सत्यमेव जयते

संघ राज्य प्रशासन, लद्दाख

विद्युत विकास एवं नवीन एवं
नवीकरणीय ऊर्जा विभाग

THE ADMINISTRATION OF
UNION TERRITORY OF LADAKH
Power Development and New &
Renewable Energy Department

No. Secy.AdmUTL/PDD/RTS/56/293-99

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Date:06.06.2025

Subject: Invitation for Comments on "Draft Scheme for Rooftop Solar for Commercial Consumers in the Union Territory of Ladakh"-Regarding

Reference: *E-file No. M/919/2025-OFFICE OF EE (PDD)*

Order No.೨೩(LPDD)/UTL of 2025

Dated: 06/06/2025

Whereas, the Ladakh Power Development Department (LPDD) has prepared a Draft Rooftop Solar Policy aimed at facilitating the adoption of rooftop solar energy systems by commercial consumers in the Union Territory of Ladakh.

Whereas, the policy seeks to promote clean energy usage, reduce dependency on conventional power sources, and align with Ladakh's vision of becoming a carbon-neutral region. (Draft Policy is attached as Annexure-A.)

Therefore, all stakeholders, including commercial electricity consumers, Solar Developers, and members of the general public, are hereby invited to provide their comments, suggestions, or objections (if any) on the proposed policy **within 21 days** from the date of this notification.

(Enclosure: Annexure-A – Draft Rooftop Solar Policy for Commercial Consumers).

Sd/-
Vikram Singh Malik, IAS
Administrative Secretary
Power Development Department
UT Ladakh

Copy to the:

1. *All the Administrative Secretaries, UT Ladakh.*
2. *Deputy Commissioner/CEO, LAHDC, Leh/Kargil.*
3. *Chief Engineer, Distribution/Generation, PDD, UT Ladakh for information.*
4. *Joint Director Information Department, UT Ladakh with the request to give wide publicity.*
5. *Superintending Engineer, Distribution, PDD Ladakh, for information.*
6. *I/C website, NIC UT Ladakh for uploading on the official website.*
7. *Office record file.*

STANZIN THAKCHOS
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Dr. Stanzin Thakchos
OSD to Administrative Secretary
Power Development Department
UT Ladakh.

Draft Scheme for Rooftop Solar for Commercial Consumers of LPDD

Contents

Draft-Scheme for (Grid-Connected) Rooftop Solar for Commercial Consumers of LPDD

Introduction

Ladakh, with its abundant solar irradiation and commitment to carbon neutrality, is poised to lead India's clean energy transition. As part of this vision, this proposal introduces a financial and operational support scheme to encourage **Grid-Connected Rooftop Solar PV Systems** for **Commercial Category Consumers.**

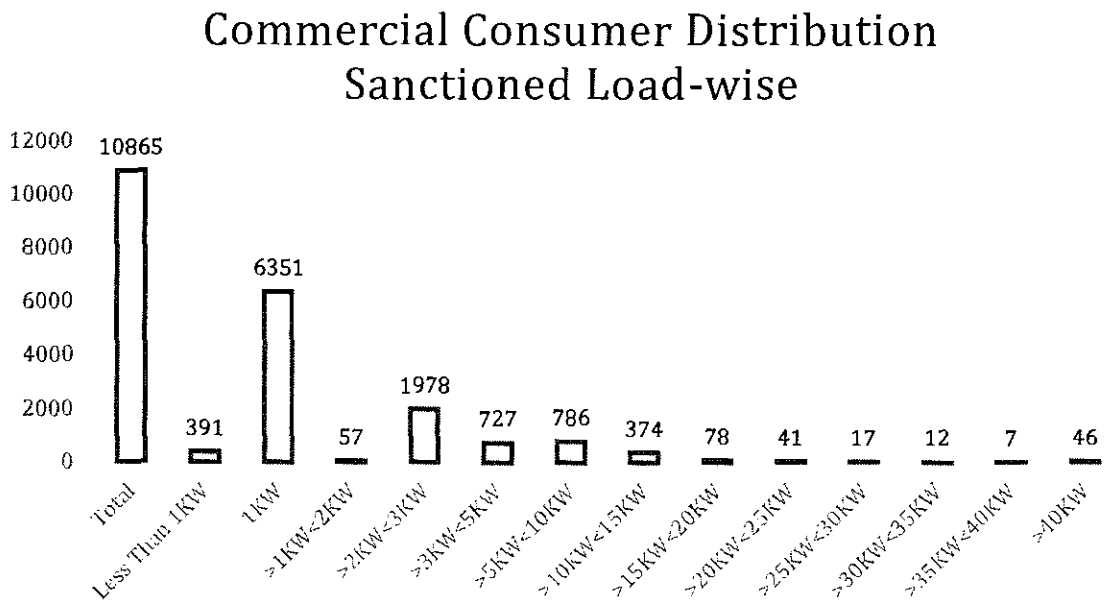
The Union Territory currently has over **10,865 commercial consumers as on 31st March-2025**, with a combined **sanctioned load of approximately 29.5 MW**, distributed across both the districts of UT Ladakh. This presents a substantial opportunity for decentralized energy generation, leveraging vacant commercial rooftops.

Proposed Model

To promote sustainable energy and reduce dependence on conventional power sources, the Power Department of Union Territory of Ladakh proposes a targeted subsidy-driven initiative to install Grid-Connected Rooftop Solar PV Systems for commercial consumers. With a commercial base exceeding 10,800 consumers and a combined sanctioned load of nearly 29.5 MW, the region offers substantial potential for solar adoption. The scheme encourages installations ranging from 1 kW to 40 kW, with a UT-funded subsidy of **₹15,000 per kW or 1/3 rd of the total project cost whichever is lower**, capped at ₹6 lakh per consumer. A dual-phase energy accounting mechanism ensures that excess energy initially offsets the subsidy, after which LPDD will buy back power at regulated rates. The initiative includes integrated digital processes for consumer registration, meter data synchronization—positioning Ladakh as a leader in decentralized commercial solar deployment.

Commercial Consumer profile in Ladakh

The table below represents the **commercial electricity consumer base** and their **sanctioned load** across Leh and Kargil as on 1st April-2025:



Load Range	Total Consumers
Total	10865
Less Than 1KW	391
1KW	6351
>1KW<2KW	57
>2KW<3KW	1978
>3KW<5KW	727
>5KW<10KW	786
>10KW<15KW	374
>15KW<20KW	78
>20KW<25KW	41
>25KW<30KW	17
>30KW<35KW	12
>35KW<40KW	7
>40KW	46

This consumer base constitutes the primary target for grid-connected rooftop solar installations under the proposed subsidy scheme.

Eligibility Criteria

To qualify for participation in the rooftop solar subsidy scheme, commercial consumers must fulfil the following conditions:

1. The applicant must be registered under the Commercial Tariff Category as recognized by the Ladakh Power Development Department (LPDD).

2. The spare rooftop premises where the system is to be installed must be owned by the consumer or held under a valid lease agreement.

3. The proposed solar PV system must be grid-connected and compliant with the net metering regulations of LPDD and JERC Ladakh.

4. Consumers having a sanctioned load of less than 1 kW shall be required to install a minimum 1 kW rooftop solar plant. Consumers having a sanctioned load above 1 kW may install rooftop solar capacity up to 80% of their sanctioned load, rounded off to the nearest whole number (kW). For this scheme, the sanctioned load for existing consumers **shall be frozen as on 31st March 2025** and considered **as the reference for determining eligible solar capacity.**

5. Priority Mechanism: Eligible consumers shall be considered for subsidy disbursement and energy buyback on a **First-In-First-Out (FIFO) basis**, based on the date and time of successful registration under the scheme, subject to fulfilment of all eligibility criteria and technical validations.

6. Consumers failing to meet these criteria shall not be eligible for subsidy benefits or energy buyback provisions under this scheme.

Capacity Range and System Limitations

1. Solar Projects of capacity up to **500 kWp** at one premise based on the technologies approved by MNRE are eligible for connecting the project with the Grid under this proposal. The capacity of the Solar Project to be installed under Group Net Metering or Virtual Net Metering framework **shall not be less than 5 kWp and more than 500 kWp.**
2. Provided that the Solar Project of rating higher than 500 kWp can be considered by the LPDD, if the distribution system remains stable with higher rating Solar Project getting connected to the grid.

3. However, to get the UT subsidy of **₹15,000 per kW or 1/3 rd of the total project cost (whichever is lower)** LPDD is proposing the higher cap for Solar rooftop subsidy to **Rs 6,00,000**.
4. **Sanctioned Load Constraint:**

   For commercial consumers, the installed rooftop solar capacity shall be governed as follows:

   Consumers having a sanctioned load of **less than 1 kW** shall be required to install a **minimum 1 kW** rooftop solar plant.

   Consumers having a sanctioned load above 1 kW may install rooftop solar capacity up to 80% of their sanctioned load, rounded off to the nearest whole number (kW).

All installations must be in accordance with the approvals of LPDD and relevant technical standards.

These limitations are intended to optimize grid integration, avoid back-feed issues, and ensure proportional benefit utilization across consumer categories.

Financial Subsidy Structure

To encourage adoption of rooftop solar systems by commercial category consumers, the Union Territory of Ladakh shall extend financial assistance as outlined below:

Subsidy Amount: ₹15,000 per kW of installed capacity.

Maximum Subsidy Cap: ₹6,00,000 per consumer. Disbursement: Subsidy shall be released post successful installation, inspection, and commissioning certification by LPDD. The subsidy will be directly disbursed from the UT Ladakh's Renewable Energy Fund.

Example:

Capacity (kW)	Subsidy at ₹15,000/kW	Eligible Subsidy
5	₹ 75,000	₹ 75,000 or 1/3rd of Total Project Cost whichever is lower
30	₹ 4,50,000	₹ 4,50,000 1/3rd of Total Project Cost whichever is lower
40	₹ 6,00,000	₹6,00,000 (max)

Note: Installed capacity must not exceed the consumer's80% of sanctioned load. Subsidy is applicable only to eligible commercial consumers as defined under LPDD's guidelines.

Energy Offset and Buyback Mechanism

Offset Phase

- The **excess solar energy exported** by the consumer to the grid will be used to **offset the upfront subsidy** received.
- **Offset Rate:** Levelized Tariff discovered (₹3.56 per kWh) (subject to revision by LPDD and Hon'ble JERC-JKL).

Buyback Phase (Post-Offset Completion)

- Once the subsidy is fully offset, **LPDD will purchase additional exported electricity** from the consumer.

- **Buyback Rate:** Levelized Tariff discovered (₹3.56 per kWh) (subject to revision by LPDD and Hon'ble JERC-JKL). Detail calculation is attached in annexure.

Metering Mechanism

Gross Energy Meter (Smart Solar Meter)

1. A Smart Solar Meter shall be installed by the Commercial Consumer, adhering to specifications prescribed under the applicable rules and regulations issued by the Central Electricity Authority (CEA), the Ministry of New and Renewable Energy (MNRE), and the Joint Electricity Regulatory Commission (JERC) for Ladakh.

2. The meter must include real-time communication capabilities for seamless integration with the DISCOM's IT systems, enabling efficient energy monitoring and automated billing adjustments.

3. The metering system must also support data integration with the MNRE National Portal, providing real-time visibility of generation data for subsidy processing and national-level tracking.

4. LPDD shall be responsible for the testing and sealing of the installed meter. All associated costs, including meter testing and related services, shall be borne by the consumer.

5. All metering activities—including testing, inspection, calibration, and installation—shall comply with the relevant CEA metering regulations and LPDD's metering guidelines.

Net Metering Arrangement (Bi-Directional Metering)

6. Consumers opting for net metering shall install a bi-directional meter that accurately records both the energy imported from the grid and the surplus solar energy exported to the grid.

7. The net metering system must be compliant with the latest standards and guidelines issued by CEA, MNRE, and JERC for Ladakh, ensuring accurate measurement and transparent billing.

8. The bi-directional meter shall support real-time communication, allowing seamless integration with DISCOM's IT systems for automated billing adjustments and performance monitoring.

9. LPDD shall oversee the testing, calibration, and sealing of the net metering system. The associated costs shall be borne by the consumer.

10. The exported surplus energy shall be credited to the consumer's account as per the applicable tariff regulations.

Technical & Regulatory Compliance

To ensure safety, reliability, and performance consistency across all installations, the following compliance measures shall be strictly enforced:

A Roof Top Solar (RTS) Photo Voltaic (PV) system shall be installed on rooftops/terraces/balcony/Building Integrated Photovoltaic (BIPV) or on elevated structures. In case of installation on an elevated structure, the structure must have a minimum ground clearance of 8 feet at the lowest point, to be considered eligible for the CFA under the scheme.

The RTS system shall consist of the following:

1. Solar Photo Voltaic (SPV) modules consisting of required number of SPV modules
2. Inverter/PCU
3. Module Mounting structures
4. Net Meter/Smart Meter
5. Array Junction Boxes
6. DC Distribution Box
7. AC Distribution Box
8. Protections – Earthing, Lightning, Surge
9. Cables
10. Drawing & Manuals

11. Miscellaneous Components/Package of Grid Connected Rooftop Solar PV System: The components of a Grid Connected Rooftop Solar PV System shall essentially comprise but not be limited to solar PV Panels/modules of required number, Inverters/PCU, module mounting structures of minimum 600mm ground clearance at the lowest point from the roof surface, total Cable/wiring of suitable length, cable conduits, required array junction boxes, DC distribution box, AC distribution box, various connectors, nut- bolts, civil and mechanical works, Protection-Earthing, lightning, surges, drawling & manual, 05 years of comprehensive operation & maintenance of grid-connected rooftop solar PV plant and other miscellaneous works.

1. Solar PV modules

1.1. **Domestic Manufactured Solar PV modules using domestically manufactured Solar cells shall be used in the Scheme.**

1.2. The PV modules used must qualify to the latest edition of IEC standards or equivalent BIS standards, i.e. IEC 61215/IS 14286, IEC 61853-Part I or IS 16170-Part I, IS/IEC 61730 Part-1 & Part 2 and IS 17210(part 1) or IEC 62804-1 (PID). For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701/IS 61701. Thin - Film terrestrial photovoltaic (PV) modules must qualify to IS 16077: 2013 / IEC 61646: 2008

1.3. The rated power of solar PV module shall have maximum tolerance up to +3%.

1.4. The peak-power point current of any supplied module string (series connected modules) shall not vary by +1% from the respective arithmetic means for all modules and/or for all module strings (connected to the same MPPT), as the case may be.

1.5. The peak-power point voltage of any supplied module string (series connected modules) shall not vary by + 2% from the respective arithmetic means for all modules and/or for all module strings (connected to the same MPPT), as the case may be.

1.6. The temperature co-efficient power of the PV module shall be equal to or better than -0.4%/°C for crystalline modules and -0.3 %/°C for thin films modules.1.7. Solar PV modules capacity to be used should adhere to the Approved List of Models and Manufacturers (ALMM) of Solar Photovoltaic Modules (Requirement for Compulsory Registration) Order 2019 - Implementation issued vide OM NO. 283/54/2018-GRID SOLAR -Part (I) Dated 10th March 2021 and subsequent amendments and latest regulations.

1.8. Solar PV modules of minimum fill factor 75%, to be used.

1.9. All PV modules should have a nominal power output of >90% at STC during the first 10 years, and >80% during the next 15 years. Further, module shall have nominal power output

of >97% during the first year of installation—degradation of the module below 0.5 % per annum

1.10. 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.

i. Defects and/or failures due to manufacturing.

ii. Defects and/or failures due to quality of materials.

iii. Nonconformity 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. The PV modules shall be replaced by manufacturers, without charging any cost to the end consumer during the specified period of warranty.

1.11. Modules deployed must use a RF identification tag laminated inside the glass. The following information must be mentioned in the RFID used on each module:

i. Name of the manufacturer of the PV module

ii. Name of the manufacturer of Solar Cells.

iii. Month & year of the manufacture (separate for solar cells and modules)

iv. Country of origin (separately for solar cells and module)

v. I-V curve for the module Wattage, Im, Vm and FF for the module

vi. Unique Serial No and Model No of the module

vii. Date and year of obtaining IEC PV module qualification certificate.

viii. Name of the test lab issuing IEC certificate.ix. Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001.

x. Nominal wattage +3%.

xi. Name, if applicable.

1.12. Other details as per IS/IEC 61730-1 clause 11 should be provided at appropriate place. In addition to the above, the following information should also be provided:

i. The actual Power Output Pmax shall be mentioned on the label pasted on the back side of PV Module.

ii. The Maximum system voltage for which the module is suitable to be provided on the back sheet of the module.

iii. Polarity of terminals or leads (colour coding is permissible) on junction Box housing near cable entry or cable and connector.

1.13. Unique Serial No, Model No, Name of Manufacturer, Manufacturing year, Make in India logo and module wattage details should be displayed inside the laminated glass.

2. Inverter/PCU

2.1 The Solar Photovoltaic Inverters must comply with the Quality Control Order dated 30.08.2017 for Solar Photovoltaic Inverters and its amendments thereof.

2.2 Inverters/PCU should comply with applicable IEC/equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683, IS 16221 (Part 2), IS 16169 and IEC 60068-2(1,2,14,30)

2.3 /Equivalent BIS Std.

2.4 Maximum Power Point Tracker (MPPT) shall be integrated in the inverter/PCU to maximize energy drawn from the array. Charge controller (if any) / MPPT units environmental testing should qualify IEC 60068-2(1, 2, 14, 30)/Equivalent BIS standard. The junction boxes/enclosures should be IP 65 or better (for outdoor)/ IP 54or better (indoor) and as per IEC 529 Specifications.2.5 All inverters/PCUs shall be IEC 61000 compliant for electromagnetic compatibility, harmonics, Surge, etc.

2.6 The PCU/ inverter shall have overloading capacity of minimum 20%.

2.7 Typical technical features of the inverter shall be as follows-

i. Nominal AC output voltage and frequency: as per CEA/State regulations

ii. Output frequency: 50 Hz

iii. Grid Frequency Synchronization range: as per CEA/State Regulations

iv. Ambient temperature considered: -20°C to 60°C

v. Protection of Enclosure: IP-54 (Minimum) for indoor and IP-65(Minimum) for outdoor.

vi. Grid Frequency Tolerance range: as per CEA/State regulations

vii. Grid Voltage tolerance: as per CEA/State Regulations

viii. No-load losses: Less than 1% of rated power

ix. Inverter efficiency (Min.): >90% (In case of 10 kW or below with in-built galvanic isolation)

x. The Minimum Overall Efficiency (ηt) as per IS 17980 for Solar Inverters should adhere to the following:

xi. THD: < 3%

xii. PF: > 0.9 (lag or lead)

xiii. Should not inject DC power more than 0.5% of full rated output at the interconnection point and comply to IEEE 519.

xiv. The inverter should have the inbuilt facility to communicate system related data through SIM/dongle. The inverter may also be enabled for Wi-Fi based communication.

2.8 All the Inverters should contain the following clear and indelible Marking Label & Warning Label as per IS16221 Part II, clause 5. The equipment shall, as a minimum, be permanently marked with:

i. The name or trademark of the manufacturer or supplier;

ii. A model number, name or other means to identify the equipment,iii. A serial number, code or other marking allowing identification of manufacturing location and the manufacturing batch or date within a twelve- month time period.

iv. Input voltage, type of voltage (a.c. or d.c.), frequency, and maximum continuous current for each input.

v. The Ingress Protection (IP) rating

2.9 In case the consumer is having a 3-ϕ connection, 1-ϕ/3-ϕ inverter shall be provided by the vendor as per the consumer's requirement and regulations of the State.

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

2.11 Integration of PV Power with Grid & Grid Islanding:

i. 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 Rooftop PV 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, if not available in inverter.

3. Module Mounting Structure (MMS):

3.1 Supply, installation, erection and acceptance of module mounting structure (MMS) with all necessary accessories, auxiliaries and spare part shall be in the scope of the work.

3.2 Module mounting structures can be made from three types of materials. They are Hot Dip Galvanized Iron, Aluminium and Hot Dip Galvanized Mild Steel (MS). However, MS will be preferred for raised structure.3.3 MMS Steel shall be as per latest IS 2062:2011 and galvanization of the mounting structure shall be in compliance of latest IS 4759. MMS Aluminium shall be as per AA6063 T6. For Aluminium structures, necessary protection towards rusting need to be provided either by coating or anodization.

3.4 All bolts, nuts, fasteners shall be of stainless steel of grade SS 304 or hot dip galvanized, panel mounting clamps shall be of aluminium and must sustain the adverse climatic conditions.

Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.

3.5 The module mounting structures should have angle of inclination as per the site conditions to take maximum insolation and complete shadow-free operation during generation hours. However, to accommodate more capacity the angle of inclination may be reduced until the plant meets the specified performance ratio requirements.

3.6 The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed. The PV array structure design shall be appropriate with a factor of safety of minimum 1.5.

3.7 The upper edge of the module must be covered with wind shield so as to avoid build air ingress below the module. Slight clearance must be provided on both edges (upper & lower) to allow air for cooling.

3.8 Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed. The Empanelled Agency shall be fully responsible for any damages to SPV System caused due to high wind velocity within guarantee period as per technical specification.

3.9 The structures shall be designed to allow easy replacement, repairing and cleaning of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Necessary testing provision for MMS to be made available at site.

3.10 Adequate spacing shall be provided between two panel frames and rows of panels to facilitate personnel protection, ease of installation, replacement, cleaning of panels and electrical maintenance.

3.11 The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.3.12 The Rooftop Structures maybe classified in three broad categories as follows:

i. Ballast structure

a. The mounting structure must be Non-invasive ballast type and any sort of penetration of roof to be avoided.

b. The minimum clearance of the structure from the roof level should be in between 70-150 mm to allow ventilation for cooling, also ease of cleaning and maintenance of panels as well as cleaning of terrace.

c. The structures should be suitably loaded with reinforced concrete blocks of appropriate weight made out of M25 concrete mixture.

ii. Tin shed

a. The structure design should be as per the slope of the tin shed.

b. The inclination angle of structure can be done in two ways-

c. Parallel to the tin shed (flat keeping zero-degree tiling angle), if the slope of shed in Proper south direction

d. With same tilt angle based on the slope of tin shed to get the maximum output.

e. The minimum clearance of the lowest point from the tin shade should be more then 100mm.

f. The base of structure should be connected on the Purlin of tin shed with the proper riveting.

g. All structure member should be of minimum 2 mm thickness.

iii. RCC Elevated structure: It can be divided into further three categories:

A Minimum clearance from roof (upto 1000 MM) (for reference only)

a. The structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. The gap between module should be minimum 30MM.b. Base Plate – Base plate thickness of the Structure should be 5MM for this segment.

c. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40 MM in flange side in Lip section.

d. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side (y- axis) and 40 MM in flange side (x-axis).

e. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.

f. Front/back bracing – The section for bracing part should be minimum 2MM thickness.

g. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

h. For single portrait structure the minimum ground clearance should be 500MM.

B Medium clearance from roof (1000MM – 2000 MM) (for reference only)

a. Base Plate – Base plate thickness of the Structure should be Minimum 6MM for this segment.

b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.

c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.

d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.

f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

C Maximum clearance from roof (2000MM – 3000 MM) (for reference only)

a. Base Plate – Base plate thickness of the Structure should be minimum 8 MM for this segment.

b. Column – Structure Column thickness should be minimum 2.6MM in square hollow section (minimum 50x50) or rectangular hollow section (minimum 60x40) or 3MM in C-Channel section.

c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.

d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.

e. Front/back bracing – The section for bracing part should be minimum 3MM thickness.

f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

D Super elevated structure (More than 3000 MM clearance from roof) (for reference only)

A. Base structure

a. Base Plate – Base plate thickness of the Structure should be 10MM for this segment.b. Column – Structure Column minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).

c. Rafter - Structure Rafter minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).

d. Cross bracing – Bracing for the connection of rafter and column should be of minimum thickness of 4mm L-angle with the help of minimum bolt diameter of 10mm.

B. Upper structure of super elevated structure –

a. Base Plate – Base plate thickness of the Structure should be minimum 5MM for this segment.

b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.

c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.

d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.

e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.

f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and

g. purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

C. If distance between two legs in X-Direction is more than 3M than sag angle/Bar should be provide for purlin to avoid deflection failure. The sag angle should be minimum 2MM thick, and bar should be minimum 12Dia.

D. Degree - The Module alignment and tilt angle shell be calculated to provide the maximum annual energy output. This shall be decided on the location of array installation.E. Foundation – Foundation should be as per the roof condition; two types of the foundation can be done- either penetrating the roof or without penetrating the roof.

a. If penetration on the roof is allowed (based on the client requirement) then minimum 12MM diameter anchor fasteners with minimum length 100MM can be used with proper chipping. The minimum RCC size should be 400x400x300 cubic mm. Material grade of foundation should be minimum M20.

b. If penetration on roof is not allowed, then foundation can be done with the help of 'J Bolt' (refer IS 5624 for foundation hardware). Proper Neto bond solution should be used to adhere the Foundation block with the RCC roof. Foundation J - bolt length should be minimum 12MM diameter and length should be minimum 300MM.

E. Material standards:

a. Design of foundation for mounting the structure should be as per defined standards which clearly states the Load Bearing Capacity & other relevant parameters for foundation design (As per IS 6403 / 456 / 4091 / 875).

b. Grade of raw material to be used for mounting the structures so that it complies the defined wind loading conditions (As per IS 875 - III) should be referred as follows (IS 2062 – for angles and channels, IS 1079 – for sheet, IS 1161 & 1239 for round pipes, IS 4923 for rectangular and square hollow section)

c. Test reports for the raw material should be as per IS 1852 / 808 / 2062 / 1079 / 811.

d. In process inspection report as per approved drawing & tolerance should be as per IS 7215.

e. For ascertaining proper welding of structure part following should be referred:

f. D.P. Test (Pin Hole / Crack) (IS 822)

g. Weld wire grade should be of grade (ER 70 S - 6)

h. For ascertaining hot dip galvanizing of fabricated structure following should be referred:-i. Min coating required should be as per IS 4759 & EN 1461.

j. Testing of galvanized material

a) Pierce Test (IS 2633)

b) Mass of Zinc (IS 6745)

c) Adhesion Test (IS 2629)

d) CuSO4 Test (IS 2633)

e) Superior High-Grade Zinc Ingot should be of 99.999% purity (IS 209) (Preferably Hindustan Zinc Limited or Equivalent).

k. Foundation Hardware – If using foundation bolt in foundation then it should be as per IS 5624.

4. Metering

4.1 The specifications net meter/smart meter shall be as per the latest technical specifications issued by the Central Electricity Authority (CEA) and its amendment thereof.

4.2 A Roof Top Solar (RTS) Photo Voltaic (PV) system shall consist of following energy meters:

a) Net meter/ smart meter: To record import and export units.

b) Generation meter (if required as per the state regulations: To keep record for total generation of the plant.

4.3 The installation of meters including CTs & PTs, wherever applicable, shall be carried out by LPDD as per the terms, conditions and procedures laid down by the concerned JERC-JKL/LPDD.

5. Array Junction Boxes

5.1 The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated aluminum /cast

aluminium alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.5.2 Copper bus bars/terminal blocks housed in the junction box with suitable termination threads Conforming to IP 65 or better standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry, Single /double compression cable glands should be provided.

5.3 Polyamide glands and MC4 Connectors may also be provided. The rating of the junction box shall be suitable with adequate safety factor to interconnect the Solar PV array.

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

5.5 Junction boxes shall be mounted on the MMS such that they are easily accessible and are protected from direct sunlight and harsh weather.

6. DC Distribution Box (DCDB)

6.1 May is not required for small plants, if suitable arrangement is available in the inverter.

6.2 DC Distribution Box are to be provided to receive the DC output from the PV array field.

6.3 DCDBs shall be dust & vermin proof conform having IP 65 or better protection, as per site conditions.

6.4 The bus bars are made of EC grade copper of required size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the inverter along with necessary surge arrestors. MCB shall be used for currents up to 63 Amperes, and MCCB shall be used for currents greater than 63 Amperes.

7. AC Distribution Box (ACDB)

7.1 AC Distribution Panel Board (DPB) shall control the AC power from inverter, and should have necessary surge arrestors, if required. There is interconnection from ACDB to mains at LT Bus bar while in grid tied mode.

7.2 All switches and the circuit breakers, connectors should conform to IEC 60947:2019, part I, II and III/ IS 60947 part I, II and III.

7.3 The isolators, cabling work should be undertaken as part of the project.

7.4 All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air -insulated, cubical type suitable for operation on 1-ϕ/3-ϕ, 415 or 230 volts, 50 Hz (or voltage levels as per CEA/State regulations).7.5 The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

7.6 All indoor panels will have protection of IP 54 or better, as per site conditions. All outdoor panels will have protection of IP 65 or better, as per site conditions.

7.7 Should conform to Indian Electricity Act and CEA safety regulations (till last amendment).

7.8 All the 415 or 230 volts (or voltage levels as per CEA/State regulations) AC devices / equipment like bus support insulators, circuit breakers, SPDs, Voltage Transformers (VTs) etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions.

a. Variation in supply voltage: as per CEA/State regulations

b. Variation in supply frequency: as per CEA/State regulations

7.9 The inverter output shall have the necessary rated AC surge arrestors, if required and MCB/ MCCB. RCCB shall be used for successful operation of the PV system, if inverter does not have required earth fault/residual current protection.

8. Protections

The system should be provided with all necessary protections like earthing, Lightning, and Surge Protection, as described below:

8.1 Earthing Protection

8.1.1 The earthing shall be done in accordance with latest Standards.

8.1.2 Each array structure of the PV yard, Low Tension (LT) power system, earthing grid for switchyard, all electrical equipment, inverter, all junction boxes, etc. shall be grounded properly as per IS 3043-2018.

8.1.3 All metal casing/ shielding of the plant shall be thoroughly grounded in accordance with CEA Safety Regulation 2010. In addition, the lightning arrester/masts should also be earthed inside the array field.

8.1.4 Earth resistance should be as low as possible and shall never be higher than 5 ohms.

8.1.5 For 10 KW and above systems, separate three earth pits shall be provided for individual three earthing viz.: DC side earthing, AC side earthing and lightning arrestor earthing.8.2 Lightning Protection

8.2.1 The SPV power plants shall be provided with lightning & over voltage protection, if required. The main aim in this protection shall be to reduce the overvoltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. Lightning arrestor shall not be installed on the mounting structure.

8.2.2 The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors (LAs). Lightning protection should be provided as per NFC17-102:2011/IEC 62305 standard.

8.2.3 The protection against induced high voltages shall be provided by the use of Metal Oxide Varistors (MOVs)/Franklin Rod type LA/Early streamer type LA.

8.2.4 The current carrying cable from lightning arrestor to the earth pit should have sufficient current carrying capacity according to IEC 62305. According to standard, the minimum requirement for a lightning protection system designed for class of LPS III is a 6 mm2 copper/ 16 mm2 aluminium or GI strip bearing size 25*3 mm thick). Separate pipe for running earth wires of Lightning Arrestor shall be used.

8.3 Surge Protection

8.3.1 Internal surge protection, wherever required, shall be provided. It will consist of three SPD type-II/MOV type surge arrestors connected from +ve and –ve terminals to earth.

9. Cables

9.1 All cables should conform to latest edition of IEC/equivalent BIS Standards along with IEC 60227/IS 694, IEC 60502/IS 1554 standards.

9.2 Cables should be flexible and should have good resistance to heat, cold, water, oil, abrasion etc.

9.3 Armored cable should be used, and overall PVC type 'A' pressure extruded insulation or XLPE insulation should be there for UV protection.9.4 Cables should have Multi Strand, annealed high conductivity copper conductor on DC side and copper/FRLS type Aluminium conductor on AC side. For DC cabling, multi- core cables shall not be used.

9.5 Cables should have operating temperature range of -10°C to +80°C and voltage rating of 660/1000 V.

9.6 Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop less than 2% (DC Cable losses).

9.7 The size of each type of AC cable selected shall be based on minimum voltage drop. However, the maximum drop shall be limited to 2%.

9.8 The electric cables for DC systems for rated voltage of 1500 V shall conform to IS 17293:2020.

9.9 All cable/wires are to be routed in a RPVC pipe/ GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable is easily identified.

9.10 All cable trays including covers to be provided.

9.11 Thermo-plastic clamps to be used to clamp the cables and conduits, at intervals not exceeding 50 cm.

9.12 Size of neutral wire shall be equal to the size of phase wires, in a three-phase system.

9.13 The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25 years.

10. Drawings & Manuals:

10.1 Operation & Maintenance manual/user manual, Engineering and Electrical Drawings shall be supplied along with the power plant.

10.2 The manual shall include complete system details such as array lay out, schematic of the system, inverter details, working principle etc.

10.3 The Manual should also include all the Dos & Don'ts of Power Plant along with Graphical Representation with indication of proper methodology for cleaning, Operation and Maintenance etc.

10.4 Step by step maintenance and troubleshooting procedures shall also be given in the manuals.

10.5 Vendors should also educate the consumers during their AMC period.

11. Miscellaneous:

11.1 Connectivity: The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the JERC-JKL regulation for Grid connectivity and norms of LPDD and amended from time to time.

11.2 Safety measures: Electrical safety of the installation(s) including connectivity with the grid must be considered and all the safety rules & regulations applicable as per Electricity Act, 2003 and CEA Safety Regulation 2010 etc. must be followed.

11.3 Shadow analysis: The shadow analysis report with the instrument such as Solar Pathfinder or professional shadow analysis software of each site should be provided, and the consumer should be educated to install the system only in shadow free space. Lower performance of the system due to shadow effect shall be liable for penalty for lower performance.

Quality Certification, Standards and Testing for Grid-Connected Rooftop Solar PV Systems/Power Plants

Solar PV Modules/Panels			
Category	**Standard/Certification**	**Details**	**Purpose**
Solar PV Modules/Panels	**IEC 61215 / IS 14286**	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules	Ensures modules can withstand environmental conditions and remain durable.
	IS/IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules	Tests resilience of PV modules in coastal and corrosive environments.
	IEC 61853-1 / IS 16170-1	Photovoltaic (PV) Module Performance Testing and Energy Rating	Measures irradiance and temperature performance, providing power ratings for energy efficiency.
	IEC 62716 / IS 16664	Ammonia (NH3) Corrosion Testing of Photovoltaic (PV) Modules	Tests PV modules for ammonia corrosion, particularly for agricultural environments.
	IS 16077: 2013 / IEC 61646: 2008	Thin-Film Terrestrial Photovoltaic (PV) Modules – Design Qualification and Type Approval	Tests thin-film solar modules for efficiency and performance.
	IS/IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing	Ensures modules meet safety standards for construction and durability.
	IS 17210 (Part 1) / IEC TS 62804-1	Test Method for Detection of Potential-Induced Degradation in Photovoltaic (PV) Modules	Detects potential-induced degradation (PID) in crystalline silicon modules to prevent efficiency loss.
Solar PV Inverters	**IEC 62109 or IS 16221**	Safety of Power Converters for Use in Photovoltaic Power Systems – Part 1: General Requirements, Part 2: Requirements for Inverters	Establishes safety standards for inverters used in solar systems.

	IS/IEC 61683 (latest)	Photovoltaic Systems – Power Conditioners: Procedure for Measuring Efficiency	Measures efficiency of PV inverters under various load conditions (10%, 25%, 50%, 75%, 90-100%).
	IEC 60068-2 / IEC 62093	Environmental Testing of PV System – Power Conditioners and Inverters	Ensures inverters perform reliably under diverse environmental conditions.

FUSES			
Category	**Standard/Certification**	**Details**	**Purpose**
Fuses	**IS/IEC 60947 (Part 1, 2 & 3), EN 50521**	General safety requirements for connectors, switches, and circuit breakers (AC/DC):	Establishes the safety rules for low-voltage switchgear and connectors used in PV systems.
		1) Low-voltage Switchgear and Control-gear, Part 1: General rules	
		2) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers	
		3) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors switch-disconnectors and fuse-combination units	
		4) EN 50521: Connectors for photovoltaic system-Safety requirements and tests	
	IS/IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems	Specifies fuse-link standards to protect PV energy systems.
Solar PV Roof Mounting Structure	**IS 2062/IS 4759/ AA6063 T6**	Material for the structure mounting	Ensures the material strength and durability for roof mounting
		1) IS 2062 - Steel for Structural Purpose	

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		2) IS 4759 - Aluminium alloys for construction	structures in solar installations.
		3) AA6063 T6 – Aluminum alloy for roof mounting structures	
Surge Arrestors	**BFC 17-102:2011/ NFC 102:2011/ IEC 62305**	Lightening Protection Standard	Provides guidelines for protecting solar systems from lightning and surge damage.
	IEC 60364-5-53/ IS 15086-5 (SPD)	Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching, and control	Ensures proper installation of surge protection devices (SPD) to safeguard electrical systems from power surges.
		Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods	

Cables			
Category	**Standard/Certification**	**Details**	**Purpose**
Cables	**IEC 60227 / IS 694**	General test and measuring methods for PVC insulated cables (working voltage ≤ 1100V); suitable for outdoor use	Ensures safety and performance of PVC insulated power and control cables in solar systems.
	IEC 60502 / IS 1554 (Part 1 & 2)		
	IEC 69947		
	IS 17293:2020	Electric cables for photovoltaic systems rated for 1500V DC	Ensures reliability and safety in high-voltage DC applications for solar PV installations.
Earthing / Lightning	**IEC 62561 Series / IEC 60634 Series**	Chemical earthing standards (as applicable); specifies requirements for components of lightning protection systems	Ensures system grounding and lightning protection is safe, effective, and corrosion resistant.
	IEC 62561-1	LPSC Part 1: Requirements for connection components	Defines material and construction standards for secure electrical connections in lightning protection systems.

	IEC 62561-2	LPSC Part 2: Requirements for conductors and earth electrodes	Ensures conductor and electrode components meet lightning safety performance thresholds.
	IEC 62561-7	LPSC Part 7: Requirements for earthing enhancing compounds	Specifies standards for materials used to enhance conductivity of earthing systems in poor soil conditions.
Junction Boxes	**IEC 60529**	Specifies IP protection levels: IP65 or better for outdoor and IP54 or better for indoor junction and terminal boxes	Ensures dust and water ingress protection, enhancing safety and longevity of junction boxes in solar systems.

Monitoring, Inspection & Disbursement

To maintain transparency, accountability, and quality across all solar rooftop installations, the following protocol shall be followed:

1. The UT Subsidy shall be disbursed only after successful site inspection and issuance of a Commissioning Certificate by the designated officials of Ladakh Power Development Department (LPDD).
2. All installations are subject to random and scheduled third-party quality audits, ensuring adherence to MNRE/CEA norms and system performance benchmarks.
3. The inspection process will include checks for installation quality, metering accuracy, grid synchronization, and compliance with sanctioned load and capacity limits.
4. Any deviation or non-compliance identified during inspection shall be rectified by the consumer prior to subsidy release.

Budgetary Framework and Implementation Timeline

To ensure the financial viability and long-term sustainability of the Rooftop Solar Subsidy Scheme for Commercial Consumers, the following budgetary and implementation structure shall be adopted:

1. Capital Subsidy Support: A capital subsidy of ₹15,000 per kW, subject to a maximum limit of ₹6,00,000 per consumer, shall be provided. This subsidy shall be funded directly from the budgetary provisions of the Union Territory of Ladakh.

2.Annual Financial Cap: An annual financial cap shall be determined by the UT Administration based on:

I. Available budgetary resources
II. Projected consumer demand
III. Annual rooftop solar capacity addition targets

3. Budgetary Review and Adjustment:

Budgetary allocation shall be reviewed at the end of each financial year and adjusted in accordance with:

I. Actual scheme uptake.
II. Total subsidy disbursed.
III. Performance of installations and consumer participation.

4. Mid-Year Revisions: Provision shall be made for mid-year revisions in case of:

I. Higher-than-anticipated demand
II. Market-driven cost fluctuations
III. Such revisions shall be subject to administrative approval by the competent authority.

Proposed Timeline and Priority Targets

The scheme shall be implemented over a 5-year period, with segmented consumer targeting to maximize energy savings, improve grid performance, and ensure equitable access:

Year	Financial Year	Target Segment	Load Range	Objective	Subsidy Allocation (₹ Cr)
Year 1	FY 2025–26	High-load commercial consumers	>15 kW	Drive early impact in energy savings and demand reduction	₹ 4.06
Year 2	FY 2026–27	High-load commercial consumers (contd.)	>15 kW	Continued deployment among large consumers	₹ 3.19

Year 3	FY 2027–28	Moderate commercial consumers	10–15 kW	Support mid-size businesses and institutions	₹ 4.94
Year 4	FY 2028–29	Small & medium commercial consumers	3–10 kW	Enable wider adoption and support distributed generation	₹ 8.10
Year 5	FY 2029–30	Low load & small businesses	<3 kW	Ensure inclusive access and energy equity across commercial segments	₹ 4.31
Total	FY 2025–30	—	—	—	₹ 24.61

Projected Consumer Growth and Subsidy Increment Trends

This section outlines historical consumer addition, current subsidy levels, and projected growth across each target segment. It also includes estimated increases in consumer base and corresponding subsidy adjustments:

Target Segment	Load Range	Current Subsidy Amount (In Cr)	New Consumer added in past three Fiscal			Actual Consumer Strength	Projected Consumer Strength (In Nos.)			
			FY-22-23	FY-23-24	FY-24-25	FY-25-26	FY-26-27	FY-27-28	FY-28-29	FY-29-30
High-load commercial consumers	>15 kW	₹ 7.25	18	12	24	201	219	237	255	273
Moderate commercial consumers	10–15 kW	₹ 4.94	61	37	26	374	415	456	497	538
Small & medium commercial consumers	3–10 kW	₹ 8.10	151	200	124	1513	1671	1829	1987	2145
Low load & small businesses	<3 kW	₹ 4.31	550	975	1122	8777	9659	10541	11423	12305
Total		₹ 24.61	780	1224	1296	10865	11964	13063	14162	15261

Target Segment	Load Range	Current Subsidy Amount (In Cr)	Projected Subsidy Increment (In Cr)			
			FY26-27	FY27-28	FY28-29	FY29-30
High-load commercial consumers	>15 kW	₹ 7.25	₹ 0.65			

Moderate commercial consumers	10–15 kW	₹ 4.94		₹ 1.08		
Small & medium commercial consumers	3–10 kW	₹ 8.10			₹ 2.54	
Low load & small businesses	<3 kW	₹ 4.31				₹ 1.73
Total		₹ 24.61	₹ 0.65	₹ 1.08	₹ 2.54	₹ 1.73

Sl No	Target Segment	Load Range	Year	Total Subsidy (In Cr)
1	High-load commercial consumers	>15 kW	2025-2027	7.9
2	Moderate commercial consumers	10–15 kW	2027-28	6.02
3	Small & medium commercial consumers	3–10 kW	2028-29	10.64
4	Low load & small businesses	<3 kW	2029-30	6.04
Total Subsidy Amount in Cr				30.6

Note: The target consumer segment is only considered for the existing consumers falling within the timeline & category, however new consumers added in the system as per the projection have to ensure installation of Solar Rooftop (by own-self) which can be made mandatory through the competent authority at the time of providing permission for commercial establishment.

Digital Portal & MNRE Integration

To ensure seamless consumer engagement and transparency throughout the rooftop solar process, a robust digital portal will be developed with the following features:

Consumer Registration & Tracking: The portal will allow for easy online registration of commercial consumers, enabling real-time tracking of application status, subsidy approval, and installation progress.

API Integration with MNRE: The portal will be integrated with the Ministry of New and Renewable Energy (MNRE) system, allowing real-time data exchange. This will ensure timely updates on system performance, subsidy processing, and compliance with national guidelines.

Technology Stack: The platform will be built using secure and scalable technologies such as React for the front-end, Node.js for back-end development, and PostgreSQL for data management. Additionally, it will be hosted on NIC/MNRE/UBS of LPDD or AWS Cloud to ensure high availability, security, and scalability.

This digital infrastructure will enhance user experience, streamline approval processes, and provide stakeholders with easy access to accurate, up-to-date information.

Generation Guarantee Clause

To safeguard the **UT Ladakh Subsidy** and ensure that the solar installations meet the required energy generation standards, the following conditions will be applied:

1. **Minimum Generation Guarantee:** The **consumer (prosumers)** shall guarantee a minimum generation of **80% of the installed capacity** over a 5-year period, starting from the **date of commissioning** of the rooftop solar system.

2. **Performance Monitoring:** The system's performance will be monitored via **real-time data integration** with the digital portal and the **MNRE National Portal**. The energy generated will be tracked and cross-verified against the expected generation based on the system's size, local solar radiation, and other environmental factors.

3. **Subsidy Recovery Clause:** In case the system fails to meet the **minimum generation guarantee**, the **UT subsidy** disbursed to the consumer will be **proportionally**

recovered by the Ladakh Power Development Department (LPDD) from the consumer, in accordance with the terms and conditions set forth in the agreement.

4. **Exception Criteria:** Generation shortfalls due to **uncontrollable circumstances** (e.g., extreme weather events, grid outages, equipment failure etc.) will be reviewed on a case-by-case basis, with the possibility of extending the guarantee period to account for downtime.

This clause ensures that the subsidy is used effectively and that consumers maintain their responsibility for the long-term operation and performance of their solar systems.

Expected Outcomes

The implementation of this rooftop solar initiative for commercial consumers in Ladakh is expected to deliver significant benefits, including:

Increase in Rooftop Solar Capacity: The scheme will foster a substantial increase in solar capacity within Ladakh's commercial sector, enabling businesses to adopt renewable energy solutions at scale.

Grid Decongestion & Diesel Use Reduction: By encouraging solar energy adoption, the program will help reduce grid dependence and alleviate pressure on local power infrastructure. Additionally, it will contribute to reduction in diesel generator usage, which is currently prevalent due to limited grid capacity in remote areas.

Digitally Integrated Deployment Model: The initiative will establish a digitally integrated platform for seamless tracking, monitoring, and subsidy management. This will ensure compliance with subsidy guidelines while enhancing operational efficiency.

Empowered Commercial Prosumers: The scheme will transform commercial consumers into prosumers—individuals who both produce and consume energy—empowering them to take a leading role in Ladakh's clean energy transition, contributing towards national renewable energy goals and carbon neutrality.

The program will create a cleaner, more resilient energy ecosystem in Ladakh, improving the region's energy security and supporting sustainable economic growth.

Consumer Awareness & Engagement:

To ensure informed participation and smooth implementation, awareness workshops will be conducted with commercial consumers once the rooftop solar proposal is approved by the competent authority. These workshops will aim to educate stakeholders on technical requirements, regulatory compliance, benefits of rooftop solar adoption, and the application process.

Levelized Tariff Calculation

Solar Capacity (in KW)	Project Cost (in Rs)	UT-Subsidy (in Rs)	Total Investment (in Rs)	Debt Amount (in Rs)	Equity Amount (in Rs)	Return on Equity (in %)	Levelized Tariff (Considering 25 Years) (in Rs/KWh)
5	₹ 3,00,000.00	₹ 75,000.00	₹ 2,25,000.00	₹ 1,57,500.00	₹ 67,500.00	14%	₹ 3.56
10	₹ 6,00,000.00	₹ 1,50,000.00	₹ 4,50,000.00	₹ 3,15,000.00	₹ 1,35,000.00	14%	₹ 3.56
15	₹ 9,00,000.00	₹ 2,25,000.00	₹ 6,75,000.00	₹ 4,72,500.00	₹ 2,02,500.00	14%	₹ 3.56
20	₹ 12,00,000.00	₹ 3,00,000.00	₹ 9,00,000.00	₹ 6,30,000.00	₹ 2,70,000.00	14%	₹ 3.56
25	₹ 15,00,000.00	₹ 3,75,000.00	₹ 11,25,000.00	₹ 7,87,500.00	₹ 3,37,500.00	14%	₹ 3.56
30	₹ 18,00,000.00	₹ 4,50,000.00	₹ 13,50,000.00	₹ 9,45,000.00	₹ 4,05,000.00	14%	₹ 3.56
35	₹ 21,00,000.00	₹ 5,25,000.00	₹ 15,75,000.00	₹ 11,02,500.00	₹ 4,72,500.00	14%	₹ 3.56
40	₹ 24,00,000.00	₹ 6,00,000.00	₹ 18,00,000.00	₹ 12,60,000.00	₹ 5,40,000.00	14%	₹ 3.56

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Total Payback period of Subsidy

Total Load (in MW)	Total Subsidy Amount (In Cr)	Winter Duration (In Month Nos.)	Percentage of Energy pushed-in to Grid	CUF	Total Energy Per Year (In MWh)	Initial Payback Rate (In Rs/KWh)	Total Amount per Year (In Cr)	Payback period (In Year Nos.)
23.84	₹ 24.61	5	90%	21%	16219.09	₹ 3.56	₹ 5.77	4.3

Revenue Savings for LPDD

APPC Rate	Total Energy Available Per Year	Energy purchase Amount @APPC Rate (In Cr)	Energy purchase Amount @Levelized Tariff rate (In Cr)	Total Savings Per Year (In Cr)
₹ 4.25	16219.09	₹ 6.89	₹ 5.77	₹ 1.12

Assumptions:

1. *It is presumed during November to March 90% of the Solar Energy will be fed to grid.*
2. *The Solar CUF considered as 21%*