Concept Note

Subject: Performance based Incentive Scheme for DISCOMs for expeditious development of Grid Connected Rooftop Solar Power Plants

Background: Renewable energy must play a major role in the energy mix for achieving sustainable energy security in the years ahead. Accordingly, India has committed before the United Nations to increase the share of installed electric power from non-fossil-fuel sources to 40 % by 2030 as a part of our Nationally Determined Contributions (NDCs). In the immediate term, the ambitious target of 175 GW of installed renewable power by 2022 will be a crucial contribution to this NDC goal. Of this, 40 GW of Solar power has to be achieved by 2022 from Rooftop Solar (RTS) power projects. In a Grid connected RTS plant, the power generated from SPV panels during the day time can be utilized for powering captive loads and for feeding excess power to the grid. **On an average, 1 kWp solar power plant can be developed over rooftop area of about 10 sqm and at the benchmark cost of Rs. 75,000**.

2. Initiatives: Realizing our immense RTS potential and the ambitious targets, Ministry of New & Renewable Energy had launched Grid Connected Rooftop and Small Solar Power Plants Programme (Phase - I) with increased budget of Rs. 5000 Cr for rooftop solar photovoltaic (RTS) projects up to 2019-20. Under this programme, RTS capacity in the commercial and industrial sectors to be developed without any subsidy support. RTS plantson rooftops and vacant areas of buildings in residential/ social /institutional / Government / PSU sectors would be developed based on subsidy/ incentiveas follows :-

a. For rooftops and vacant areas of buildings in residential/ social / institutional sectors, capital subsidy at the rate of upto 30% of project cost for General category States and upto 70% of project cost for Special category States
b. For rooftops and vacant areas of buildings in Government / PSU sectors, financial incentive at the following rates:

Achievement vis-a-vis Target Allocation	**Incentives for General Category States**	**Incentives for Special Category States/UTs**
80% and above within sanctioned period	Rs.18,750/- per kW	Rs.45,000/- per kW
Below 80% and upto 50% within sanctioned period	Rs.11,250/- per kW	Rs.27,000/- per kW
Below 50%/ delayed commissioning up 6 months beyond sanctioned period	Rs.7,500/- per kW	Rs.18,000/- per kW

3. In addition to the interest and initiative by the investors and developers, development of RTS sector depends significantly on net/ gross metering regulations. Considering this, State Electricity Regulatory Commissions of 30 States/ UTs have notified regulations for net-metering/feed-in-tariff mechanism. On the financing side, the Reserve Bank of India (RBI) has included financing to such projects under priority sector lending. To enable RTS development from planning stage, Ministry of Urban Development (MoUD) has recently amended Model Building Bye-laws for including RTS plants for major building projects.MoUD has also asked all States/UTs to mandate RTS plants on all new buildings through the Urban Local Bodies. The guidelines for Smart City programme also require at least 10% energy to be sourced from Solar energy.

4. During past few years, most RTS plants under net metering regulations have been developed in two modes; viz. (i) CAPEX/Ownership mode where investment is made by the rooftop owner and bids are invitedon the project cost and (ii) RESCO/PPA mode where project investment is made by private developer and bids are invited on tariff to be charged by developer for recovering the investment. Under the second model, Power Purchase Agreement (PPA) is signed by the Rooftop owner with the developer. To support such development in either of the models (CAPEX/ RESCO), MNRE has issued guidance documents of the Compendium of allpolicies and regulations of GoI and State/UTs and the Best Practice Guide on RTS. Further, MNRE has initiated training 10000 Surya Mitras/installers. Government of India is also collaborating with multilateral organisations for supporting utilities on RTS projects, including training for Discom, SNA and SERCs' officers.

5. **Challenges:** Out of present solar capacity of 8,000 MW, only 4% is from RTS systems. The main issues stalling the progress of RTS segment are:
    a. High investment costs for consumers in installation of RTS plants under CAPEX mode for the consumers. Further without Central subsidy, RTS development tariffs are presently competitive only for commercial and industrial sectors;
    b. For project developers, there is additional cost for aggregation of demand as it is difficult to identify and persuade willing and financially capable customers. Further decentralized nature of development requires installation at multiple locations. The deal closing cycle, in general, is long ranging between 6 months to one year which hinders developersto raise funds from banks;
    c. Challenges are also faced by Distribution Company/Utility/ Board (Discom) to operationalize net-metering regulations due to concerns onreduced electricity sale, revenue erosion from paying customers, operational challenges, etc. Further Design and implementation of RTS project requires substantial coordination of several agencies, viz. Regulatory Commission (Net metering regulation), Discom (net-metering & approvals), ChiefElectrical Inspector (approval), SNA (release of subsidy), Banks (housing/ improvement loan), Urban Local Body (enforcing model building byelaws), Rooftop owner (access to roofs), Developers/ Aggregators / EPC contractors (project implementation & maintenance), etc.
    d. Lack of awareness among different stakeholders, mainly the Discoms and rooftop owners about the strong business case of RTS.

6. **Benefits of RTS:**While majority of the solar installations globally are on rooftops, RTS plants are yet to gain popularity in India. RTS projects offer severaladvantages and opportunities for a Discom as follows :-
    a. they do not require pooling of land or separate transmission facilities, unlike ground mounted solar projects;
    b. they have minimal technical losses as power generation is near to the place of consumption;
    c. RTS project enables Discom to meet its renewable purchase obligation (RPO);
    d. Electricity from RTS systems will help them manage daytime peak loads, which are projected to become more widespread as India's economy grows;
    e. Localized generation helps meet daytime peaking power requirements and avoids the need to buy expensive short term power;
    f. RTS plant ensures fruitful utilization and economic value of idle rooftops;

g. RTS plants help improve tail-end grid voltages and reduction in system congestion with higher self-consumption;
h. Decentralized generation reduces pressure on grid;
i. RTS plant makes the consumer an active investor and a participant in the energy sector;

7. **Expected Roles of Discom:** Discoms can thus play a key role in proliferation of RTS as they provide approval for installation, provide electricity balancing services manage the distribution network and also have billing interface with rooftop owner. Thus it is essential that Discoms become the key drivers of this programme rather than an indirect participants. As Discoms already have access to consumers, RTS client acquisition or demand aggregation cost would be cut down substantially. Discoms already have organised invoicing/ billing/ execution systems, which is understood and accepted by all customers. Further they are best suited to manage distributed and relatively independent clients / prosumers. Hence the proactive roles that Discoms could play for ensuring rapid development of RTS sector are

a. **<u>Facilitation & Demand Integration Role</u>**
   i. Developing a dedicated RTS cell headed by Chief/ Superintending Engineer rank officer for focusing on RTS development,
   ii. Undertaking mass campaign to promote RTS by consumers by educating them about benefits of RTS plants,
   iii. Creating facilitative and easy to access mechanism for consumers,
   iv. Revisiting and streamlining existing approved processes for net-metering/grid connectivity,
   v. Reducing time delays and laying down strict timelines for Discom actions,
   vi. Developing Online portal for gathering information of willing consumers and for uploading of application forms, their transfer across levels and speedy approval. Such portal can facilitate interfaces of rooftop owner with SNA, Electrical Inspector, Banks, etc.

b. **<u>Pro-active Coordination Role</u>**
   i. Training Discom officers/ staff supporting RTS installation and grid connectivity,
   ii. Creating coordination mechanism for ensuring that activities of SNA, ChiefElectrical Inspector, Banks, ULB, Rooftop owner, Developers for ensuring easy installation of RTS plants,
   iii. Coordinating with the Urban Local Bodies (ULBs) to undertake city specific initiatives, to develop guidelines for mandatory RTS installation for new /large buildings, to provide incentives for RTS like concession in property tax to building owners etc. Such coordination should enable ULBs to integrate maximum possible RTS at the design / building plan stage itself,
   iv. Coordinating with all Departments/ PSUs of State/ UT Government for solarizing the rooftops of all their buildings.

c. **<u>Driver of RTS</u>**
   i. Empanelling project developers and/ or EPC contractors,
   ii. Undertaking RTS development under CAPEX/ RESCO modes,
   iii. Directly accessing subsidy from Ministry for development of RTS plants for buildings in residential/ social / institutional sectors,

iv. Directly accessing financial incentive from Ministry for development of RTS plants for buildings in Government / PSU sectors,
v. Providing facility of joint billing and recovery for RTS plant through common billing, reading and payment mechanisms

8. **Proposal:** Accordingly, it is proposed to bring Discoms to the forefront in RTS implementation by providing them performance enabling financial support to accelerate deployment of RTS systems within their distribution area. This Scheme would provide financial assistance in the form of grant upto maximum of **Rs. 37.5 lakh per installed MW of RTS**. The thrust will be on the outcomes and performance improvement of Discom through required reforms. The key objectives of the proposal is to:
    a. Expand RTS projects by supporting capacity of 1350 MW in various sectors, and
    b. Support the Discoms to assess upgradation and modernization requirements of their distribution network, facilitate demand aggregation, developing consumer awareness, developing enabling forms/ processes, meter/ equipment procurement, capacity development, etc.

9. **Eligibility, Reforms & Conditions:** While all Discoms, including private sector Discoms and State Electricity/Power Departments (where applicable) shall be eligible for financial assistance, Discoms must fulfil the following conditions :-
    a. State/ UT of the Discom shall have the regulation or tariff order enabling the deployment of grid-connected rooftop and small solar PV systems;
    b. Discom shall have a well-defined and functional implementation process for its RTPV programme clearly addressing consumer application process, approval process, commissioning process, infrastructure upgradation, timeframes, etc.;
    c. Discom shall establish a dedicated "RTS Cell", headed by Chief / Superintending Engineer rank officer for focusing on RTS development. Such cell shall act as the node for implementation of this Scheme and be empowered to perform all functions under this Scheme;
    d. Discom must commit to proactively undertake all the three roles as explained aboveand must undertake the **mandatory reforms** (**Annexure 1**);
    e. Discom should ensure achievement of year-wise RTPV installation "Targets" for subsequent releases;
    f. Discom's budget heads and requisite funds should be clearly identified in the proposal;
    g. Discoms must provide a year-on-year plan for the requirement of the proposed grant funds and RTS capacity implementation. Discoms shall be reimbursed, bi-annually, for the amounts of grant funds based on RTS plants implemented.
    h. Discoms shall report back to MNRE, their respective state departments and the SERCs the application of such funds. Such reporting is to ensure that there is no overlap with any other scheme executed by the Discom either with State or Central Government support, like Integrated Power Development Scheme (IPDS).

10. **Programme Components:** This scheme would support various Programme Components, including, but not be limited to, the following:
    a. Establishment of RTS Cell for rapid RTS development.
    b. Developing streamlined enabling forms/ processes and online portals for easy processing,

c. Focused consumer awareness campaigns for large scale proliferation of RTS by clarifying business case for variety of consumers,
d. Empanelling vendors in transparent fashion for Discom areas and developing standard terms of contract for consumers
e. Developing web-portal for demand aggregation, for online processing of application and for acting as interface for consumer with Discom, SNA, Banks, Chief Electrical Inspector, etc
f. Undertaking joint billing for grid supply and RTS supply and remitting RTS amount to concerned developers.
g. Setting up consumer helpline center/ consumer grievance cell for quick and clear guidance to consumers and for addressing issues related to installed RTS plants,
h. Preparing formats for application, templates for agreements and guidelines to be followed for installation of rooftop solar projects under different models,
i. Capacity building/ technical training of engineers/ staff of Discom, SNA, SERC and Chief Electrical Inspector on safety and interconnection requirements, grid integration, business models, streamlined processes, energy accounting, billing software and net metering,resolution of customer issues, etc
j. Training and certification of RTPV installers / project developers to ensure quality installation and O&M,
k. Development or upgradation of existing IT platform for billing for ensuring credit for the export of energy from RTS systems. For this, framework for Net Metering and the reverse flow of current must be integrated into the Enterprise Resource Planning System and billing software of Discom.
l. Third-party inspection of RTPV systems,
m. Technical studies, Research and development,Market research and Consumer survey,
n. Procurement and installation of net-meters with smart metering capabilities as such net/ bi-directional meters are often not available to individual consumer, leading to excessive delays in commissioning. Utilities presently ask the consumers to procure their own bi-directional meters and get them certified from the Utility's testing labs.
o. Upgradation of distribution transformers (DT) to accommodate higher solar penetration,
p. Investment in storage system in load shedding areas,
q. Establishment of allied technologies/ solutions such as network automation, energy storage, etc. through appropriate justification,
r. Online consumer feedback/rating for RTPV installers
s. Promoting standardized PPAs, Lease Right Agreements,
t. Encouraging bankers to partner with them for providing easy sanction process and develop customer friendly financing options,
u. Developing mechanisms for payment guarantee to developers, joint billing & recovery, joint sanction of subsidy and Bank loan, etc
v. Developing an effective monitoring and evaluation system to track progress of installation and performance of the RTS projects,
w. Proactively interacting and coordinating with SNA, Banks, Chief Electrical Inspector and RTS Developers to understand market challenges and provide solutions.

11. **Proposal Formulation:** Discom can undertake any or all the programme component as per its needs, within the overall central financial assistance (grant) upto **37.5 lakh per installed MW of RTS**. State/ UT Government may provide additional assistance/ grant to Discom. Discom

shall submit its proposal to MNRE through the respective State / UT departments. SNA and SERC would be kept apprised by the Discom of the proposal and final approval for ensuring that there is no overlap with any other scheme executed by the Discom either with State or Central Government support such as the Integrated Power Development Scheme (IPDS). Eligible Discom should, in their proposal submit the following information

a. Year-on-year RTS installation target up to 2019-20. Such installation targets should be in lines with the National Tariff Policy and orders there under as also with State level RTS target,
b. Selected Programme Components supported by Discom towards achieving the RTS Targets and the timelines for their implementation,
c. Project reports on the undertaken Programme Components capturing needs assessment, scope of works, bill of quantities (BOQ), associated cost heads (with necessary justification), anticipated benefits/ outcomes, monitoring and evaluation,
d. Statement on congruence of proposed Targets with the State/ UT's RTS deployment targets and on convergence of funds available under other schemes of the State/ Central Government for the proposed components,
e. Recommendations/ Views of SNA dealing with Renewable Energy
f. Recommendations/ Views of State/ UT Department dealing with Power.

12. **Sanction & Fund Releases:**National-level Sanctioning and Monitoring Committee (SMC) would assess the Discom proposals and committed targets and sanction the proposals based on availability of funds. While the central financial assistance in the form of grant for the Discom proposal shall be limited to maximum of **Rs. 37.5 lakh per installed MW of RTS,** State/ UT Government may provide additional assistance/ grant to Discom. Based on the approval of the Scheme Proposal and Project Reports by the National-level Sanctioning and Monitoring Committee (SMC), the sanction under the Performance based Incentive Schemeand the initial instalment (30%) would be issued. This should be utilized by the Discom to undertake projects/ activities for creating enabling eco-system for RTS and for timely achievement of targets. MNRE would depute independent agencies to assess **performance of the Discom on mandatory reforms and on committed targets**. Subsequent releases would be tied to such assessed performance and the installed capacity in MW of RTS during previous financial year as per the Operational Guidelines of this Scheme.

13. **Convergence:** Apart from the such Performance enabling financial support, the Discoms can also avail subsidy/ incentive support from this Ministry as mentioned in paragraph 2 abovefor RTS development. Further, this incentive scheme does not render the Discoms ineligible to receive grants, incentives, financing or any other kind of support from any existing or future schemes of Central/State/other agencies, unless so specific and till the time there is no doubt counting of expenses.

14. **Awards:** The scheme will also identify best practices of Discoms/ SNAs and award the best performance at Discom, Division (EE) and Zone (AE) levels. Hence to promote the grid connected RTS systems, cash awards along with certificates /shields shall be provided as follows:

Sl. No.	Achievement / Performance Benchmark	Type/No. of Awards	Cash Awards/ Certificates	Total Amount (Rs. in Lakh)

1.	Highest capacity installation by Discom	1st 2nd 3rd	Rs. 10.00 lakh Rs. 07.00 lakh Rs. 03.00 lakh	20.00
2.	Highest capacity installation on State/ UT Government buildings	1st 2nd 3rd	Rs. 5.00 lakh Rs. 3.00 lakh Rs. 2.00 lakh	10.00
3.	Highest no. of connections/net-metering provided by Discom	1st 2nd 3rd	Rs. 10.00 lakh Rs. 07.00 lakh Rs. 03.00 lakh	20.00
4	Highest capacity installation by commercial and industrial establishments in private sector.	1st 2nd 3rd	Rs. 5.00 lakh Rs. 3.00 lakh Rs. 2.00 lakh	10.00
5	Largest capacity installation on a single roof by private establishments	1st 2nd 3rd	Rs. 5.00 lakh Rs. 3.00 lakh Rs. 2.00 lakh	10.00
6	Highest capacity installed (with subsidy) by a Developer / Channel Partner	1st 2nd 3rd	Rs. 5.00 lakh Rs. 3.00 lakh Rs. 2.00 lakh	10.00
7	Highest capacity installed (without subsidy) by a Developer/ Channel Partner	1st 2nd 3rd	Rs. 5.00 lakh Rs. 3.00 lakh Rs. 2.00 lakh	10.00
8.	Innovative & Proactive Actions/ Experiment of Discom	1st 2nd 3rd	Rs. 5.00 lakh Rs. 3.00 lakh Rs. 2.00 lakh	10.00

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Annexure 1 : Mandatory Reforms to be undertaken by the DISCOMs

Pursuant to the 40 GW target from rooftop Solar (RTS) power by 2022, there is an urgent need for Discoms to step up their efforts in facilitating RTS systems. Discoms have till now been silent bystanders to the RTS market till now. While they need to actively promote this segment, some Discom policies are more restrictive rather than promotional, especially in terms of capacities, contractual arrangements and approval processes. HenceDiscoms need to put in place minimum essential requirementsto support RTS installations :

1. **Definition of "rooftop solar":** The concept of rooftop solar is based on the scale of the PV plant rather than the fact whether it is situated on a roof/ terrace or not. Hence, the definition of RTS should also include small plant on the ground residing within the boundary of a facility up to the capacity of 2000 kWp.

2. **Injection voltage level:** Most state regulations prescribe a particular injection voltage level based on the capacity of the rooftop PV system (for example - capacities up to 6 kW to 230 V/ 1-ph/ 50 Hz, capacities between 6 kW and 100 kW to 415 V/ 3-ph/ 50 Hz, capacities between 100 kW and 4 MW to 11 kV/ 3-ph/ 50 Hz, and so on). However, a large rooftop PV system under net-metering should be allowed to inject power into the Consumer's premises at lower voltage levels and multiple injection points because the Consumer is also consuming power at such lower voltage levels. Stepping up voltages of large rooftop PV systems to higher levels and then stepping them down again for consumption would result into a loss of efficiency and also increased capital costs.

3. **PV system capacity limitation due to Consumer's contract demand/ sanctioned load:** The Consumer should be allowed to interconnect a rooftop solar PV system with capacity up to 100% of its contract demand/ sanctioned load. This provision is present in several State/ UT policies and regulations such as Andhra Pradesh, Maharashtra and Delhi. Such a provision aims towards maximizing the overall installed solar capacity without exceeding the actual demand.

4. **PV system capacity limitation due to distribution transformer (DT) capacity:** Several Discoms already allow connecting RTS to 80% of the DT capacity.But the allowable PV capacity connected to a DT should be 100% of the DT's capacity. This is because the DT should be used to its fullest capacity, and also solar PV would typically not exceed 85% of its nameplate DC capacity. If the DT is unable to step-up power in the reverse direction, the Discom should make the necessary modifications/ replacements to it.

5. **Cost of augmentation of distribution network:** The Consumer should not bear the cost of any upgradation/ modification of the distribution grid, as it serves as a deterrent for the Consumer to adopt an RTS system often making the returns unviable. This cost should to be adjusted under the annual revenue requirement (ARR) and the proposed scheme.

6. **Simple and efficient interconnection process**: Discom should have a simple yet effective interconnection process, which can be broadly divided into four steps as follows: 1) Application Process, which is initiated by the Consumer; 2) Screening for technical feasibility and Preliminary Approval given by the Discom to the Consumer to start installation; 3) Installation of the PV system by the Consumer and, upon installation, call for inspection/ commissioning; and 4) Inspection and commissioning of the PV system by Discom. This process must be

reviewed with consumer groups, solar associations, think tanks, State Department and SNA. The process should be streamlined with simple forms and minimal paperwork, multi-agency approvals and transaction requirements.

7. **Time-bound Safety Requirement Certification:**Discom shall make sure that all the necessary safety approvals as envisaged by the Central Electricity Authority and SERC are taken within one week. The inspection and certification of the RTS system shall coordinated by the Utility. The reports of the inspection and safety clearances shall be duly signed and approved by the and Chief Electrical Inspector (EI/CEI).Already reform oriented Discoms do not require approvals from the Chief Electrical Inspector for interconnecting RTPV systems of capacities less than 10 kW.

8. **Timelines for Utility Approvals:** The entire process from the consumer application till RTS system commissioning should be undertaken within 3 months(including commissioning). For such time bound execution, the Utility and SERC should prescribe timelines for specific sub-tasks. The end-to-end approval process for RTPV systems should be well-defined, streamlined and have a realistic mandatory timelines.

9. **Public Domain & FIFO:** The approval process should be executed on electronic/ online platform for simplicity and transparency.The timelines need to be made public by publication of the entire procedures for interconnection on the Discom, SERC and the SNA's websites. Discoms must allow connectivity to the RTS system, on first come first serve basis, subject to operational constraints.

10. **Treatment of surplus power fed into the grid:** The philosophy of net metering is to create a balance between the Consumer and the Discom, and hence the rate of purchase of surplus RTS power by Discom should be the same as the retail tariff. This rate is independent of settlement method, whether at the end of each billing cycle or annual.

11. **Banking of solar power:** Solar power, being seasonal in nature, should be eligible for banking to the tune of 12 months without any banking charges.

12. **Clarity on duration of exemption from wheeling/ banking charges and cross-subsidy surcharge:** The duration of exemption from wheeling/ banking charges and cross-subsidy surcharge should be clearly specified at the beginning of the life of a RTS system, which is critical for the Consumer/ Investor to plan for revenue and returns. Thusfew SERCs provide 10 year period for exemption from wheeling/ banking charges and cross-subsidy surcharge.

13. **Capacity building:** It is extremely important that RTS systems are systematically designed, constructed and maintained. Hence strong efforts should be made towards promoting skilling and certifying installers, and ensuring that installation works are undertaken by such skilled and certified manpower.

14. **Group net-metering:** As many rooftops/ terraces are 'common areas', several Beneficiaries/ Consumers would like to install their own RTS systems at a single location, which should be facilitated. For example, Delhi's solar policy allows Group Captive RTPV plants, where multiple Consumers can be credited from a single larger RTS system. Such an arrangement can be done by either (i) providing a combined billing meter for all participating consumers at a

single location and allowing the Consumers to internally settle their consumption/ generation, or (ii) providing for internal adjustments from a solar generation meter among Consumers.

15. **Virtual net-metering:** As several Consumers may want to benefit from net-metering but not have access to their own roof/ terrace, they should be allowed to set up a RTPV system anywhere in the same DisCom's Licensee Area, directly feed into the grid, and adjust it against their electricity bill. Delhi's solar policy has recognized this such an arrangement, where all surcharges, duties and losses are exempted.

16. **Broaden the scope of net-metering:** Net-metering is a transaction concept rather than an interconnection topology, which can accommodate many connectivity and contractual arrangements under its umbrella. A very common model, 'third-party ownership' of RTPV systems should be allowed, where the Consumer may buy solar power or lease RTPV system/ equipment from a third party. In some arrangement, the Consumer may even connect their RTPV system to the grid using an apparent 'feed-in'/ 'generation'/ 'gross meter', but the accounting may be done by the Discom on a net-metering basis. Group and virtual net-metering should also be allowed. Such arrangement should be recognized and qualify for all promotional benefits as a net-metered RTPV system.

17. **Empanelment of Suppliers, Component Vendors and RTS Developers:** For fast and easy installation of RTS plants with proper quality, the Discoms should undertake empanelment of vendors/ supplies for basic components such as inverters and net meters as also turn-key RTS system developers. This information should be communicated to the Utility staff for an efficient due-diligence process. The same shall also be communicated to the consumers through a dedicated solar PV rooftop page/ web-portal on the utility website.

18. **Customer Education:**Rooftop solar program is essentially a public movement. Hence it is equally important to educate and motivate consumers regarding: 1) The solar technology, its possibilities and its limitation, 2) Investing in a rooftop PV system and its payback, 3) Selecting the right system installer, and with appropriate terms and conditions, and 4) Administrative processes for establishing a RTS system. This should be done in local language.

19. **Innovative Business Models :**Utilities can further promote solar rooftop projects through innovations such as facility of joint billing and recovery (through common billing, reading and payment mechanism), direct investment by Discom in RTS projects, offering loans (low interest) to consumers and recovering them through billing, developing attractive schemes for RTS with ULBs/ State Government, etc

20. **Developing Comprehensive system for Monitoring & Evaluation:**Maintenance of technical standards,quality control and timely grievance redressal hold the key for customer satisfaction and success of the programme. Hence Utilities should track performance of all developers to ensure quality in execution. Further mapping of all RTS projects on GPS and data entry on SPIN portal of MNRE are critical for tracking of performance.

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Annexure 2: State-wise Cumulative RTS Installation Target & Scheme Target (MWp)

Sr	Head	Rate (Rs.)		Quantity		Total (Rs.)	Remarks
1	Net Meters	5,000	per meter	200	meters	10,00,000	200 Nos. of RTPV Systems of 5 kWp each.
2	DT Augmentation	241,26,984	per MVA	20%		48,25,397	Rs. 1.52 Cr. per MVA, Efficiency: 91%, Power Factor: 0.7, Augmentation requirement for 20% of DTs
3	Storage Systems	200,00,000	per MWh	20%		40,00,000	Assuming 1 hour of storage for 20% of RTPV Capacity
4	Development/ Upgradation of IT System	2000,00,000	Lump sum	1		5,71,429	Lump sum cost: Rs. 20 Cr., distributed among 350 MW
5	Network Automation	2500,00,000	Lump sum	1		7,14,286	Lump sum cost: Rs. 25 Cr., distributed among 350 MW
6	Capacity Building (Engineers, Inspectors)	15,000	per person	250	Personnel	10,714	
7	Installer Training and Certification	30,000	per Installer	20	Installers	3,00,000	20 Installers per MW; Training subsidized by 50%
8	Third-Party Inspection	0.5%	of CapEx	1	MW	3,00,000	Capital Cost of Rs. 6 Cr. per MW for RTPV systems
9	Technical Studies, R&D	100,00,000	Lump sum	1		28,571	Lump sum budget: Rs. 1 Cr., distributed among 350 MW
10	Market Research and Consumer Survey	50,00,000	Lump sum	1		14,286	Lump sum budget: Rs. 50 Lakh, distributed among 350 MW
11	Consumer Awareness Campaigns	100,00,000	Lump sum	1		28,571	Lump sum budget: Rs. 1 Cr., distributed among 350 MW
12	Establishment of Portals/ Call Centres	50,000	per month	300	months	42,857	Monthly office rent of Rs. 50,000/-, 5 offices per DisCom

13	Consumer Helpline	10,80,000	Annual CTC	5	years	15,429	Monthly salary for 3 people: Rs. 40,000/ x1-; Rs. 25,000/- x2
14	Training for Utility Ancilliary Activities	50,000	per person	50	Personnel	7,143	Policy, regulation, business models, best practices, etc.
15	Development of Process, Formats, etc.	10,00,000	Lump sum	1		2,857	Lump sum budget: Rs. 10 Lakh, distributed among 350 MW
16	Installer Rating/ Review System	5,00,000	Lump sum	1		1,429	Lump sum budget: Rs. 5 Lakh, distributed among 350 MW
17	Support for establishment of RTS Cell	36,00,000	Annual CTC	5	years	51,429	Monthly salary for 5 Officers: Rs. 1,00,000/- x1; Rs. 60,000/- x2, Rs. 40,000/- x2.
18	Misc/ Contingency	5%				5,95,720	
	TOTAL					**125,10,117**	

A	**DisCom Cost Share**	**70%**				**87,57,082**	
B	**MNRE Cost Share**	**30%**				**37,53,035**	**(Rounded to Rs. 37.5 Lakh)**

Note: Activity heads, amounts, cost share, etc. given in this Annexure are for illustration purpose only. The Discom should undertake its own gap assessment and propose activities in order to undertake its mandatory reforms.

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Annexure3: State-wise Cumulative RTS Installation Target & Scheme Target (MWp)

States	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	Total	Target Capacity under Proposed Scheme* (indicative only)
Andhra Pradesh*	10	240	250	300	350	400	450	2,000	68
Bihar	5	120	125	150	175	200	225	1,000	34
Chhattisgarh	4	84	88	104	120	140	160	700	24
Delhi	5	132	138	165	190	220	250	1,100	37
Gujarat	15	385	400	480	560	640	720	3,200	108
Haryana	5	200	200	235	280	320	360	1,600	54
Himachal Pradesh	2	38	40	48	56	64	72	320	10
Jammu & Kashmir	2	54	55	74	80	90	95	450	15
Jharkhand	4	96	100	120	140	160	180	800	27
Karnataka	10	275	290	344	403	460	518	2,300	78
Kerala	4	96	100	120	140	160	180	800	27
Madhya Pradesh	10	265	275	330	385	440	495	2,200	74
Maharashtra	20	565	588	704	823	940	1060	4,700	160
Orissa	5	120	125	150	175	200	225	1,000	34
Punjab	10	240	250	300	350	400	450	2,000	68
Rajasthan	10	275	288	344	403	460	520	2,300	78
Tamil Nadu	15	420	438	524	613	700	790	3,500	118
Telangana*	10	240	250	300	350	400	450	2,000	68

Uttarakhand	2	42	44	52	60	70	80	350	12
Uttar Pradesh	20	510	538	650	752	860	970	4,300	145
West Bengal	10	252	263	315	370	420	470	2,100	70
Arunachal Pradesh	2	5	5	8	10	10	10	50	2
Assam	4	30	30	38	42	50	56	250	8
Manipur	4	3	6	8	9	10	10	50	2
Meghalaya	1	6	6	8	9	10	10	50	2
Mizoram	1	6	6	8	9	10	10	50	2
Nagaland	1	6	6	8	9	10	10	50	2
Sikkim	1	6	6	8	9	10	10	50	2
Tripura	1	6	6	8	9	10	10	50	2
Chandigarh	1	12	12	14	18	20	23	100	3
Goa	1	20	20	22	23	30	34	150	5
Dadra & Nagar Haveli	1	24	25	30	35	40	45	200	7
Daman & Diu	1	12	12	14	18	20	23	100	3
Puducherry	1	12	12	14	18	20	23	100	3
Andaman & Nicobar	1	2	2	2	5	4	4	20	1
Lakshadweep	1	1	1	1	2	2	2	10	1
TOTAL	**200**	**4,800**	**5,000**	**6,000**	**7,000**	**8,000**	**9,000**	**40,000**	**1350**

Utility Related Actions

1. **A simple and efficient interconnection process**: Each utility should have a simple yet effective interconnection process, which can be broadly divided into four steps as follows: 1) Application Process, which is initiated by the Consumer; 2) Screening for technical feasibility and Preliminary Approval given by the DISCOM to the Consumer to start installation; 3) Installation of the PV system by the Consumer and, upon installation, call for inspection/ commissioning; and 4) Inspection and commissioning of the PV system by DISCOM. The DISCOMs should not complicate process by, adding additional conditions, information, paperwork and transaction requirements.

2. **Timelines for Utility Approvals:** The entire process from the time the consumer applies for a Net Metering connection till the time the system is commissioned shall be undertaken in a time bound manner as prescribed by the Utility and monitored by the Utility Management as well as the State Regulatory Commission. This timeframe needs to be prepared by the concerned Utility keeping in mind the timelines requirement by its specific sub-tasks (but should not be higher than 50% of the average of other utilities). These timelines need to be made public by publication of the entire procedures for interconnection on the Utilities and the SNA's websites. The Managing Director and Director Technical and Director Commercial should monitor these timelines and steps of the interconnection procedures once every month. Utilities should allow connectivity to the rooftop solar PV system, on first come first serve basis, subject to operational constraints.

3. **ERP Systems of Utilities:** One of the biggest challenges facing solar PV installations at the beginning is to get the credit for the export of energy from the solar PV rooftop systems. This can only be achieved if the framework for Net Metering and the reverse flow of current is already integrated into the Enterprise Resource Planning System of the Utilities and their billing softwares. The Utilities shall also cater to the changes required to be made in their ERP systems in order to ensure that the appropriate changes in recording and accounting of energy exchange through bi-directional meters and their settlement is done smoothly and as soon as the scheme is launched by the concerned Utility. Therefore any utility offering Net Metering needs to have modified its ERP and billing systems to suit these requirements.

4. **Procurement of Bi-directional Meters:** As the demand for solar rooftop installations grows, so does the demand for bi-directional meters. Utilities usually do not have a accurate idea of how many Bi-directional Meters to order and thus in many cases there is a huge wait time to procurement of meters from the Utility end, leading to delays in commissioning. It is proposed that the Utilities shall, in the meanwhile, allow the consumers to procure their own bi-directional meters from the market (also in case the utility has run out of its own ones) and get them certified from the Utility's testing labs in order to speed up the process.

5. **Monthly Monitoring:** There should be a working group formed under the supervision of the Managing Director of the Utility. The monthly monitoring group shall be in place to monitor the performance of interconnection and timely execution of the projects at the consumer end. In case of any delays in the execution of the interconnection process for more than a month after request of commissioning, the Utility shall put in place a redressal and possibly a penalty mechanism for its own engineers.

6. **Capacity Building of Utility Personnel:** It is pertinent to specify here that with the introduction of solar energy in the energy mix will require a significant rise in the number of installations, capacity building of the Utility Engineers and other Officials shall become the utmost priority. The Utility shall ensure that its engineers are trained on how these systems are deployed and have capacity to technically review applications, resolve customer issues, inspect key safety and interconnection requirements on sites, etc.

7. **Commissioning and Safety Requirement Certification:** The Utility shall make sure that all the necessary safety approvals as envisaged by the Central Electricity Authority and the State Utility are taken within one week of each other. The inspection and certification of the roof top system shall coordinated by the Utility. The reports of the inspection and safety clearances shall be duly signed and approved by the EI/CEI of the concerned Utility.

8. **Online Application and Approval Process:** In order to speed up the entire application process, thus cutting down on the timeframe for installation. The entire application process along with the interconnection procedure shall be performed through online process. The Utility shall make sure that all the relevant information that may be required by the consumer/developer is readily available on the Utility website/web-portal.

9. **Empanelment of Suppliers and Component Vendors:** Basic components such as inverters and net meters shall be empanelled by the Utility and the information with regards to the empanelment shall be communicated to the staff of the Utility for an efficient due-diligence process. The same shall also be communicated to the consumers and other developers in the market through a dedicated solar PV rooftop page/web-portal on the utility website.

10. **Technical and Process Committee:** In order to make the due interconnection process easy the Utility shall constitute a Technical and a Process Committee for reviewing, addressing and managing the interconnection processes and technical challenges arising out of the deployment of the solar rooftop systems. These committees shall be constituted by the utility and shall have representation from research organizations, consumer groups, solar associations, think tanks and the state nodal agency. These groups shall help the Utility address the various technical challenges that arise as the Program scales up but also address some of the process and management issues that

keep coming up with changes in technology and development of the investment market.

11. **Web Portal for Sharing Information**: The Distribution Licensee shall provide information regarding distribution transformer level capacity available for connecting rooftop solar PV system under net metering arrangement, existing rooftop capacities for each transformer and other technical details of approved projects on a web-portal and shall update the same on the monthly basis, this information should also be shared with the State Energy Department and the Regulatory Commission. This will help project developers significantly. Same web-portal can be used for application and approval process.

12. **Regulatory approval of process and formats:** Although the state may have a rooftop solar policy and regulation, the DISCOM should still get its administrative interconnection process, terms and conditions, schedules and formats approved by the SERC as there would be elements over and above those mentioned in the policy or regulation. As the application and approval documents between the Consumer and DISCOM would form a part of the overall interconnection agreement, and this agreement would substitute the power purchase agreement, an overall regulatory approval becomes important.

13. **Billing cycle and banking:** The billing cycle should be as per the consumer's current billing cycle and excess energy allowed to be banked during a financial year, at the end of which excess generation to be paid at an appropriate tariff determined by concerned SERC.

14. **REC and RPO Accounting:** Consumer can claim REC for solar energy consumed by self and energy sold to Distribution Licensee at APPC. (In addition, the Developer shall abide by all other provision as per the relevant REC regulations.) Distribution Licensee can claim RPO if (i) consumed solar energy is not credited towards the Consumer's RPO, and (ii) no REC is claimed for the generated solar energy.

15. **Customer Education:** As a rooftop solar program is also social in nature, it is equally important to educate the consumer regarding: 1) The solar technology, its possibilities and its limitation, 2) Investing in a rooftop PV system and its payback, 3) Selecting the right system installer, and with appropriate terms and conditions, and 4) Administrative processes for establishing a rooftop PV system. This should be facilitated by the DISCOM in local language.

Policy and Regulatory

1. **Third Party Investment:** Investment(s) are a key driving factor when it comes to infrastructure projects. With the Government of India's target of 40 GW to be achieved by 2022, solar PV rooftop markets need a boost from a large cross section of investors. This means allowing third party investors to come in and set up systems in the market with the same policy and regulatory regime as a rooftop owner would.

There is a need for Electricity Regulatory Commissions to allow third party investments in this sector without discrimination. If Open Access charges are being charged to these consumers, then they need to be reviewed and revised. The utilities can do this by being the party to make the case to the policy makers and the regulators. The utilities will get a boost in achieving their Solar RPO targets if this happens.

2. **HT Consumers allowed to undertake Solar PV rooftop systems:** It is to be noted that Industry consumes lot of energy vis-a-vis the residential consumers. These consumers also have the ability to invest in solar PV rooftop systems. These consumers should thus be allowed to install rooftop systems connecting at their own internal LT grid and subsequently avail the provision of Net Metering at HT levels. This will help the Utilities to get necessary push to increase its solar roof top installations thereby achieving their requisite targets.

3. **Limit on the system size:** It is recommend to allow PV System capacity up to the Consumer's Contract Demand/ Sanctioned Load. If any capacity restrictions are mentioned in the policy or regulation, this should be addressed soon.

Other possible interventions (non-mandatory)

1. **Utilities based Business Models**: Utilities can further promote solar rooftop projects by making direct investment in solar rooftop projects, offer loans (low interest) and, develop and promote community rooftop schemes.

2. **Match between incentive mechanisms and needs of the market**: Net Metering leaves out a large number of Consumers like schools, hospitals, and storage facilities etc. which have large rooftop space but do not have the financial justification of adopting net metered solar rooftop business models. The regulatory framework needs to evaluate the target market and reach of the business models, which can work, and aim for optimal rooftop utilization and penetration. States might choose to provide an additional subsidy if required, especially for marginal groups and economically weaker sections of society. In such cases, the availability of funds earmarked in the State budget should be in line with the target for each year. This will ensure that the entire planned goals are met without compromising the subsidy.

3. **Regular review of progress and adjustment of incentive structures:** State Electricity Regulatory Commissions and the State Energy Departments should regularly (at least once a year) review the progress of rooftop development and adjust the incentive structures accordingly. The overall solar PV market subsidies must be reduced gradually over time and must be explicitly stated in the policy.
