additional subsidy/benefit being given by the State/UT over and above the CFA being given by the Central Government, performance of the State/UT/DISCOM in the past, etc.
ii. MNRE will release funds to the DISCOMs for disbursement of CFA to the vendors installing RTS plant in the residential sector.
iii. The participating Government owned DISCOMs may avail advance CFA of up to 30% of the total CFA amount for the project. For private DISCOMs, CFA will be disbursed on reimbursement basis. CFA would be released on reimbursement basis for the capacity installed from time to time without any need to wait for the entire sanctioned capacity. Funds may be released on receipt of Project Installation Reports in prescribed formats on SPIN portal.
iv. MNRE will release eligible incentive to the DISCOMs based on their performance in the last financial year.
v. MNRE will do the physical sample inspection of the installed RTS plants for which CFA or Incentive has been claimed by the DISCOMs. Sample inspection may be done by the officials of MNRE or any other designed Central Government agency.
vi. To provide necessary assistance to DISCOMs in respect of Portal development and its integration with SPIN portal of MNRE, capacity building of DISCOM officials, updation of billing software, etc., if so, required by them.
vii. Undertake capacity building and public awareness campaigns through print and electronic media.

8.2 **DISCOMs:**

i. Create a RTS cell at each Division level headed by the Executive Engineer and the respective Sub-Divisional Officer shall act as nodal officer for implementation of RTS projects in his operational area.

ii. Develop dedicated online portal for grid connected RTS projects. This portal shall be integrated with MNRE SPIN portal for which assistance may be provided by MNRE to respective DISCOMs.

iii. Empanelment of agencies for design, supply, installation, testing & commissioning of RTS system in residential premises lying under their jurisdiction as described in Paragraph 5.1.6 above by floating of Expression of Interest either itself or through a designated agency

iv. Notify time bound procedure for implementation of the programme.

v. Notify cost of metering arrangements, related connectivity components and other charges and ensure availability of appropriate meters.

vi. No CEIG inspection is required for RTS plants up to 500 kVA capacity.

vii. Undertake capacity building programs for DISCOM officers for RTS projects on regular basis.

viii. Undertake consumer awareness campaigns through print and electronic media, developed guidebook/handbook.

ix. Inclusion of appropriate metering settlement in ERP system and billing software.

x. Develop time bound grievance redressal mechanism.

xi. Submit the cumulative capacity of grid connected RTS plants (in MWp) installed in their distribution area first time as on 31st March 2019 and thereafter on 31st March every year for calculating the applicable incentive payable to them by MNRE.

xii. DISCOM will take utmost care so that there is minimum loss of solar power due to grid failure during daytime or from any other reasons within their jurisdiction.

xiii. The project commissioning timeline for the residential sector shall be fifteen months from the date of sanction from MNRE. For this, the implementing agencies may specify a cut-off date after which no project would be allocated so as to allow sufficient time for completion of already allocated projects. Benchmark cost prevailing at the time of commissioning of the project shall be applicable for calculation of CFA. The implementing agencies shall inform MNRE regarding capacity commissioned within stipulated timeline and submit documents to the Ministry within 45 days of completion of project time line. After 45 days, deduction of service charges at the rate of Rs. 1000/- per day would be levied on the project. In case the submission of project documents is delayed by more than 90 days from the date of completion timeline/last day of financial year, no service charges would be provided for the said project.

8.3 Empaneled Vendors for supply and installation of RTS projects

i. Install RTS plant within the timeframe decided by the DISCOMs.

ii. For projects covered under CFA, only indigenously manufactured PV panels (both cells and modules) should be used.

iii. Vendors for supply and installation of the RTS shall establish a service centre in each District. In case if it is not economically viable for an individual vendor then Group of vendors can establish service centre in each District. Their contact details will be made available on the website of the DISCOMs.

iv. These service centres have to provide services to the RTS owners within the timelines decided by the DISCOMs, free of cost for first five years (Warranty period) of commissioning of the RTS. Non-performing/Under-performing PV Panels will be replaced free of cost in the warranty period. Non-compliance of the service standards by the vendor will make it ineligible for future work orders by the Government.

9. Business models

Various business models in accordance with the prevailing legal framework are covered under the programme such as CAPEX, RESCO, rent a roof/lease model, community model, utility model, through a SPV having share of Utility, plug-in RTS model and any other model as specified by respective State Govt. Policy/Regulations. RTS systems with or without battery storage are covered under the programme.

In addition, hybrid systems, e.g., solar rooftop PV- wind hybrid, solar rooftop PV- solar thermal hybrid, solar rooftop PV- biomass hybrid etc. are also covered for which the capacity of the PV modules installed on rooftop of buildings within the campus will be considered for CFA/incentive calculations. However, this won't be applicable for cases wherein the developer/implementing agency has availed the CFA for solar module from the other components viz. wind, biomass etc.

10. Capacity building/awareness activities:

An amount of Rs. 66 Crore (i.e. 1 % of the amount allocated for CFA sector) has been allocated under the programme for capacity building /awareness activities. This fund will be retained by MNRE for promoting capacity building activities. These activities can be implemented directly by MNRE and/or in coordination with implementing agencies. The implementing agency (DISCOM) will submit detailed proposal /communication plans towards various activities for conducting such capacity building/awareness activities for consumers. Funds will be released in three phases, i.e., up to 40 % in advance and balance up to 60 % after completion of the activities, submission of activity reports, utilization certificates and audited statement of expenditure. DISCOM may be at liberty to use the existing infrastructure of State Nodal Agencies of Renewable Energy of the respective States/UTs (SNAs) for the same. The admissible CFA for conducting the capacity building programme e.g. National, International or State level by the implementing agency may be restricted as per the norms set by the I&PA/HRD Division.Any advance to private DISCOM will be released after submission of bank guarantee of requisite amount.

11. Service charges:

An amount of Rs. 198 Crore (i.e. 3 % of the amount allocated for CFA sector) has been allocated under the programme towards the service charges of the programme. The service charges will essentially cover but not be limited to the following: -

- demand aggregation activities,
- creation of working RTS cell in DISCOM
- bid process management
- implementation
- availability and streamlining the process of net-metering /billing
- inspection, monitoring, development of online portal
- training of DISCOM officials
- awareness programs for proliferation of rooftop solar PV projects
- creation and operating project management cell in MNRE etc.

DISCOMs may also utilize existing infrastructure of SNAs or may also implement the program through SNAs. In such cases, service charges may be appropriately divided between

the two agencies. However, projects would be sanctioned to DISCOMs only and SNA would be acting as the supporting agencies for DISCOMs. This service charge may also be used for 3rd party verification of the projects by MNRE or its designated agency (say State Nodal Agencies/ Govt. departments/PSUs/DISCOMs etc.) wherever required.

12. Pattern of release of CFA/incentives: -

	Advance	2nd instalment	3rd Instalment
Release of CFA in residential sector	30 % of CFA* After issuance of work order /empanelment of system integrators	30 % of CFA* after completion of 30% of the sanctioned capacity, submission of online project completion report and utilisation certificates etc.	Balance 40 % after completion of sanctioned capacity in the sanctioned timeline, submission of online PCR, UC, Audited SoE, Project Completion Certificates etc.
Incentives	Eligible incentives after submission of achievement details, i.e. Cumulative achievement (in MW) in the preceding FY ending Capacity of the RTS system installed the FY 2019-20,2020-21, 2021-2022 along with list of projects in SPIN portal along with Undertaking on project completion and sample inspection by 3rd party		

* CFA will be calculated @ 20% of benchmark cost or cost discovered through tender whichever is lower for the purpose of advance to DISCOMs

13. **Suggestive expectation from State Governments**

- RTS capacity be permitted up to 100% of connected load
- Distribution Transfer (DT) capacity be increased to avoid denial of permission for setting up RTS on this ground
- Mandating installation of rooftop solar projects on Government buildings and new residential buildings
- Banking of solar power may be permitted for 12 months without any banking charges
- Monitoring of sanctioned RTS capacity and expedite commissioning of the allotted capacity
- Timely and correctly submission of project proposals and project commissioning reports for timely release of funds

14. Interpretation of the Guidelines

14.1 In case of any ambiguity in interpretation of any of the provisions of these Guidelines, the decision of MNRE shall be final.

14.2 The Guidelines may be reviewed from time to time based on the experience gained from the implementation of the programme and necessary modifications would be incorporated after getting approval of Minister, NRE.

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Annexure-II

Terms and Conditions:

1. Eligible Central Financial Assistance

The MNRE will provide subsidy up to 40 % for RTS systems up to 3 kW capacity. For RTS systems of capacity above 3 kW and up to 10 kW, the subsidy of 40% would be applicable only for the first 3 kW capacity and for capacity above 3 kW the subsidy would be limited to 20 %. The residential sectors users may install RTS plant of even higher capacity as per their requirement and the respective SERC regulation; however, the subsidy would be limited for first 10 kWp capacity RTS plant as mentioned above.

For Group Housing Societies/Residential Welfare Associations (GHS/RWA) subsidy will be limited to 20% for installation of RTS plant for supply of power to common facilities. The capacity eligible for subsidy for GHS/ RWA will be limited to 10 kWp per house and total not more than 500 kWp, inclusive of RTS already installed on individual houses in that GHS/ RWA at the time of installation of RTS for common activity.

The Residential RTS plant would be the solar power system installed mainly on the roof of a residential building having an active residential power connection from the local DISCOM, and would also include installations on open contiguous land within the premises of the Residential building. The subsidy pattern for the residential sector will be as follows: -

Type of residential sector	**Subsidy (as percentage of benchmark cost or cost discovered through competitive process whichever is lower)**
Residential sector (maximum up to 3 kW capacity)	40 % of benchmark cost**
Residential sector (above 3 kW capacity and up to 10 kW capacity)*	40 % up to 3 KW Plus 20% for RTS system above 3 kW and up to 10 kW
Group Housing Societies/Residential Welfare Associations (GHS/RWA) etc. for common facilities up to 500 kWp (@ 10 kWp per house), with the upper limit being inclusive of individual rooftop plants already installed by individual residents in that GHS/RWA at the time of installation of RTS for common activity	20% of benchmark cost

** The residential sector users may install RTS plant of even higher capacity as provisioned by HERC; however, the subsidy will be limited up to 10 kWp capacity of RTS plant.*

*** The subsidy shall be on benchmark cost of MNRE for the state/ UT or lowest of the costs discovered in the tenders for that state/ UT, whichever is lower (May change without notice- Benchmark cost at the time of installation of system will apply)*

The CFA will be based on the scheme guidelines of Ministry of New and Renewable Energy (MNRE) which are amended from time to time.

Only domestic manufactured Solar Panels with domestic manufactured Solar cells are to be used in the system.

Certificate (As per Annexure-IV) from Manufacturer on its letter head certifying that the Modules supplied with system (with Sr. Nos.) are domestic manufactured solar modules in which domestic manufactured solar cells are used shall be provided.

If at any stage it is found that you have misused the policy of using domestic manufactured solar PV Cells and Modules by way of mis-declaration and imported

solar cells and modules have been used instead of domestic then following action shall be taken against your firm: -

1. Filing of criminal case under IPC 420 and related sections.
2. Blacklisting for a period of 10 years.
3. Forfeiting of relevant Bank Guarantees.
4. Immediate de-empanelment.

2. Scope of Work

a) Scope of work covers Design, Supply, Installation, Testing, Commissioning and five years comprehensive warranty Maintenance and Operation of Grid Connected SPV Rooftop Plant under Net Metering without battery or with the battery backup for 1 hour of the connected load as per the technical specification given in this bid.
b) Wiring upto Distribution Board from the SPV Rooftop system will be in the scope of the successful bidder(s). The maximum cable length of 25m for every solar power plant installed shall be in the scope of the bidder and supply of excess cable length if required shall be provided by consumer/beneficiary.
c) Performance testing of the complete system.
d) The empanelled installer will collect firm work order from the UHBVN/DHBVN. A copy of Work Order, Invoice, Commissioning report Statement of Expenditure, Joint Inspection Report, Net Metering Work Completion & Synchronization reports, installed system photographs, beneficiary photo, aadhar card, mobile no & Electricity bill and bill of material has to be submitted to UHBVN/DHBVN for release of CFA of MNRE.
e) The empanelled firm shall undertake to supply spares free of cost for the maintenance of the offered items during the warranty period.
f) A leaflet containing the details of operation and the service centres shall be provided to each purchaser as well as to UHBVN/DHBVN.
g) If the operation or use of the system proves to be unsatisfactory during the warranty period, the installer shall replace the faulty ones or carry out necessary repairs as per the warranty terms and conditions.
h) The empanelled firm shall do necessary coordination with concerned office of UHBVN/DHBVN for providing tested metering equipment to the consumers. However the cost of bi-directional meter, CT/PT shall applicable as approved by the HERC from time to time.
i) The empanelled firm shall Install RTS plant within the specified timeframe, as per guidelines specified by the Nigam**.**
j) For projects covered under Central Financial Assistance (CFA), only indigenously manufactured PV panels (both cells and modules) should be used.
k) Vendors for supply and installation of the RTS shall establish a service centre in each District. In case if it is not economically viable for an individual vendor then Group of vendors can establish service centre in each District. Their contact details will be made available on the website of UHBVN and DHBVN.
l) These service centres have to provide services to the RTS owners within the timelines decided by the UHBVN/DHBVN, free of cost for first five years (Warranty period) of commissioning of the RTS. Non-performing/Under-performing PV Panels will be replaced free of cost in the warranty period. Non-compliance of the service standards by the vendor will make it ineligible for future work orders by the Government/MNRE.
m) The empanelled firm shall not claim any subsidy / incentive directly from MNRE / any other organization for the projects sanctioned by New & Renewable Energy Department, Haryana. An undertaking to this effect has to be submitted with each subsidy claim. UHBVN/DHBVN shall submit the all subsidy claim details to MNRE, GOI.
n) The Solar Photo Voltaic (SPV) power plants should be supplied, installed & commissioned by the companies as per latest specifications given in technical

specifications which comply with the MNRE, GOI Guidelines. Following parts for each SPV projects are mainly required to be supplied.

i) SPV Module of capacity of Minimum 250Wp (with 60 cells) for plant capacity upto 10 kWp and Minimum 300 Wp (with 72 cells) for plant capacity above 10 kWp.
ii) Inverter equivalent to the plant capacity.
iii) PVC insulated Copper cables as per BIS Codes for AC & DC inter connections.
iv) Junction Boxes with Surge Protection Device (SPD).
v) Structure for solar PV project (i) Aluminum / MS Hot Dipped Galvanized
vi) AC Distribution Box with SPD and MCB/MCCB, Uni-directional solar meter and necessary protection as per CEA rules and safety regulations.
vii) Lightening arrestor.
viii) Earthing as per BIS/ISI standards required for the SPV Power Plant.
ix) Earthing as per BIS/ISI standards required for inverter/ Power Conditioning Unit (PCU)
x) Remote monitoring system from 10 kWp and above.
xi) O&M manual and warranty card in English/Hindi Language.
xii) Any other part as per site requirement.
xiii) The Supplier will help the user in all respect such as apply of application online, electrical inspection etc. till installation of Solar Generation meter and Bi-Directional Meter.

o) **Metering:** The existing service connection meter needs to be replaced with a bidirectional (import kWh and export kWh) service connection meter for the purpose of net-metering for eligible categories. Installation of the net meter will be carried out by UHBVN/DHBVN. Beneficiary will submit application to UHBVN/DHBVN to enable the connectivity of Solar rooftops with Grid and to avail net metering benefits. The beneficiaries can also purchase the Net meter from market and get it install by the UHBVN/DHBVN.

3. Requirements for Compulsory Registration of Solar Photovoltaic Modules and Solar Cell Manufacturers with MNRE

a) The Ministry of New & Renewable Energy has issued Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order Dated 02.01.2019. The effective dates for operationalizing of Approved list of Model Manufacturers for Solar PV Modules and Cells would be from 31.03.2020.
b) As per the MNRE order, only the models and manufacturers included in ALMM Lists (of solar PV Cells and Modules) will be eligible for use in Government/ Government assisted Projects/ Projects under Government Schemes & Programmes, to be implemented in the country, including Projects set-up for sale of electricity to Government under *"Guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Solar PV Power Projects dated 03.08.2017 and the amendments thereof".* The word "Government" shall include Central Government, State Governments, Central Public Sector Enterprises, State Public Sector Enterprises and, Central and State Organizations/ Autonomous bodies.
c) You shall ensure compliance to the MNRE notification no 283/54/2018-GRID SOLAR and its amendment from time to time.

4. Other Terms and Conditions

a) The empanelled firm shall follow the quality control orders and standards for all components of RTS system and its installation procedure, if any, issued by MNRE/UHBVN from time to time.

The beneficiary will have option of installing RTS system through any of the empanelled vendors at net of subsidy amount i.e. making payment to the

vendors after deducting the eligible CFA amount. The vendor will claim the CFA from the UHBVN/DHBVN. The CFA for residential sector as stated above shall be permissible only if domestic manufactured Solar Panels (using domestic manufactured Solar cells) are used by the beneficiary. However, subsidy will be limited up to 20% / 40% (as the case may be) of the benchmark cost of RTS system as defined by MNRE from time to time or the rate discovered through transparent bidding by the UHBVN, whichever is lower.

The subsidy of the pre-sanctioned projects will be released through UHBVN/DHBVN to the empanelled vendor after commissioning and inspection of RTS plant on availability from Government.

The payment to the supplier is to be made by the user on the mutual agreed terms and conditions between user and the supplier after deduction of eligible subsidy. UHBVN/DHBVN will not be responsible for any dispute between user & supplier regarding payment. However, the CFA, if sanctioned by UHBVN/DHBVN prior to installation, shall be released to the vendor only after the commissioning of the project in all respect as per guidelines.

b) The Implementing agency or Ministry officials or designated agency may inspect the ongoing installation or installed plants. In case the systems are not as per standards, non-functional on account of poor quality of installation, or non-compliance of AMC, the Ministry/NRE/UHBVN reserves the right to blacklist the vendor. Blacklisting may inter-alia include the following: -

   i. The Vendor/Firm will not be eligible to participate in tenders for Government supported projects.
   ii. In case, the concerned Director(s) of the firm/company joins another existing or starts/ joins a new firm/company, the company will automatically be blacklisted.

c) The beneficiary interested to install RTS plants will submit their application online and after sanction of the application, applicant may install the system through enlisted vendors/manufacture/system integrators. Only the system which have been installed as per guidelines issued by UHBVN/MNRE and as per Technical Specifications will qualify for CFA. The system shall be installed within time line mentioned in the sanction letter issued to the applicant.

d) The entire process of receiving proposals, processing them and giving approvals would be IT enabled.

e) The consumer will pay only the balance amount, after excluding CFA portion, to the empanelled vendor. The CFA will be released through UHBVNL/DHBVN to the empanelled vendor after commissioning and inspection of RTS plant.

f) While releasing any RTS connections to the consumer, all the guidelines of HERC Net Metering Regulations shall be adhered to.

5. Security Deposit

a) The empanelled firm shall arrange to furnish performance bank guarantee equal to Rs.10 lac for each DISCOM (UHBVN and DHBVN separately in the O/o CE/Comml., UHBVN/DHBVN) with validity up to 90 days after expiry of warranty period, i.e. defect liability period, within 15 days from the date of issue of detailed letter of empanelment failing which:-

   i. No CFA shall be released to the firm. This amount shall be released after submission of BG.

   ii. Further penalty @0.35% per week or part thereof subject to maximum of 2% of the value of the Bank Guarantee if the bank guarantee not submitted within 15 days from the date of issue of letter of empanelment.

   iii. In case BG is not submitted within 45 days from the issue of letter of empanelment by CE Commercial, UHBVN the employer reserves the right to withdraw the letter of empanelment in addition to forfeiture of EMD.

b) The security deposit will be refunded after warranty period of last system installed.

c) The performance security /BG shall be encashed by UHBVN/DHBVN if the Empanelled company failed to provide the services towards the CMC of plants installed during Empanelled period or the plant is not installed as per specifications or in the case of any fraudulent practices

d) If the firm has serious complaints related to the installation of system during the period of warranty, then the system will be got rectified at the risk and cost of the firm and the expenditure incurred on rectification will be recovered from the due payments of the firm and also forfeit the security deposit. Other penal actions as mentioned in this documents will also be taken against the firm.

e) If the empanelled firm does not receive any order during empanelment period than security deposit will be returned after the completion of Empanelment period. Certification in this regard issued by XEN/OP concerned of UHBVN/DHBVN shall be provided by the firm.

6. Period of validity (CoC)

The Security Deposit shall be valid until the Enlisted firm has executed, completed and remedied defect in the Works in accordance with the Contract. No claim shall be made against the Security Deposit after the issue of the Defects Liability Certificate and Security Deposit shall be returned to the Enlisted firm within 14 days of the issue of the Defects Liability Certificate.

7. Non-compliance (CoC)

Failure of successful bidder to comply with the requirement mentioned in Scope of work, shall constitute sufficient grounds for annulment of empanelment and for forfeiture of the Bid Security.

8. Taxes and Duties

The price quoted should include all GSTs, any other taxes, duties and Insurance expenditure etc. if any. A contractor/ bidder shall be entirely responsible for all taxes, duties, license fees, etc. All taxes payable as per Government income tax & service tax norms will be payable by the contractor/ bidder. If any new tax/duty is levied during the contract period the same will be borne by the contractor exclusively. TDS and GST will be deducted from the payment of the contractor/ bidder as per the prevalent laws and rules of Government of India and Government of the Haryana in this regard.

9. Service Centres

Empanelled Installer shall have minimum of one service centres in area under jurisdiction of UHBVN and DHBVN. Additional service centres shall be opened in area under UHBVN/DHBVN in different districts based on the installations carried out by them under this empanelment mechanism.

10. Warranty Period

a) The Solar power projects shall be warranted for five years after the date of commissioning of the project for replacement in case of any manufacturing, operation failure, non-performance as per design standards.

b) The PV module(s) shall be warranted for its performance for a minimum period of 25 years from the date of commissioning of the project. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

c) The Warranty Card to be supplied to the beneficiary/consumer with the system must contain the details of the system. The bidder will have to furnish a warranty certificate of the system.

11. Comprehensive Maintenance Contract during Warranty Period of Five Years.

a) Visit to the site on call basis to provide maintenance services within three days of lodging of complaint. Failure to arrange for the immediate repair/replacement within 15 days, the firm will be liable for penalty per complaint of Rs. 500/- per day for each day delay after 15th day from the date of complaint lodged by beneficiary. The amount of penalty will be recovered from Security Deposit during warranty period. If the supplier failed to

maintain/repair the plant during 5 years maintenance period within stipulated time period then UHBVN/DHBVN shall have every right to forfeit the BG lying with UHBVN/DHBVN and the company will be blacklisted.

b) Corrective & remedial maintenance services to set right the malfunction of the SPV-projects include supply and replacement of all damaged parts/ components including electronics/ charge controller, Inter connected cables/parts and fuse etc. with new parts.

c) Scope Of CMC Of SPV Power Plant For A Period Of 5 Year From Date Of Commissioning:

   i. Proper CMC of the SPV Power Plant for a period of five years after commissioning along with supply of consumable items as and when necessary shall come, under the CMC contract. The break down maintenance of the entire system including supply of necessary spare parts, if any, are already under the coverage of warranty clause for a period of 60 months from date of commissioning of power plant.

   ii. The security of the power plant will rest with the supplier/agency till such time operation and maintenance of the power plant is not handed over to the purchaser/department.

   iii. The deputed personnel shall be qualified and well trained so that they can handle any type of operation hazard quickly and timely.

   iv. The deputed personnel shall be in a position to check and test all the equipment regularly, so that, preventive actions, if any, could be taken well in advance to save any equipment from damage. Any abnormal behaviour of any equipment shall be brought to the notice of Engineer-in-Charge immediately for appropriate action.

   v. Normal and preventive maintenance of the power plant such as cleaning of module surface, tightening of all electrical connections etc. the module cleaning for 50 kW SPV Plant and above capacity should be responsibility of bidder.

   vi. During CMC period of 5 years of the power plant, if there is any loss or damage of any component of the power plant due to miss management/miss handling or due to any other reasons, what-so-ever, the supplier/firm shall be responsible for immediate replacement/rectification. The damaged component may be repaired, if it is understood after examination that after repairing performance of the component shall not be degraded, otherwise the defective component shall have to be replaced by new one without any extra cost.

12. Operation & Maintenance Manual

An Operation, Instruction and Maintenance Manual in English/Hindi languages should be provided with the Solar PV projects. The following minimum details must be provided in the Manual:-

a) Basic principles of Photovoltaic.
b) A small write-up (with a block diagram) on the Solar PV project - its components, PV module, inverter, junction boxes and expected performance shall be provided.
c) Type, Model number, Voltage & capacity of inverter, used in the system.
d) The make, model number, country of origin and technical characteristics of all the component are required to be provided.
e) Clear instructions on regular maintenance and troubleshooting of the Solar PV Projects.
f) DO's and DONT's.
g) Name, address and Mobile No. of the contact person for repair and maintenance, in case of non-functionality of the SPV Projects

13. Inspection & Testing (CoC)

All the SPV Rooftop systems installed will be inspected by the representative of UHBVN/DHBVN within 30 days of receipt of Installation & Commissioning

Certificate. The eligible subsidy will be released only for the systems installed in compliance to the technical specification of MNRE /DISCOMs. During the Inspection, if the system installed is found faulty (or) not in compliance to the technical specification, the cost for re-inspection by UHBVN/DHBVN after rectification/replacement shall be borne by the bidder.

14 Set Off & Risk Procedure

14.1 Set Off

Any such money due and payable to the Enlisted firm under the Contract may be appropriated by the Owner and set-off against any claim of the Owner for the payment of a sum of money arising out of or under this Contract or any other Contract entered into by the Enlisted firm with the Owner.

14.2 *Enlisted firm's Default Liability*

In the event of breach of any of the terms and conditions by the Enlisted firm, the Employer can de-empanel the firm without any notice to the Enlisted firm at any stage and the Enlisted firm shall have no claim whatsoever on the Employer on this account. But the Enlisted firm shall be liable to pay to the Employer a sum equivalent to 10 Lac as liquidated damages and not as penalty. The Enlisted firm shall in addition and without prejudice to the above said damages, make good any loss or damage that may be incurred by the Employer in getting the left out Works executed from elsewhere at the risk and cost of the Enlisted firm. In case of delay in the execution of Works, the Owner will have the right to get the Work executed from any alternative source, at the sole risk and cost of the Enlisted firm. Any extra expenditure incurred in such action shall be recoverable in full from the Enlisted firm in addition to Owner's right of claim for liquidated damages.

15. Taxation

15.1 The Enlisted firm shall be entirely responsible for payment of all GSTs, duties, license fees etc.

15.2 The Enlisted firm shall be solely responsible for the taxes that may be levied on the Enlisted firm's persons or on earning of any of his employee and shall hold the Employer indemnified and harmless against any claims that may be made against the Employer. The Employer does not take any responsibility whatsoever regarding taxes under Income Tax Act, for the Enlisted firm or his employees. If it is obligatory under the provisions under the Indian Tax Act, deduction of Income Tax at source shall be made by the Employer.

16 Advertising

Any advertising stating the subject of this EOI by the Enlisted firm in India or in other foreign countries shall be subject to approval of the Employer prior to the publication. Publication of approved articles, photographs and other similar materials shall carry approval of the Employer.

17 Compliance of Laws

The successful bidder will certify that he has complied with the provisions of Industrial & Labour Laws including PF Act, ESI Act etc. as may be applicable.

18 Corrupt or fraudulent practices

The Employer requires that Tenderers/ Suppliers/ Enlisted firms observe the highest standard of ethics during the procurement and execution of Employer contracts. In pursuance of this policy, the Nigam:-

(a) defines, for the purposes of this provision, the terms set forth as follows:

(i) "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution: and

(ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer, and includes collusive practice among tenderers (prior to or after tender submission) designed to establish tender prices at artificial, non- competitive levels and to deprive the Employer of the benefits of free and open competition;

(b) will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a Nigam contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a Employer contract.

19 Settlement of Disputes

If any dispute or difference of any kind whatsoever will arise between the Employer and the firm in connection with or arising out of the conditions of EoI Document, the parties will make every effort to resolve amicably such dispute or difference by mutual consultation.

If, after thirty (30) days the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Employer or the firm may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of the matter may be commenced unless such notice is given.

20 Arbitration

All the matter questions, disputes, differences and /or claims arising out of and/or concerning and/or in connection and/or in consequences or relating to this EoI whether or not obligations of either or both parties under this EoI be subsisting at the time of such dispute and whether or not this EoI has been terminated or purported to be terminated or completed, shall be referred to the sole arbitrator to be appointed by the CMD, UHBVN/DHBVN. The award of the Arbitrator shall be final and binding on the parties to this contract. Provision of Arbitration and cancellation act 1996 and the Rules made there under the statutory modification thereof for the time being in force shall be deemed to apply for the Arbitration proceeding under this clause.

21 Blacklisting of the Firms

The contractor will be blacklisted,

i) If the Enlisted firm backs out of the work at any stage, the firm will be issued two 15 days notices to commence the work failing which no further notices will be issued and the firm will be straightway Blacklisted, without prejudice to other terms and conditions of the contract.

ii) If the firm Indulge in fraudulent and illegal practices such as forgery, cheating or any civil/criminal wrongdoing or any grave misconduct of similar nature which has a direct impact on the contract and the Nigam. In such case no notice of default will be issued and the firm will be straightway blacklisted in addition to initiating the legal proceedings etc., without prejudice to the other terms and conditions of the contract.

iii) The Performance Bank Guarantee of the blacklisted firms will be forfeited and the firm shall have no claim whatsoever on the same.

SECTION – V: TECHNICAL SPECIFICATIONS

DETAILED TECHNICAL SPECIFICATIONS

(Grid Connected Solar Rooftop Photo Voltaic (SPV) power plant-with/without battery bank**)**

The projects shall be installed and commissioned as per the technical specifications given below.

1. DEFINITION

A Grid Connected Solar Rooftop Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Inverter/Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), and Controls & Protections, interconnect cables and switches. PV Array is mounted on a suitable structure. Grid connected SPV power plant may be with or without battery and should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, inverters/PCUs, battery etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable.

- Solar PV system shall consist of following equipments/components.
- Solar PV modules consisting of required number of Crystalline PV cells.
- Grid interactive Inverter with Remote Monitoring System
- LiFePO4 Battery bank (for Hybrid System)
- Mounting structures
- Junction Boxes.
- Earthing and lightening protections.
- IR/UV protected PVC Cables, pipes and accessories

2. SOLAR PHOTOVOLTAIC MODULES:

(i) Only domestic manufactured Solar Panels with domestic manufactured Solar cells are to be used in the system.

(ii) The efficiency of the PV modules should be minimum 16% and fill factor should be more than 70%.

(iii) Modules of mono/poly crystalline type can be used.

(iv) The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules. In addition, the modules must conform to IEC 61730 Part-1 - requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS. a) For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701. Certificate for module qualification from IEC or equivalent to be submitted as part of the bid offer. Self-undertaking from manufacturer / supplier that the modules being supplied are as per above. The Potential Induced Degradation (PID) test for solar modules will be mandatory. It should be valid during the operational period.

(v) Module shall consists of Solar Cell of minimum 5 Bus Bar technology. At the time of supply the supplier shall submit the certificate from the manufacturer of the module certifying that he has supplied the modules to ……. (name of supplier) strictly manufactured as per BOM of IEC certificate mentioning the technology of the solar cell (as per Annexure-E).

(vi) The modules of the manufacturers who are having OEM and co-certification will not be considered as qualified modules.

(vii) The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar crystalline modules of minimum 300 Wp (with 72 cells) and above wattage for the project above 5 kWp and of minimum 250 Wp (with 60 cells) and above wattage for the project upto 5kWp. Module capacity less than minimum of these wattage shall not be accepted.

(viii) Protective devices against surges at the DC side shall be provided. Low voltage drop bypass diodes shall be provided.

(ix) PV modules must be tested and approved by one of the IEC authorized test centres and shall meet the latest higher side specifications prescribed by MNRE/HAREDA/UHBVNL.

(x) The module frame shall be made of corrosion resistant materials, preferably having anodized aluminum.

(xi) The bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his bid.

(xii) Other general requirement for the PV modules and subsystems shall be the Following:

a) The rated output power of any supplied module shall have tolerance of plus 3% or above.

b) 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.

c) The module shall be provided with a junction box with weather proof lid of sealed type and IP-65 rated.

d) I-V curves at STC shall be provided with the module.

(xiii) The module should have the following minimum information laminated inside the module.

- Made in India (to be subscribed in words)
- Company name /logo
- Model number (it should indicate the voltage and rated wattage of the module)
- Serial number
- Year of make

3. WARRANTIES

a) 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 (5) years from the date of commissioning of the system

(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.

b) Performance Warranty:

(i) 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.

4. ARRAY STRUCTURE (MODULE MOUNTING STRUCTURE)

Module mounting structure (MMS) should be of anodised aluminium or Hot Dipped Galvanised Iron (HDGI), of prescribed Specifications given below, for mounting of SPV modules at site. The panel frame structure should be capable of withstanding a minimum wind speed load of 150 KM per hour, after grouting and installation. MMS should be sturdy & designed to assist SPV Modules to render maximum output. The hardware (fasteners) used for installation of SPV Modules & MMS should be of suitable Stainless Steel (SS 304). Each MMS should be with minimum four legs grouted on pedestals of minimum 300X300X250 mm with anchoring/ chipping & chemical sealing of foundation based on RCC roof. Foundation bolts of stainless /GI steel should be at least 300 mm long.

Its size should be with reference to the specifications of the selected make SPV modules. Anti Theft Nut Bolts of SS (with washers) should be used for mounting modules for better theft proofing.

4.1 Aluminium structure should meet the following minimum specifications:

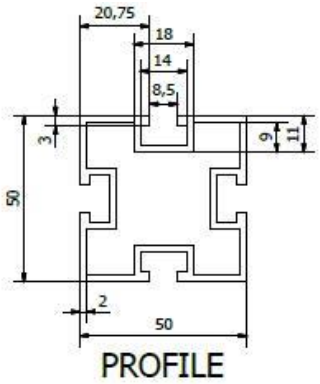
A. Structure Assembly Main Components:

1. Purlin

2. Leg & Base Plate
3. Rafter (with cleat)

B. Component Details:

1. Purlin/Rafter (Design is indicative)



- Cross section Length: 50mm, Cross section Width: 50mm, Thickness: 02mm
- Component Length – As per PV modules table designed
- Tolerance: ±5%

Cleat:

- Cross sectional length – 135mm, Cross sectional width – 50mm, Thickness – 5mm
- Tolerance: ±5%

2. Leg & Base Plate

(a) Base Plate:

- Cross sectional Length: 75mm, Cross sectional Height: 75mm, Thickness: 5mm
- Component Length: 150mm with two holes on base area for fixing of J Bolts
- Tolerance: ±5%

(b) Leg attached to base plate

- Cross sectional length – 50mm, Cross sectional width – 50mm, Thickness – 5mm
- Component Length – 3808mm ((or as per site requirement of tilt angle and may vary with the required height of structure) with two holes on bottom area for fixing with base plate and one hole on top are for fixing of Rafter
- Tolerance: ±5%

4.2 Hot Dipped Galvanised Iron (HDGI) structure should meet the following minimum specifications:

Rafter : 60mmX60mmX3.2mm or 60mmX45mmX15mmX2.6mm

Purlin : 90mmX45mmX15mmX2.6mm

Vertical Post : 60mmX60mmX3.2mm or 60mmX45mmX15mmX2.6mm

Base Plate : 200mmX200mmX8mm

Top Plate : 176mmX176mmX8mm

4.3 Foundation:

The CC foundation shall have to be designed on the basis of the weight of the structure with module and minimum wind speed of the site, i.e. 150 Km/hour. Normally, each MMS should be with minimum four legs grouted on pedestals of proper size. However, for sheds CC work will not be required. The structure shall be grouted with fasteners with chemical sealing to withstand the required wind velocity. Angle of inclination shall be between 15^0 to 30^0, however, may be changed as per site requirement.

- CC Pillar size shall be: 300X300
- For Pillars: Cement: Concrete: Sand Ratio :: 1:2:3
- Screws shall be Grouted in the Slab of roof up to depth of 50 mm.
- Lengths of rafter/Purlin may be changed as per site requirement.

Sufficient numbers of vertical post shall be provided so that the structure may not bent.

5. SPECIFICATIONS FOR INVERTER /POWER CONDITIONING UNIT (PCU)

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 "Inverter". In addition, the inverter shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter should also be DG set interactive, if necessary. Inverter output should be compatible with the grid frequency. Typical technical features of the inverter shall be as follows:-

Specifications of Inverter	
Parameters	Detailed Specifications
Switching devices	IGBT
Capacity	The Rated Capacity of the Inverter shall not be less than the solar PV array capacity.
Control	Microprocessor /DSP
Nominal Voltage	230V / 415V as the case may be
Voltage range	Single Phase: Shall work from 180 Volts to 270 Volts; Three Phase: Shall work from 180 Volts to 270 Volts per phase
Operating frequency/ range	50 Hz(47to52 Hz)
Grid Frequency Synchronization range	± 3 Hz or more (shall also compatible for Synchronization with DG Set)
Waveform	Sine Wave
Harmonics	AC side total harmonic current distortion<5%
Ripple	DC voltage ripple content shall not be morethan1%.
Efficiency	1. The inverters should be tested as per IEC standards/ as per latest MNRE Specification. The following criteria should be followed : 2. The benchmarking efficiency criteria for the Grid tied (central/string) inverter • At nominal voltage and full load is >95% • For load >25% is >92%.

	3. The benchmarking efficiency criteria for Grid Tied PCU of capacity < 5KW: >85%and for capacity ≥ 5KW: ≥90% 4. No load losses should not be more than 5%.
Losses	Maximumlossesinsleepmode:2Wper5kW Maximumlossesinstand-bymode:10W
Casing protection levels	Degree of protection: MinimumIP-21 and 22for indoor useandIP65 certification for outdoor use
Temperature	Shouldwithstandfrom-10to+50 deg Celsius
Humidity	Shouldwithstandupto95%(relative humidity)
Operation	Completely automatic including wake up, synchronization (phase-locking)and shutdown
MPPT	Maximum power point tracker shall be integrated in the inverter to maximize energy drawn from the array. MPPT range must be suitable to individual array voltages in power packs
Protections	Mains Under / Over Voltage
	Overcurrent
	Over / Under grid frequency
	Over temperature
	Short circuit
	Lightening
	Surge voltage induced at output due to external source
	Anti Islanding (for grid synch. mode)
	Battery Under Voltage and Over Voltage
System Monitoring Parameters	Inverter/PCU voltage & current Mains Voltage, Current & Frequency PV Voltage, Amps & KWH System Mimic & Faults
Recommended LCD Display on Front Panel	Accurate displays on the front panel:
	DC input voltage
	DC current
	AC Voltage (all 3 phases, in case of 3 phase)
	AC current (all 3 phases in case of 3 phase)
	Ambient temperature
	Instantaneous & cumulative output power
	Daily DC energy produced
	Battery Voltage (in case of Hybrid PCU)

Communication interface	RS 485 / RS 232 PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array to the power conditioning unit/inverter should also be DG set interactive.
Power Factor	> 0.9
THD	<3%
Test Certificates	The inverter should be tested from the MNRE approved test centres / NABL /BIS /IEC accredited/authorised testing-calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

a) Three phase inverter shall be used with each power plant system (10kW and/or above) but in case of less than 10kW single phase inverter can be used as per site requirement. The inverter of single phase shall be installed if grid supply is of single phase and that of three phase shall be installed if grid supply is of three phase.

b) Inverter/PCU shall be capable of complete automatic operation including wake-up, synchronization & shutdown.

c) The output of power factor of inverter/PCU 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.

d) Built-in meter and data logger to monitor plant performance through external computer shall be provided (Providing Computer is not part of DNIT & is in the scope of user).

e) **Anti-islanding (Protection against Islanding of grid):** The inverter/PCU shall have anti islanding protection in conformity to IEEE 1547/UL 1741/ IEC 62116/IS16169 or equivalent BIS standard.

f) Successful Bidders/Supplier shall be responsible for galvanic isolation of solar roof top power plant (>100kWp) with electrical grid or LT panel.

g) In Inverter/PCU, there shall be a direct current isolation provided at the output by means of a suitable isolating transformer. If Isolation

Transformer is not incorporated with Inverter, there shall be a separate Isolation Transformer of suitable rating provided at the output side of inverter units for capacity more than 100 kW.

h) The inverter generated harmonics, flicker, DC injection limits, Voltage Range, Frequency Range and Anti-Islanding measures at the point of connection to the utility services should follow the latest CEA (Technical Standards for Connectivity Distribution Generation Resources) Guidelines.

i) The inverter should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IS/IEC 61683 and IEC 60068-2 (1,2,14,30)/ Equivalent BIS Std./EN50530,IEC 61727 (all clauses except clause 5.2.2). in case of clause 5.2.2, it should withstand the over/under frequency in the range 47 to 52 Hz.

j) The 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.

6. BATTERY

The battery should be Lithium Ferro Phosphate (LiFePO4) having given capacity. The other feature of battery should be:-

S.No.	Description	Specification
1.	Battery Type	LiFePO4
2.	Working temperature range (both for charging & discharging)	20-60 Deg. C
3.	Minimum capacity of individual Cells	3.2V 40Ah
4.	Type of Cell	Prismatic or Cylindrical

The Cell and Battery should be got tested as per IEC 62133-2012 or BIS specifications with MNRE/ NABL/IEC accredited test centre/ laboratory as per IEC/ BIS standard IEC 62133, IEC 61960 & UL1642: Safety of LiFePo4 battery

The Lithium Ferro Phosphate battery needs a very good "Battery Management System (BMS)" to ensure the proper charging and discharging of each cell of battery with proper protection of battery when temperature is reaching beyond battery permissible limits.

7. INTEGRATION OF PV POWER WITH GRID:

(i) The output power from SPV would be fed to the inverters/PCU which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. 4 pole isolation of inverter output with respect to the grid connection need to be provided. Solar Generation Meter(s) and bidirectional energy meter, as per HERC Net Metering Regulations should also be installed in the campus/building of beneficiary.

(ii) The solar generation meter and Bi-directional meter along with CT/PT (if required) with Surge Protection Device (SPD) should be of 0.2S accuracy class is in the scope of bidder. For LT connection the accuracy shall be as per requirement of DISCOMs.

(iii) CEA guideline 2013 for interconnecting solar power with Grid shall be followed.

(iv) Certification of Islanding protection in the inverter from the manufacturer of the equipment shall be mandatory. This shall be arranged by the supplier from the manufacturer.

(v) Technical Standards for Interconnection:

S.No.	Parameters	Requirements	Reference
1.	Overall Conditions of Service	Reference to regulations	Conditions for Supply of Electricity of Distribution Licensees
2.	Overall Grid Standards	Reference to regulations	Central Electricity Authority (Grid Standards) Regulations 2010
3.	Equipment	Applicable industry standards	IEC standards/IS
4.	Safety and Supply	Reference to regulations, Chapter III (General Safety Requirements)	Central Electricity Authority (Measures of Safety and Electricity Supply) Regulations, 2010 and subsequent amendments
5.	Meters	Reference to regulations and additional conditions issued by the Commission.	Central Electricity Authority (Installation & Operation of Meters) regulations 2006 and subsequent amendments
6.	Harmonic Current	Harmonic current injections from a generating station shall not exceed the limits specified in IEEE 519	IEEE 519 relevant CEA (Technical Standards for Connectivity of the distributed generation resource) regulations 2013 and subsequent amendments
7.	Synchronization	Photovoltaic system must be equipped with a grid frequency synchronization device, if the system is using synchronizer inherently built into the inverter than no separate synchronizer is required.	Relevant CEA (Technical Standards for Connectivity of the distributed generation resources) regulations 2013 and subsequent amendments.
8.	Voltage	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to 110% of the nominal connected voltage. beyond a clearing time of 2 seconds, the Photovoltaic system must isolate itself from the grid.	
9.	Flicker	Operation of Photovoltaic system shouldn't cause voltage flicker in excess of the limits stated in IEC 61000 or other	Relevant CEA regulations 2013 and subsequent if any, (Technical Standards for Connectivity of the distributed generation resource)

		equivalent Indian standards, if any	
10.	Frequency	When the Distribution system frequency deviates outside the specified conditions (52 Hz on upper side and 47 Hz on lower side up to 0.2 sec), the Photovoltaic system shouldn't energize the grid and should shift to island mode.	
11.	DC Injection	Photovoltaic system should not inject DC power more than 0.5% of full rated output at the interconnection point. or 1% of rated inverter output current into distribution system under any operating conditions	
12.	Power Factor	While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9 shall be maintained	
13.	Islanding and Disconnection	The Photovoltaic system in the event of voltage or frequency variations must island/ disconnect itself within IEC standard on stipulated period	
14.	Overload and Overheat	The inverter should have the facility to automatically switch off in case of overload or overheating and should restart when normal conditions are restored	
15	Cable	For interconnecting Modules, Connecting modules and junction Boxes and junction boxes to inverter, DC copper cable of proper sizes shall be used. To connect inverter with AC panel aluminium cable of proper size shall	Relevant CEA regulations 2013 and subsequent if any, (Technical Standards for Connectivity of the distributed generation resource)

		be used. All the internal cables to be used in the systems shall be included in the cost while 100mtr. AC aluminium cable of proper size to be used to connect inverter/PCU to AC panel shall be included in the cost of the system.	

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

b) The change-over switches, cabling work should be undertaken by the bidder as part of the project.

8. JUNCTION BOXES FOR CABLES FROM SOLAR ARRAY:

The junction boxes shall be made up of FRP (Hensel or equivalent make)/PP/ABS with dust, water and vermin proof. It should be provided with proper locking arrangements.

Series / Array Junction Box (SJB/AJB) (whichever is required): All the arrays of the modules shall be connected to DCCB. AJB shall have terminals of bus-bar arrangement of appropriate size Junction boxes shall have suitable cable entry with suitable glanding arrangement for both input and output cables. Suitable markings on the bus bars shall have to be provided to identify the bus bars etc. **Suitable ferrules shall also have to be provided to identify interconnections. Every AJB should have suitable arrangement Reverse Blocking diode of suitable rating. Suitable SPD, suitable Isolation switches to isolate the DC input to Inverter has to be installed in AJB for protection purpose**. Thus AJB should have DC isolator for disconnecting the arrays from inverter input. **If in any case diodes, HRC Fuses, SPDs and isolators are installed in the string inverters, then there is need to install these again in AJB. If some of these safety gadgets are not installed in String Inverter it should be installed in AJB.**

Cable interconnection arrangement shall be within conduit pipe on saddles installed properly**. <u>Cable connection should be done in such a manner that fault findings if any, can be identified easily. The cables should be connected in such a manner that clamp meter can be comfortably inserted around the individual cables to measure the data like current, voltage etc.</u>** AJB should also be marked as A1, A2, & so on. Wherever conduits are laid on wall/roof or ground, then it should be suitably laid in cable tray or appropriate civil structure which should be at least four inches above roof/ground level.

However, if the inverter/PCU is equipped with Junction Box, the cables may be connected directly to the ports provided in the inverter/PCU and no separate Junction Box is required.

9. PROTECTION & SAFETY:

Both AC & DC lines have suitable MCB/MCCB, Contractors, SPD, HRC Fuse etc to allow safe start up and shut down before & after string inverter installed in the system. String inverters should have protections for overload, surge current, high Temperature, over/ under voltage and over/ under frequency & reverse polarity. The complete operation process & safety instructions should printed on the sticker & suitably pasted on the near inverters.

Inverter should have safety measures to protect inverter from reverse short circuit current due to lightening or line faults of distribution network.

<u>Inverter should be suitably placed in covered area on a suitable platform or wall mounted or concrete platform (on rubber mat) with complete safety measure as per norms.</u>

10. INVERTER/ARRAY SIZE RATIO:

- The combined wattage of all inverters should not be less than rated capacity of power plant under STC in KW.

- Maximum power point tracker shall be integrated in the inverter to maximize energy drawn from the array

11. AC COMBINER BOX BOARD (ACCB):

This shall consist of box shall consists of grid interphase panel of good quality FRP/ suitable powder coated metal casing. One Electronic Energy Meter (0.2S Class), ISI make, Single/Three Phase duly tested by DISCOMs (Meter testing Division) with appropriate CT (if required), of good quality shall have to be installed at suitable placed to measure the power generated from SPV Power Plant, as per HERC Net Metering Regulations. Proper rating MCCB & HRC fuse and AC SPDs shall be installed to protect feeders from the short circuit current and surges as per the requirement of the site. **Operation AC Isolator Switch of Grid Connectivity should be such that it can be switched ON or OFF without opening the ACCB**.

12. CABLES/WIRE:

All cables should be of copper as per IS and should be of 650V/1.1 KV grade as per requirement. All connections should be properly made through suitable lug/terminal crimped with use of suitable proper cable glands. The size of cables/wires should be designed considering the line loses, maximum load on line, keeping voltage drop within permissible limit and other related factors. The cable/wire should be of ISI/ISO mark for overhead distribution. For normal configuration the minimum suggested sizes of cables are:

Module to module/AJB	: 4 sq mm (single core) DC Cable
AJBs to MJB/DCCB/Inverter/PCU	• Up to capacity of 10 kWp Solar Plant, minimum 4sq mm (Single/Double core) DC Cable, with respect to current ratings of designing • For capacity more than 10 kWp& up to 20 kWp Solar Plant, minimum 6sq mm (Single/Double core) DC Cable, with respect to current ratings of designing • For capacity more than 20 kWp Solar Plant, minimum 10sq mm (Single/Double core) DC Cable, with respect to current ratings of designing
Inverter to ACCB/Distribution board	AC Cable as per design & rating

The size & rating of the cables may vary depending on the design & capacity of SPV Power Plant.

13. CABLE TRAY:

All the cables should be laid in appropriate GI cable tray as per the requirement of the site, No cable should be laid directly on ground or wall cable tray should be laid such that there is gap of at least two inches above ground/roof/wall.

14. DISPLAY BOARD:

The bidder has to display a board at the project site mentioning the following:

- Plant Name, Capacity, Location, Type of Renewable Energy plant (solar), Date of commissioning, details of tie-up with transmission and distribution companies, Power generation and Export FY wise.
- Financial Assistance details from HAREDA/MNRE/UHBVN/Any other financial institution apart from loan. This information shall not be limited to project site but also be displayed at site offices/head quarter offices of the successful bidder
- The size and type of board and display shall be approved by Engineer-in-charge before site inspection.
- **DANGER BOARDS:** Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date.

15. MANUAL DISCONNECTION SWITCH:

It should be provided to isolate the system from Grid which should be outside of ACCB.

16. AC DISTRIBUTION PANEL BOARD:

a) 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.

b) All switches and the circuit breakers, connectors should conform to IEC

60947, part I, II and III/ IS60947 part I, II and III.

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

d) 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

e) The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

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

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

h) 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

17. DATA ACQUISITION SYSTEM / PLANT MONITORING

(i) Data Acquisition System shall be provided for each of the solar PV Project.

(ii) Web based remote monitoring access of each project shall also be provided to UHBVN through software monitoring system with latest configuration. If needed access to MNRE shall also be provided.

(iii) PV array energy production: Digital Energy Meters to log the actual value of AC/ DC voltage, Current & Energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.2S accuracy class. For Hybrid there shall be provision in built in the PCU to measure generated solar energy as there is no option to install separate solar generation meter.

(iv) String and array DC Voltage, Current and Power, Inverter AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and

Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency shall be monitored.

(v) All instantaneous data shall be shown on the computer screen.

(vi) Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.

(vii) Provision for instantaneous Internet monitoring and download of historical data shall be also incorporated.

18. PRIORITY FOR POWER CONSUMPTION:

Regarding the generated power consumption, in case of string inverter, priority need to given for internal consumption first and thereafter any excess power can be exported to grid.

19. PROTECTIONS

The system should be provided with all necessary protections like earthing, Lightning, and grid anti- islanding as follows:

(i) <u>Lightning And Over Voltage Protection</u>:

The SPV Power Plant shall be provided with lightening and over voltage protection. The principal aim in this protection is to reduce the over voltage to a tolerable value before it reaches the PV or other sub-systems components. The source of over voltage can be lightening or any other atmospheric disturbance. The Lighting Arrestor (LA) is to be made of 1¼" diameter (minimum) and 12 feet long GI spike on the basis of the necessary meteorological data of the location of the projects. Necessary foundation for holding the LA is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Each LA shall have to be earthed through suitable size earth bus with earth pits. The earthing pit shall have to be made as per IS 3043. LA shall be installed to protect the array field, all machines and control panels installed in the control rooms. Number of LA shall vary with the capacity of SPV Power Plant & location. Number of LA should be in such a manner that total layout of solar modules should the effective coverage of LA's.

For systems up to 10 kWp the lightening arrester shall of conventional type and for above 10 kWp systems it should be of Early Streamer Emission (ESE) type.

(ii) <u>Earthing Protection</u>:

Each array structure of the PV yard shall be grounded properly. In each array every module should be connected to each other with copper wires, lug teethed washers addition the lightening arrestor/masts shall also be provided inside the array field. Provision shall be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant shall be thoroughly grounded in accordance with Indian Electricity Act/IE rules as amended up to date. The earthing pit shall be made as per IS: 3043. All the array structures and equipments/control systems shall be compulsorily connected to the earth, separately. Number of earthling shall vary with the capacity of SPV Power Plant & location. G.I. /Copper strips should be used for earthling instead of G.I. wires. LAshouldbeinstalledtoprotectthearrayfield&machinesinstalledinthecontrolrooms.NumberofLAshallvarywiththecapacityofSPVPowerPlant &location. Earth resistance shall not be more than 5 ohms.

(iii) **<u>Surge Protection:</u>**

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

(iv) **<u>Grid Islanding:</u>**

a) In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as "islands."

Powered islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The RooftopPV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection)

disconnection due to under and over voltage conditions shall also be provided.

b) A manual disconnect pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked, if required, by the utility personnel

20. CONNECTIVITY:

The user have to take approval/NOC from the Concerned DISCOM for the connectivity, technical feasibility, and synchronization of SPV plant with distribution network and submit the same to UHBVN before commissioning of SPV plant, however the supplier have to extend all technical help to the user for preparing the documents required for getting the above clearance from DISCOMs.

Reverse power relay shall be provided by bidder (if necessary), as per the local DISCOM requirement.

The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the Distribution Code/Supply Code and amended from time to time. Following criteria have been suggested for selection of voltage level in the distribution system for ready reference of the solar suppliers.

Plant Capacity	**Connecting voltage**
Up to 10 kWp	240V-single phase or 415V-three phase as per requirement of electric connection of the consumer
Above 10kWp and up to 100 kWp	415V – three phase
Above 100kWp	415V – three phase or as per site requirement based on the availability of grid level and as per DISCOM rules

Utilities may have voltage levels other than above, DISCOMS may be consulted before finalization of the voltage level and system shall be designed accordingly.

21. DRAWINGS & MANUALS:

(i) 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.

(ii) Approved ISI and reputed makes for equipment be used.

22. SAFETY MEASURES:

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA guidelines etc. All work shall be carried out in accordance with the latest edition of the Indian Electricity Act and rules formed there under and as amended from time to time.

23. CODES AND STANDARDS

The quality of equipment supplied shall be controlled to meet the guidelines for engineering design included in the standards and codes listed in the relevant ISI and other standards, such as :

i. IEEE 928 Recommended Criteria for Terrestrial PV Power Systems.
ii. IEEE 929 Recommended Practice for Utility Interface of Residential and Intermediate PV Systems.
iii. IEEE 519 Guide for Harmonic Control and Reactive Compensation of Static Power Controllers.
iv. National Electrical NEPA 70-(USA) or equivalent national standard.
v. National Electrical Safety Code ANSI C2- (USA) or equivalent national standard.
vi. JRC Specification 503 (Version 2.2 March 1991) or JPL Block V standard for PV modules.

vii. The inverter manufacturer should attach efficiency certificate from Independent Third party Testing laboratory i.e. IEC, TUV, SNL/ERTL & STQC. PCU should confirm to IEC 61683 for efficiency measurements and IEC 60068 2 for environmental testing. MPPT unit should confirm to design qualification IEC 62093.

viii. IEC 62116 for Anti Islanding

ix. IEC 62109-1, IEC 62109-2 for safety

x. IEC 61727 FOR UTILITY INTERFACE.

Annexure-IV

(To be given on the letter head of the Modules Manufacturer)

It is certified that the Modules supplied to …….. with Sr. Nos. given below are domestic manufactured solar modules in which domestic manufactured solar cells are used. It is also certified taht these Modules are not having OEM/Co-certification.

Sr. Nos. of Modules:

1. ……..
2. ……..
3. …….
4. ……..
5. ……..
6. …….

So on

(If large quantity, then list to be attached with certification)

Date:

Signature ……

Name of Authorised person ……..

Name of Modules Manufacturer……..

(with Seal)

Annexure-V

PERFORMA OF WARRANTY CERTIFICATE-CUM-ANNUAL MAINTENANCE CONTRACT WITH PURCHASER/CONSUMER BY EMPANELLED AGENCIES AFTER SUCCESSFUL COMMISSIONING OF SPV POWER PLANT

(On a required stamp paper)

Order No. Date:

We (Name of empanelled agency with registered address) do hereby certify that the _____(make of modules)_____SPV Modules as used for (Name of the project) shall have warranty of 25 years with degradation of power generated not exceeding 20% of the minimum rated power over the 25 years period and not more than 10% after 10 years period. (Detail lists of Solar PV Modules enclosed).

Further, We_____(Name of empanelled agency with registered address)___do hereby certify that the whole system of the (Name of the project) shall have warranty and comprehensive maintenance contract for the period of 5 years from the date of commissioning of the project.

Further, if, we _____(Name of empanelled agency with registered address)_____fails to provide the 5 years warranty and comprehensive maintenance contract of whole system and 25 years warranty of SPV Modules as mentioned above, then we are liable for legal action including blacklisting of the firm by DHBVN/Purchaser.

Signature:_____

Name:_____

Designation with Stamp_____