MINUTES OF THE 56TH MEETING

OF THE

FORUM OF REGULATORS (FOR) HELD AT NEW DELHI

VENUE	**:**	**"CONFERENCE" HALL UPPER GROUND FLOOR (FRONT SIDE) C.E.R.C. CHANDERLOK BUILDING 36, JANPATH, NEW DELHI.**
DAY / DATE	**:**	**FRIDAY, THE 30TH SEPTEMBER, 2016**
LIST OF PARTICIPANTS	**:**	**AT ANNEXURE-I (ENCLOSED)**

The meeting was chaired by Shri Gireesh B. Pradhan, Chairperson, Central Electricity Regulatory Commission (CERC) and Forum of Regulators (FOR). The Chairperson, CERC / FOR welcomed the Members of the Forum to the Meeting. He formally welcomed Shri Justice (Retd.) G. Bhavani Prasad, Chairperson, APERC, Shri N.R. Bhattarai, Chairperson, SSERC and Shri W.M.S. Pariat, Chairperson, MSERC, who attended the FOR meeting for the first time after assuming the charge of Chairperson of their respective ERCs.

Thereafter, the Forum took up agenda items for consideration.

AGENDA ITEM NO. 1: CONFIRMATION OF THE MINUTES OF THE 55TH MEETING OF THE FORUM OF REGULATORS HELD ON 22ND JULY, 2016 AT NEW DELHI.

The Forum noted and agreed to the editorial correction suggested by Chairperson, WBERC in respect of Item No. 5. Thereafter, the Forum endorsed the minutes of the 55th Meeting of "FOR", held on 22nd July, 2016 at New Delhi.

AGENDA ITEM NO. 2 : IMPLEMENTATION OF TARIFF POLICY PROVISIONS ON SMART METERS.

The Forum considered the reference received from the Punjab State Electricity Regulatory Commission (PSERC) for bulk purchase of smart meters.

As per provisions of Tariff Policy, it has been mandated to ensure installation of smart meters to the consumers. However, the high cost of smart meters is one of the impediments to implement the provisions of the Tariff Policy. PSERC suggested procurement of smart meters through pooling the demand from all States.

The Forum while considering the reference from PSERC, observed that notifying standards for smart meters by CEA is a primary requirement for bulk procurement. It is equally important for the State utilities to come together to pool their demand for achieving economy in procurement price. The Forum endorsed the idea of bulk procurement of smart meters and advised the "FOR" Secretariat to write to Ministry of Power for facilitation in this regard.

AGENDA ITEM NO. 3 : LICENSEE STATUS FOR MILITARY ENGINEERING SERVICES.

The Forum considered the reference received from West Bengal Electricity Regulatory Commission (WBERC) regarding an application from Chief Engineer, Siliguri Zone, Military Engineering Services (MES), for concurrence of Distribution Licensee status to MES under 3rd proviso to Section 14 of the Electricity Act, 2003. The Chairperson, WBERC also stated that MES has further sought single part tariff and removal of demand charges.

The Forum noted that status accorded to MES in different States (copy **enclosed** as **Annexure-II**) and observed that WBERC may refer to these practices and exercise its powers under the Electricity Act, 2003 for suitable action.

AGENDA ITEM NO. 4 : INVITATION TO THE FORUM OF REGULATORS (FOR) FOR MEMBERSHIP OF THE STAKEHOLDERS ADVISORY BOARD (UNDER THE US-INDIA CLEAN ENERGY PACE-R PROGRAMME).

In November, 2009, India and United States as a part of the US-India Memorandum of Understanding to Enhance Cooperation on Energy Security, Energy Efficiency, Clean Energy and Climate Change, launched the US-India Partnership to Advance Clean energy (PACE) Program, consisting of three components, i.e., Research (PACE-R), Deployment (PACE-D) and Off-grid energy access (PEACE). As such, PACE-R Program is a Government to Government initiative which provides a platform for both public, private and

research sectors in both the countries to work towards fructifying US- India clean energy targets.

Governments of USA and India extended and expanded the program in January, 2015 under PACE-R with a joint funding of $125 million for the three existing research fields of Solar Energy, Second Generation Biofuels and Energy Efficiency of Buildings and ***included a new component on Smart Grid and Grid storage technology*** for a period of 5 years. As part of the objectives of the Smart Grid R&D, a solid foundation is required to be established for ongoing information exchange on technical issues related to microgrids and distribution system operations between stakeholders in India and USA, which necessitates establishment of Stakeholder Advisory Group (SAG) from both the countries.

In this context, NREL extended an invitation to the Forum of Regulators (FOR) to join the Stakeholder Advisory Board (SAB) of the India Consortium Advisory Board (InGEnioUS) under the above Program.

The functions of the SAB include review and playing a critical role in all the major programs and projects undertaken by the US and Indian consortiums on scheduled and *ad-hoc* basis, participation in the bi-annual conferences of the two consortiums where status, progress and future plans of the programs and projects will be discussed.

The Forum while considering the invitation from NREL to join the SAB noted that the membership is honorary in nature (without any monetary

implications). However, respective consortiums will reimburse cost of attending the bi-annual conferences to SAB members. The Forum considered the benefits such as access to the think tank of experts for discussion on common and unique issues of the States in the field of Smart Grid and Grid storage and collaboration in capacity building and technical assistance to the "FOR" members.

With due regard to the fact that it is part of a Government to Government agreement and the association involves exchange of ideas/expertise on issues like Smart Grid, Energy Storage etc., the Forum of Regulators accorded its approval to join the Stakeholder Advisory Board (SAB).

AGENDA ITEM NO. 5 : MONITORING AND COMPLIANCE OF RPO.

In the 51st meeting of the FOR, USAID had made a presentation on "RPO Compliance framework for Captive / OA transactions at State level" with a focus on RPO framework prepared for Rajasthan Renewable Energy Corp. Ltd (RRECL). As a part of the framework, the USAID has developed the RPO Compliance Web Tool under the PACE D-TA Program for the RRECL/RERC.

A presentation on the web tool was made by the representatives of PACE-D team **(**copy **enclosed** as **Annexure-III)**. The presentation included RPO Compliance Monitoring Framework (CMR), Approach for Development of RPO-

CMR and Web Tool in Rajasthan, Key Functions of Web Tool, and Demonstration of Rajasthan RPO Compliance Web Tool etc. The challenges in implementation of the RPO compliance framework were elaborated, which include difficulties in data submission, its verification, lack of standard data formats, defining roles and responsibilities of stakeholders, lack of awareness among obligated entities.

The Forum was appraised that demonstration of the Web Tool to the State Level Working Group in Rajasthan has been completed. The tasks related to Security Audit of the Web Tool as per the mandate of DoIT, Govt. of Rajasthan, and integration and launching of the Web Tool with Energy Portal of Rajasthan are still to be completed.

The Forum noted the progress made in respect of development of web tool for monitoring the compliance of RPO and felt that the same can be standardized and customized for other States as well. The Forum decided that this be referred to the "FOR" Technical Committee under the chairmanship of Shri A.S. Bakshi, Member, CERC (Implementation of Framework on Renewables at the State Level). The Committee would evolve a standardized web tool for RPO monitoring and compliance and submit a report to "FOR".

AGENDA ITEM NO. 6 : "INDIA'S TARGET FOR 175 GW OF RENEWABLE ENERGY BY 2022 – AN ASSESSMENT" DISCUSSION ON REPORT OF BROOKINGS INDIA.

Brookings India has recently published a report examining the Renewable energy targets for India with a comparison on the capacity targets with generation targets, growth rate in renewable energy required and comparison of India's RE targets with targets elsewhere.

A presentation on this report was made by Dr. Rahul Tongia, Fellow, Brookings India wherein he broadly discussed the issues connected to RE targets established by the Government of India, State level RPO & its impact and the known as well as hidden challenges **(**copy **enclosed** as **Annexure-IV)**. While globally the RE challenges include variability, uncertainty, location-specificity, in case of India, the challenges further include, high cost of capital, lack of sufficient spinning reserves, limited ancillary services etc. The solution to accommodate surge in RE generation in a must run status lies in availability of flexible generation suitable for ramping up and ramping down.

The State level RPOs have an impact on total consumption of RE capacity. However, it is recommended for exercising flexibility in swapping between solar and non-solar and the targets may be designed to remove front-loading by making them more progressive. Additionally, exclusion of hydro from RE targets adds to further complexities. Therefore, it is advised to include the same in the scope of RE. Finally, it was suggested to redefine smart grid to make it responsive to RE and redefine RPO to include storage and RE-linked hydro etc.

Discussion:

In the light of the presentation, Joint Chief (Regulatory Affairs), CERC appraised the Forum that considering the variability and uncertainty of renewable energy, the integration of renewable energy is critical to the sector. In this regard, Central Commission has already notified Ancillary Services Operations Regulations and Framework for Forecasting, Scheduling and Deviation Settlement Mechanism, which are aimed at providing regulatory support to manage variability, uncertainty and location specificity of renewable energy. The Renewable Energy Management Centers (REMCs) are also being established to facilitate pooling RE generation along with robust forecasting technology for better integration of renewable energy. Many States are also in the process of notifying State-specific frameworks for forecasting, scheduling and deviation settlement and it is anticipated that these would facilitate effective integration of dispersed renewable energy generation sources with the main grid.

The Forum appreciated the presentation.

AGENDA ITEM NO. 7 (A) : ISSUES INVOLVING POLICY AND REGULATIONS ON ROOF-TOP SOLAR PROJECTS.

Government of India launched the Jawaharlal Nehru National Solar Mission (JNNSM) in January, 2010 with a view to accelerate development and promote solar energy technologies in India. Thereafter, the Government has increased the target of achieving renewable energy capacity to 175 GW by the year 2022

(including 40 GW from grid connected rooftop solar plants). The Tariff Policy, 2016 also provided for specifying the RPO targets for solar so as to reach 8% of the total consumption of energy (excluding hydro generation) by March, 2022.

In order to facilitate roof-top solar generation, many States have notified Net-Metering / Gross-Metering Regulations. In this backdrop, Ministry of New & Renewable Energy (MNRE) has proposed to develop Performance based Incentive scheme for Discoms. A presentation (copy **enclosed** as **Annexure-V)** was made by the representatives of MNRE.

The Roof-Top solar (RTS) generation has advantages of reducing the transmission and distribution losses of network, bringing down network congestion owing to higher self-consumption, facilitating managing day-time dynamic peaks, besides meeting renewable purchase obligations etc. MNRE, arrived at a cost of Rs. 75,000/- per kWp through various benchmark / tendering processes. MNRE also increased the outlay for RTS & Small Solar Power Plants Programme from Rs.600 Cr. to Rs.5,000 Cr. In addition, with regard to residential, institutional and social building, subsidy pattern has been provided as a maximum of 30% of benchmark for general category States and a maximum of 70% for special category States and islands.

The programme is being facilitated through international agencies viz. Rs. One billion loan for Roof top/off-grid Solar/Solar parks/Solar Zones and Rs. One billion loan for Green Energy Corridor from KfW, US$ 625 million loan to SBI by

World Bank, Japanese Yen 30,000 million (Rs.1800 Crores app.) to IREDA by JICA, Euro 200 million (Rs.1700 Cr app.) to IREDA by EIB – Luxemburg, and Euro 100 million (Rs.850 Crores app.)- IREDA by AFD (through 2nd line of credit) etc. The activities initiated by MNRE include empanelment of 862 agencies as expert developers / partners, issuance of tenders for 500 MW & 1000 MW by SECI, development of web portal to facilitate consumers and developers etc.

MNRE proposed performance based incentive scheme for Discoms, which *inter alia* include providing support of Rs.500 cr to the willing Discoms for supporting capacity of 1350 MWp by 2019-20, financial assistance in the form of a grant up to a maximum of Rs.37.5 lakh per MW of installed RTS projects to Discoms, identifying best practices of Discoms / State Nodal Agencies and on awarding the best performance at DISCOM, Division (EE), Zone (AE) and individual levels. The scheme intends to focus on supporting the Discoms for up-gradation and modernization of their distribution network, demand aggregation, developing consumer awareness, developing enabling forms/ processes, meter / equipment procurement and capacity development. In this regard, the example of Panchayats in Kerala State was also cited.

Discussion:

The Forum appreciated the presentation and observed that the Roof-Top Solar programme should not only be considered as an initiative to increase use of

renewable energy but also as a part of Make in India initiative. It was noted that the definition of the term "Roof-top solar generation" may be revisited to include the ground mounted solar plants. Roof-Top solar generation will have a bearing on the revenues of the Discom and therefore, the distribution utilities should also be taken on board for successful execution of the programme. The Forum also felt that other financial institutions like PFC may also be approached for financial assistance to the programme.

AGENDA ITEM NO. 7 (B) : MNRE SCHEME FOR SETTING UP OF 1000 MW ISTS CONNECTED WIND POWER PROJECTS.

The Government of India has set a target of 175 GW Renewable Energy generation capacity by 2022, which includes 60 GW through wind energy. As against the potential wind energy capacity of 302 GW (above 100m from ground level, estimated by NIWE), the present generation capacity stands at 26.7 GW. In this backdrop, MNRE proposed Bidding Guidelines for setting up of 1000 MW CTU-connected Wind Power Projects which involves selection of projects through open competitive bidding process followed by e-reverse auction. A detailed presentation was made by the representatives of MNRE.

The main objectives of the Bidding Guidelines *inter alia* include facilitating supply of wind power to the non-windy States at a price discovered through transparent bidding process, encouraging competitiveness through scaling up of project sizes and introduction of efficient and transparent e-bidding and e-

auctioning processes, facilitating fulfillment of Non Solar Renewable Purchase Obligation (RPO) requirement of non-windy States. MNRE has taken initiatives for assessment of off-shore wind energy generation capacity.

Discussion:

The Forum appreciated the initiative. The Forum observed that emphasis should be laid on Hybrid RE power generation (combination of different RE sources viz. solar-wind etc.). It is opined that necessary clauses relating to the new GST may be incorporated in the power purchase agreement to avoid any future commercial / legal complications. The Forum observed that pooling point of wind generation must be identified in advance, in consultation with Power Grid to mitigate any future conflicts.

AGENDA ITEM NO. 8 : BACKING DOWN OF SOLAR PROJECTS AND ENFORCEMENT OF MUST-RUN STATUS FOR SOLAR POWER PROJECTS.

The Forum considered the reference received from MNRE regarding issuance of instructions by the Load Dispatch Centres for backing down solar projects in various States for various reasons. As Solar projects are treated as green power involving no fuel cost, they are being accorded must run status. Therefore, it was suggested that solar generation should not be the first option for backing down in comparison to conventional plants. MNRE requested the Forum to consider SERCs notifying Regulations to enforce must-run status to the Solar generation stations.

Discussion:

The Forum deliberated upon the reference received from MNRE. The Forum felt that integration of solar power by duly recognizing due to its variability and uncertainty is critical. All efforts should be made to provide them with must run status. The idea of two part tariff for RE may need be examined along with its implications.

AGENDA ITEM NO. 9 : CENTRE FOR ENERGY REGULATION FOR RESEARCH AND INSTITUTIONAL STRENGTHENING OF ERCS.

The proposal on establishment of "Centre for Energy Regulation (CER)" with the objective for research and institutional strengthening of Electricity Regulatory Commissions and seeking in-principle support of the Forum of Regulators was received from IIT Kanpur for consideration of the Forum.

A detailed presentation on the proposal was made by Dr. Anoop Singh, Associate Professor, IME, IIT Kanpur. The activities of CER to include strengthening and development of Regulatory Research, Regulatory Knowledge Base, Regulatory Capacity Building, Networking/Collaboration of Academia-Regulators-Policy Makers, International Collaboration/Networking etc.

The proposed activities of CER could also include, Practising Regulator / Leading International Expert to spend 1-2 weeks at IIT Kanpur, providing guidance to the ongoing activities, working towards a broad strategy / vision paper

for the respective ERC, collaborative research, comparative assessment of the regulatory strategy papers to guide regulatory practices in general and identify issues to be addressed under various activities.

The CER is proposed to be established with seed funding from Department for International Development (DfID) and sought support of Forum of Regulators for active participation, collaboration with CER as well as possible financial support, if any.

The Forum noted the proposal and observed that the Regulatory Research & Training Institute under the aegis of Forum of Indian Regulators (FOIR) is also aimed at developing in-house regulatory research and capacity building.

At the end of the meeting, Chairperson, CERC on behalf of the Members of the Forum conveyed deep gratitude to Shri Satya Prakash Nanda, Chairperson, Orissa Electricity Regulatory Commission, who was due to retire on 12th October, 2016, for his outstanding contribution to the Forum.

The Chairperson, CERC / FOR also thanked all the dignitaries present in the meeting. He conveyed to the Members of Forum that the next "FOR" Meeting will be held during the month of December, 2016 at Raipur (Chhattisgarh). Secretary, CERC thanked the staff of "FOR" Secretariat for their arduous efforts in organizing the meeting.

The meeting ended with a vote of thanks to the Chair.

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/ ANNEXURE – I /

LIST OF PARTICIPANTS ATTENDED THE 56TH MEETING OF

FORUM OF REGULATORS (FOR)

HELD ON 30TH SEPTEMBER, 2016 AT NEW DELHI.

S. No.	NAME	ERC
01.	Shri Gireesh B. Pradhan Chairperson	CERC – in Chair.
02.	Justice (Retd.) Shri G. Bhavani Prasad Chairperson	APERC
03.	Shri R.P. Singh Chairperson	APSERC
04.	Shri Naba Kumar Das Chairperson	AERC
05.	Shri S.K. Negi Chairperson	BERC
06.	Shri Narayan Singh Chairperson	CSERC
07.	Shri Anand Kumar Chairperson	GERC
08.	Shri Jageet Singh Chairperson	HERC
09.	Shri S.K.B.S. Negi Chairperson	HPERC
10.	Justice (Retd.) Shri N.N. Tiwari Chairperson	JSERC
11.	Shri R.K. Kishore Singh Chairperson	JERC for Mizoram and Manipur
12.	Shri M.K. Shankaralinge Gowda Chairperson	KERC
13.	Shri T.M. Manoharan Chairperson	KSERC
14.	Dr. Dev Raj Birdi Chairperson	MPERC
15.	Shri W.M.S. Pariat Chairperson	MSERC

16.	Shri Imlikumzuk Ao Chairperson-cum-Member	NERC
17.	Shri Satya Prakash Nanda Chairperson	OERC
18.	Shri D.S. Bains Chairperson	PSERC
19.	Shri Vishwanath Hiremath Chairperson	RERC
20.	Shri N.R. Bhattarai Chairperson	SSERC
21.	Shri S. Akshayakumar Chairperson	TNERC
22.	Shri R.N. Sen Chairperson	WBERC
23.	Shri S.K. Agarwal Member	UPERC
24.	Shri K.P. Singh Member	UERC
25.	Ms. Shubha Sarma Secretary	CERC
26.	Dr. Sushanta K. Chatterjee Joint Chief (RA)	CERC
SPECIAL INVITEES		
27.	Shri A.K. Singhal Member	CERC
28.	Shri A.S. Bakshi Member	CERC
29.	Dr. M.K. Iyer Member	CERC
30.	Shri Upendra Tripathi Secretary	MNRE
31.	Shri Inder Jit Singh Additional Secretary	MNRE
32.	Smt. Jyoti Arora Joint Secretary (R&R)	MOP
33.	Smt. Varsha Joshi Joint Secretary	MNRE
34.	Dr. Arun K. Tripathi Director	MNRE
35.	Shri T. Rout Chief (Legal)	CERC

36.	Smt. Geetu Joshi Chief (Eco.)	CERC
37.	Shri S.C. Shrivastava Chief (Engg.)	CERC

/ ANNEXURE – II /

STATUS ACCORDED TO MES IN DIFFERENT STATES

MES ACCORDED STATUS OF DEEMED DISTRIBUTION LICENSEE	***MES TREATED AS SEPARATE CONSUMER CATEGORY***	***MES TREATED AS A CONSUMER IN A COMMON CATEGORY ALONGWITH OTHER CONSUMERS***
Delhi	Jharkhand	Madhya Pradesh
Tamil Nadu		Maharashtra
Telangana		Punjab
Rajasthan		Mizoram
Uttarakhand		Karnataka
		Uttarakhand

PARTNERSHIP TO ADVANCE CLEAN ENERGY-DEPLOYMENT TECHNICAL ASSISTANCE PROGRAM

Implementation of Renewable Purchase Obligation Compliance Monitoring & Web Tool Development for Rajasthan Renewable Energy Corp. Ltd. : An Update

Presented to: Forum of Regulators
Date: September 30, 2016

Contents

- RPO Compliance Monitoring Framework (CMR)
- Approach for Development of RPO-CMR and Web Tool in Rajasthan
- Key Functions of Web Tool
- Demonstration of Rajasthan RPO Compliance Web Tool
- Key Learnings from Rajasthan
- Way Forward

RPO Compliance Monitoring Framework

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RPO Compliance Monitoring Framework

29 States/UTs have specified obligation for purchase of renewable energy by obligated entities.

- RPO compliance monitoring is crucial to ensure:
  - RPO targets are met
  - Non-compliance is brought to the notice of regulators
- RPO compliance monitoring for DISCOM through Annual Performance Review, but no such monitoring mechanism for other obligated entities.
- Suo-Motu proceedings in few states to review the RPO compliance status by OA and captive consumers.
- RPO compliance review process is undertaken with significant time lag.

Need for an innovative, process-driven and technology-based solution to address these challenges.

Challenges in Implementation of RPO Compliance Framework

Practical Difficulties in Data Submission, Verification or Compliance Reporting:
Continued engagement with stakeholders through Working Group would be necessary

Lack of Standard Data Formats:
Formulation of standard reporting formats in consultation with SNA

Defining roles & Responsibilities of Each Stakeholder:
SLDC, DISCOMs, EI, SNA

Lack of Awareness among OEs:

- RRECL initiated periodic consultation process by sending letters to CPP & OA consumers
- USAID PACE-D TA Program in consultation with RRECL prepared a Draft Manual for OEs
- DISCOMS should sensitize OA consumers about RPO compliance requirement at the time of grant of Open Access permission
- EI should sensitize CPP consumers about RPO compliance requirement at the time of registration of CPP

WEB-BASED TOOL **Monitor, Record & Report**

RPO compliance status of OEs to SERC

Support to RRECL for RPO Compliance Framework

MNRE-USAID PACE-D TA Program is supporting Rajasthan SNA (RRECL) in the development of RPO Compliance Monitoring and Reporting Framework and Web Tool development.

Assisted RRECL in the formation of RPO compliance reporting cell and designed the data collection forms.		
Designed framework and institutional structure for RPO Compliance Monitoring & Reporting.	Developed a Web-based tool for RPO Compliance Monitoring & Reporting.	Developed Manuals: Accreditation Guidebook, URS Document, Web-Hosting Requirements, Training Manuals, etc. for obligated entities.

- Presented "RPO Compliance Framework for Captive/OA Transactions at State Level" with a focus on RPO framework prepared for RRECL in 51st Meeting of FOR.
- FOR suggested to share the Web Tool/formats for replication in other States.

Work Done so Far..

Current Status

- Institutional structure at RRECL is in place.
- Standard forms and formats used for RPO compliance reporting.
- Web Tool for RPO Compliance is developed and tested with existing data.
- Demonstrated the Web Tool to the State Level Working Group.

Next Steps

- Security Audit of the Web Tool as per the mandate of DoIT, Govt. of Rajasthan.
- Integration of the Web Tool with Energy Portal of Rajasthan and its Launch.

— Approach for RPO Compliance Framework and Web-Tool Development in Rajasthan

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Rajasthan RPO Regulations: Background

RPO Trajectory

CPP & OA Consumers with total capacity of 10 MW & above:

S.No.	Year	Obligation expressed as % of Energy Consumption		
		Non Solar	Solar	Total
1	2014-15	7.5	1.5	9.00
2	2015-16	8.2	2.00	10.20
3	2016-17	8.9	2.5	11.40

CPP & OA Consumers with capacity of 1MW and above, but less than10 MW:

S.No.	Year	Obligation expressed as % of Energy Consumption
		Total
1	2014-15	9.00
2	2015-16	10.20
3	2016-17	11.40

Obligated Entities

- Distribution Licensees
- Open access consumers
- Captive consumers

Roles and Responsibility for State Agency

- OEs shall submit the details of their compliance of RPO to the State Agency quarterly. The final annual accounts shall be submitted by 31st July of the Assessment Year.
- The State Agency shall assess the shortfall, if any, in meeting the RPO by the OEs in the State for the relevant Financial Year.
- The State Agency shall serve the notices to the OEs identified as defaulters by 30th September of the Assessment Year requiring them to pay RPO charge into Fund.

State Level Working Group

comprising various stakeholders is required to facilitate and guide SNA through implementation process

Need for State Level Forum/Group & its Role: Rajasthan

1. Develop mechanism for listing and accreditation of CPP & OA consumers and set rules for accreditation of CPP & OA consumers.

2. Develop mechanism for establishing data flow and information exchange between various entities involved and to verify RPO compliance by CPP & OA consumers.

3. Provide continued assistance to SNA in verification of RPO compliance by CPP & OA consumers.

4. Meet on bi-monthly basis to review and, modify the mechanism, if necessary.

SNA shall act as convenor of the Co-ordination Forum and be responsible for co-ordinating and reporting the developments to the Commission.

Co-ordination Forum shall submit its report to the Commission within six months from the date of formation of the Co-ordination Forum.

Approach for RPO Compliance Reporting Framework Development

1 RPO Reporting Cell

Cell Structure, Role and Responsibilities of Stakeholders, etc.

2 Forms & Format Design

Formats for RPO compliance data collection from OEs

3 Manual for OEs

RPO information manual for OEs, Accreditation Guidebook, URS Document, Web Hosting Requirements, etc.

4 Reporting Framework Design

Protocol for data collection and M&V, process for OE (CPP/OA) accreditation, list of OE and updating OE list

5 Development of a Web Tool

Quarterly/Annual Reporting to RERC as per the RERC Regulations

6 Compliance Reporting to RERC

— Key Functions and Functional Diagram of the RPO Web Tool

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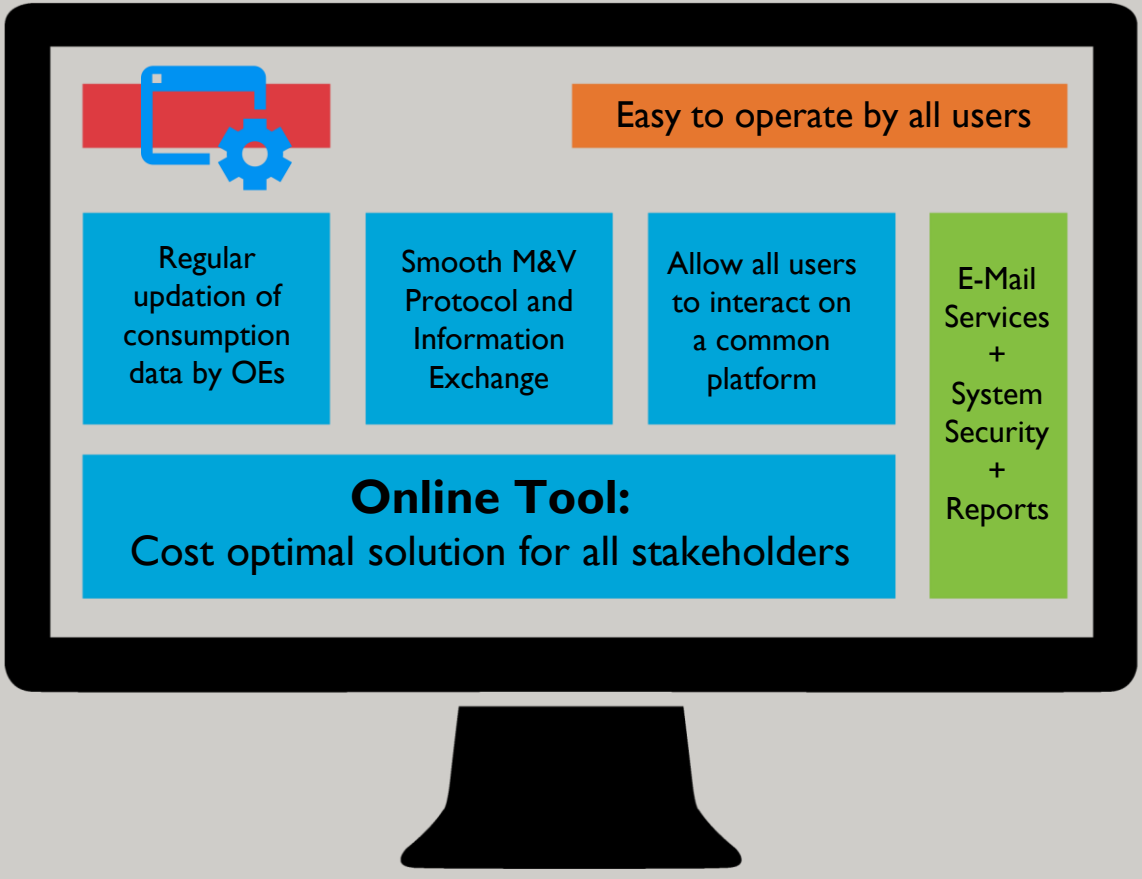
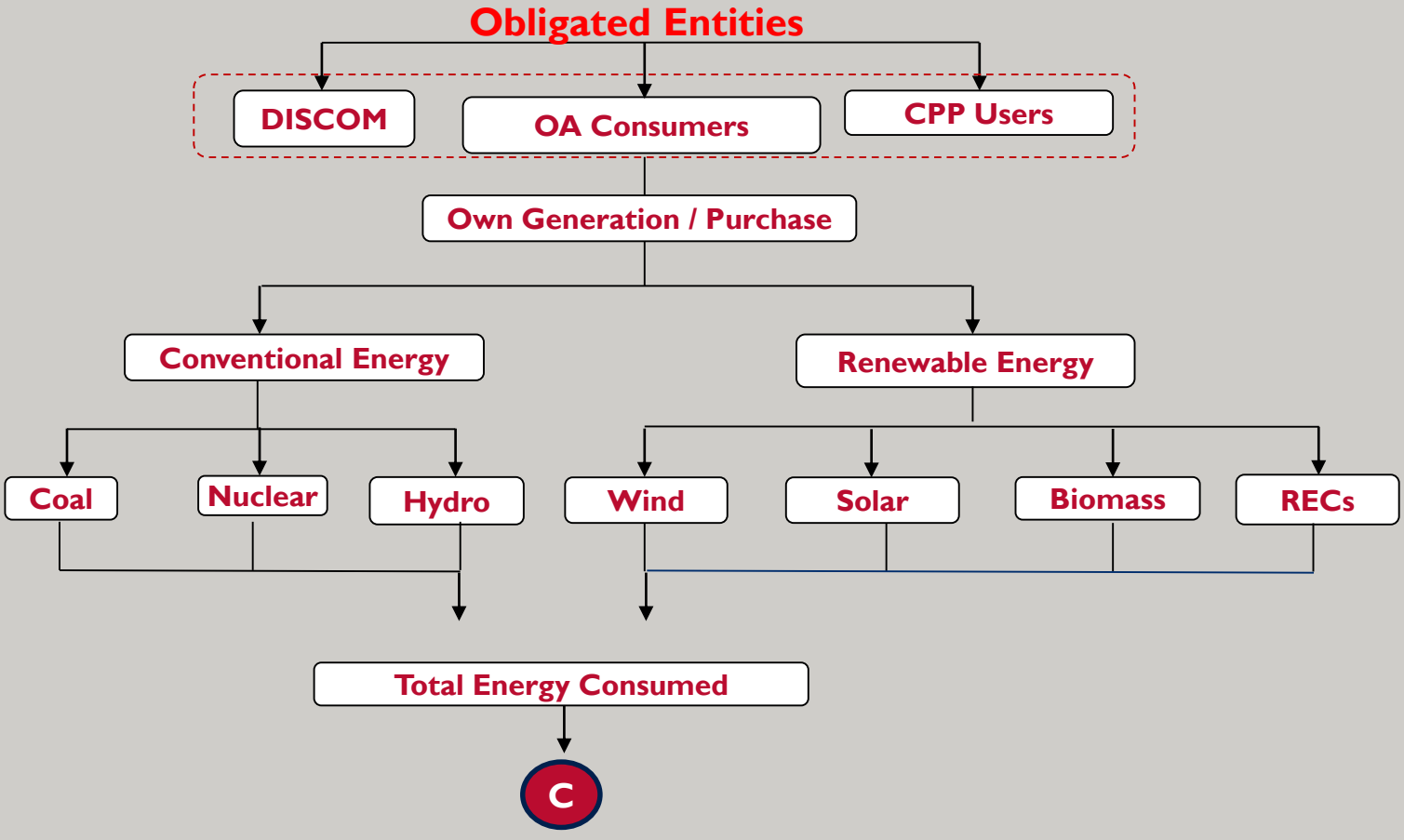
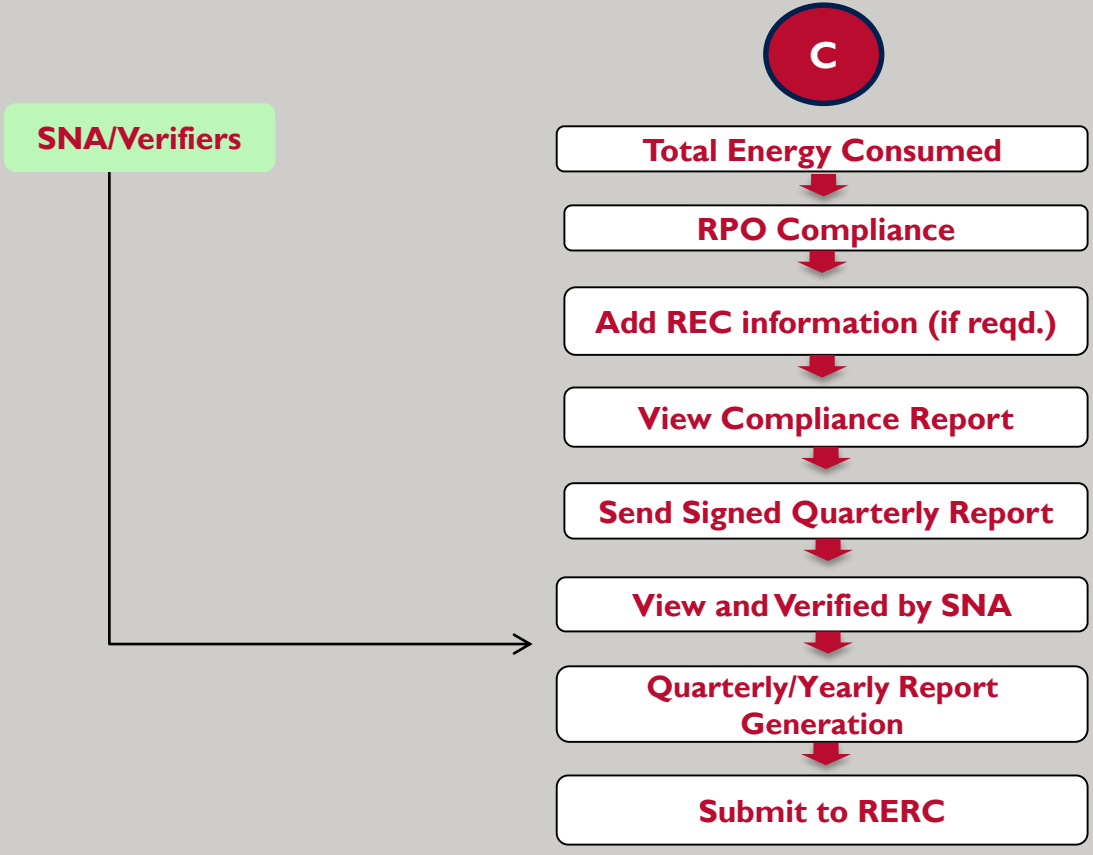
RPO Web Tool development : Requirement/Key Features



Process Flow Diagram…1/2



Process Flow Diagram…2/2



Note:

- All records maintained as per financial year
- No information saved without relevant documents
- Predefined grace period for data entry
- RPO compliances not applicable for energy procured from DISCOM

Web Tool Functionalities for RPO Compliance Monitoring

1. Defining System Users and their categories and access rights (Accreditation Process)
2. Regular update of data - consumption, generation and procurement (Forms/Formats)
3. Representation of data to web based online user interface
4. Presentation of Data in user friendly format (Excel/PDF)
5. Classification of data based on Obligated Entity/Type/DISCOM/ location
6. Alarm, Report generation, etc.
7. Monitoring, Verification and Validation Protocol and Information Exchange
8. Scalable system to incorporate future/Upcoming Obligated Entities
9. Mail services, System security and Compliance Reporting, Report Generation, etc.
10. Admin Interface for Incorporating new systems and changes

Demonstration of RPO Web Tool

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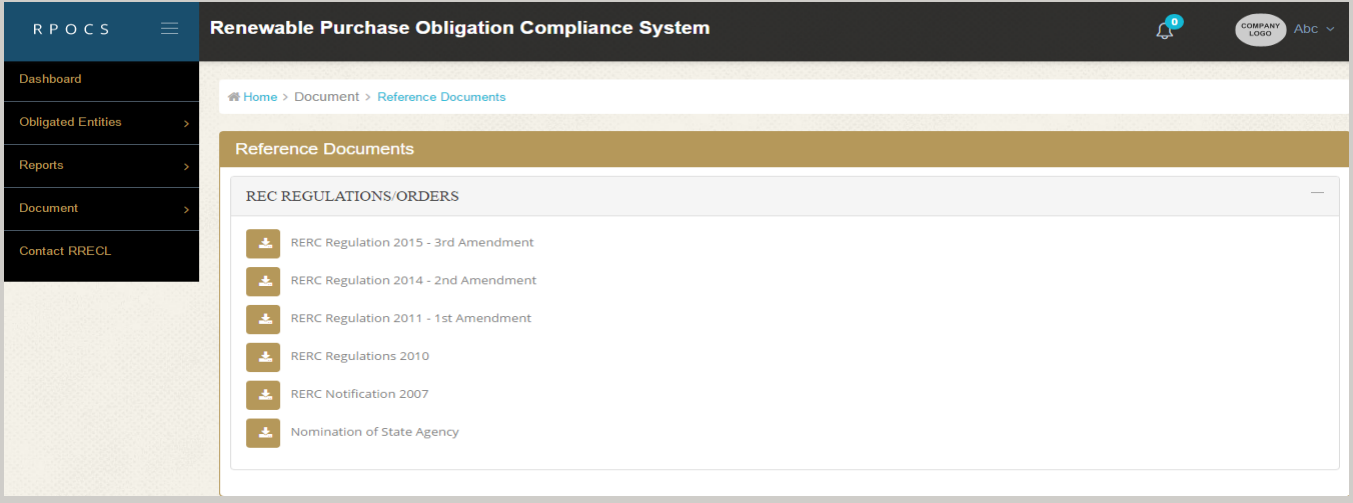
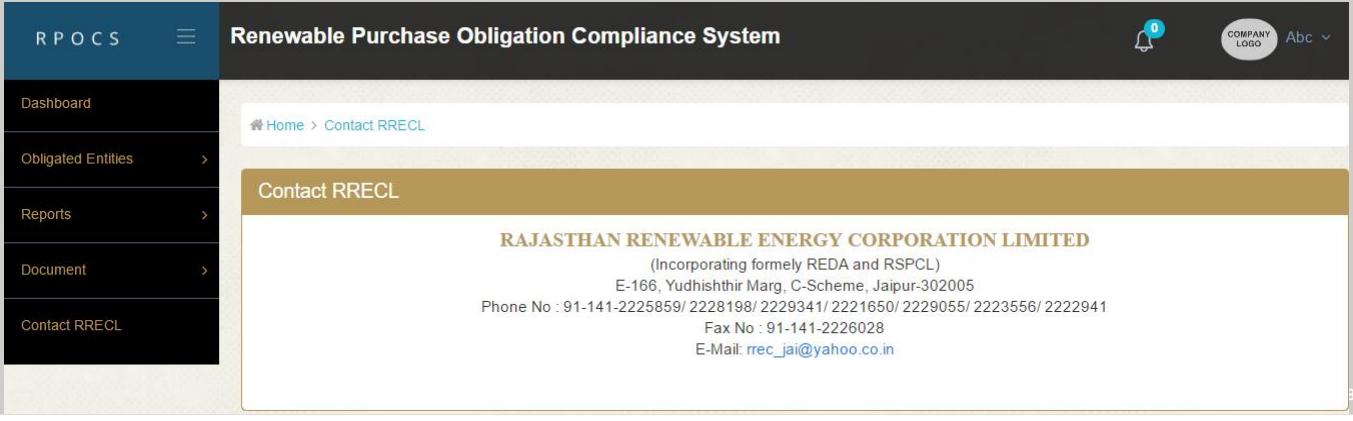
Demonstration of RPO Compliance Web Tool: Screen for All Users

Reference Documents

Provide information related to RPO Regulations, Orders, procedures issued by RERC, NLDC, FOR & CERC



Contact Details of RRECL



Demonstration of RPO Compliance Web Tool: Obligated Entities Homepage

Recent Notifications

Dashboard Summary of an obligated entity

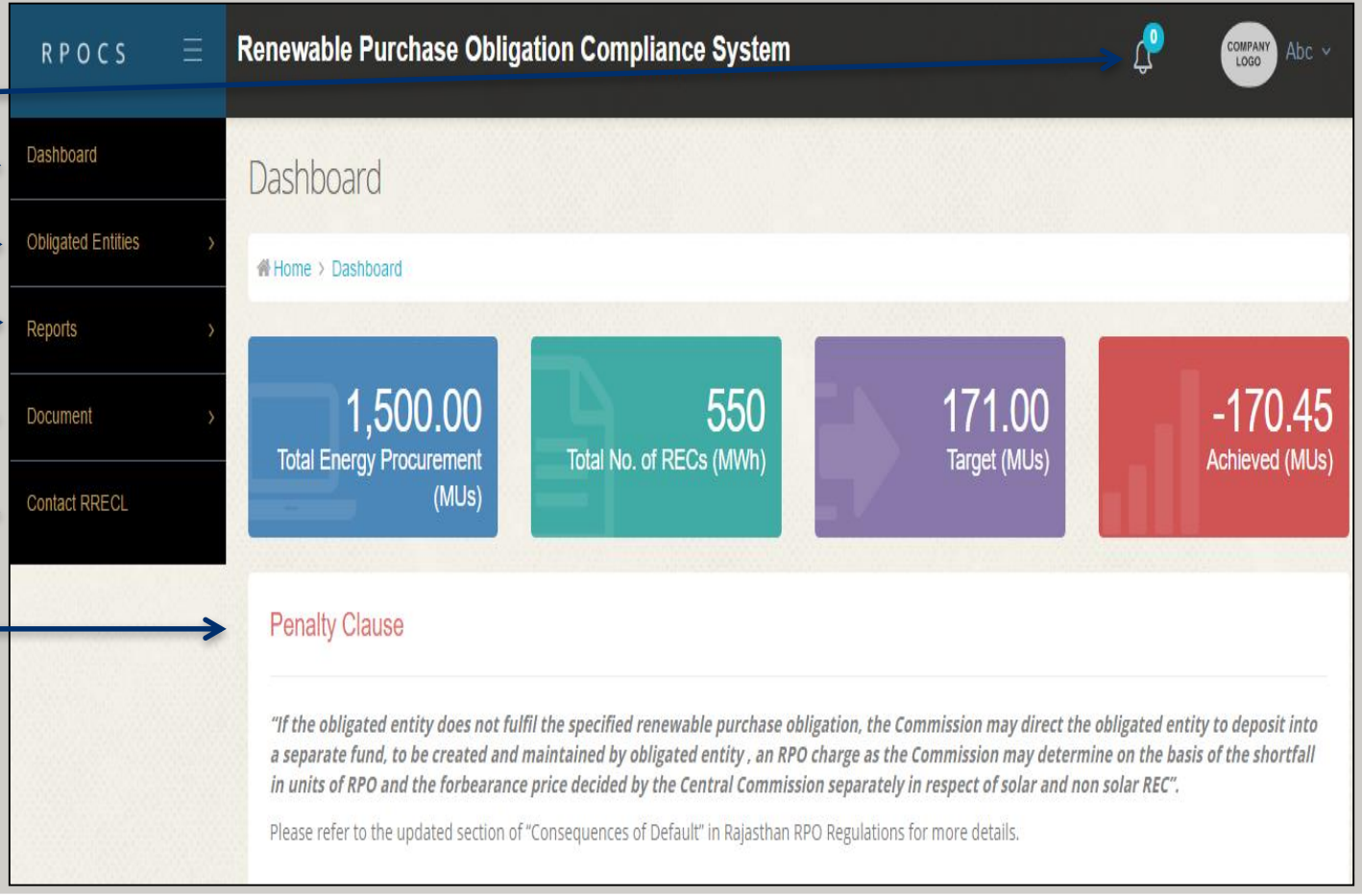
Vendor Requests, Contracts & Periodical Consumptions

Obligation Report of an Obligated Entity

All RPO related Regulatory Documents for Help

RRECL Contact Details

Penalty Clause as per latest RPO Regulations



Demonstration of RPO Compliance Web Tool: Verifier's Home Page

Name of the Web-Tool

Recent Notifications

Dashboard Summary of an obligated entity

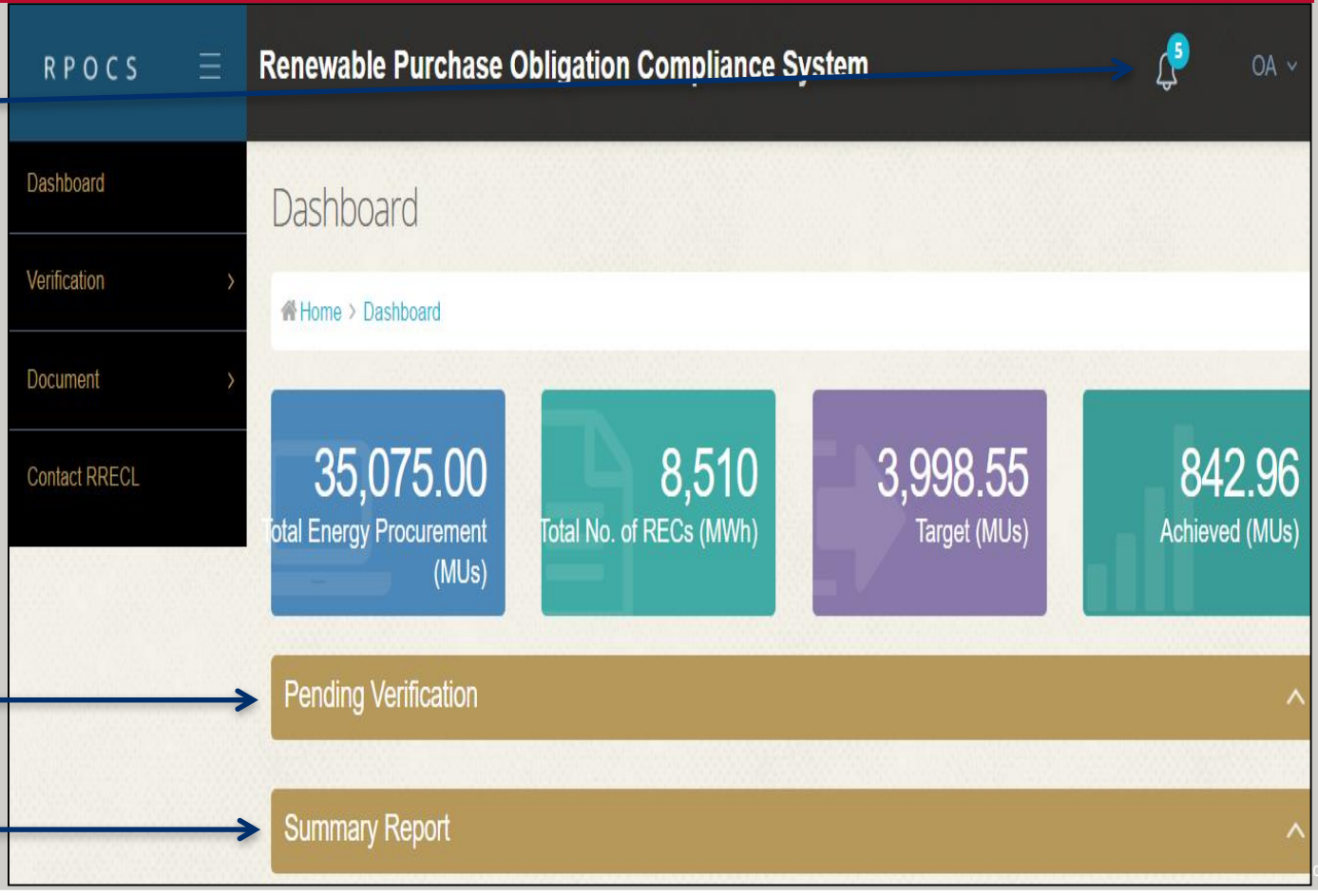
Vendor Requests, Contracts & Periodical Consumptions

All RPO related Regulatory Documents for Help

RRECL Contact Details

List of Pending Verifications: Contracts & Periodical Consumptions

\Compliance Report Summary of all obligated entities



Demonstration of RPO Compliance Web Tool: RRECL Home Page

Name of the Web-Tool

Recent Notifications

Dashboard Summary of all obligated entities

General Settings & Automatic E-Mail Alert

RPO%, FY, Categories, Manual E-Mail Alerts

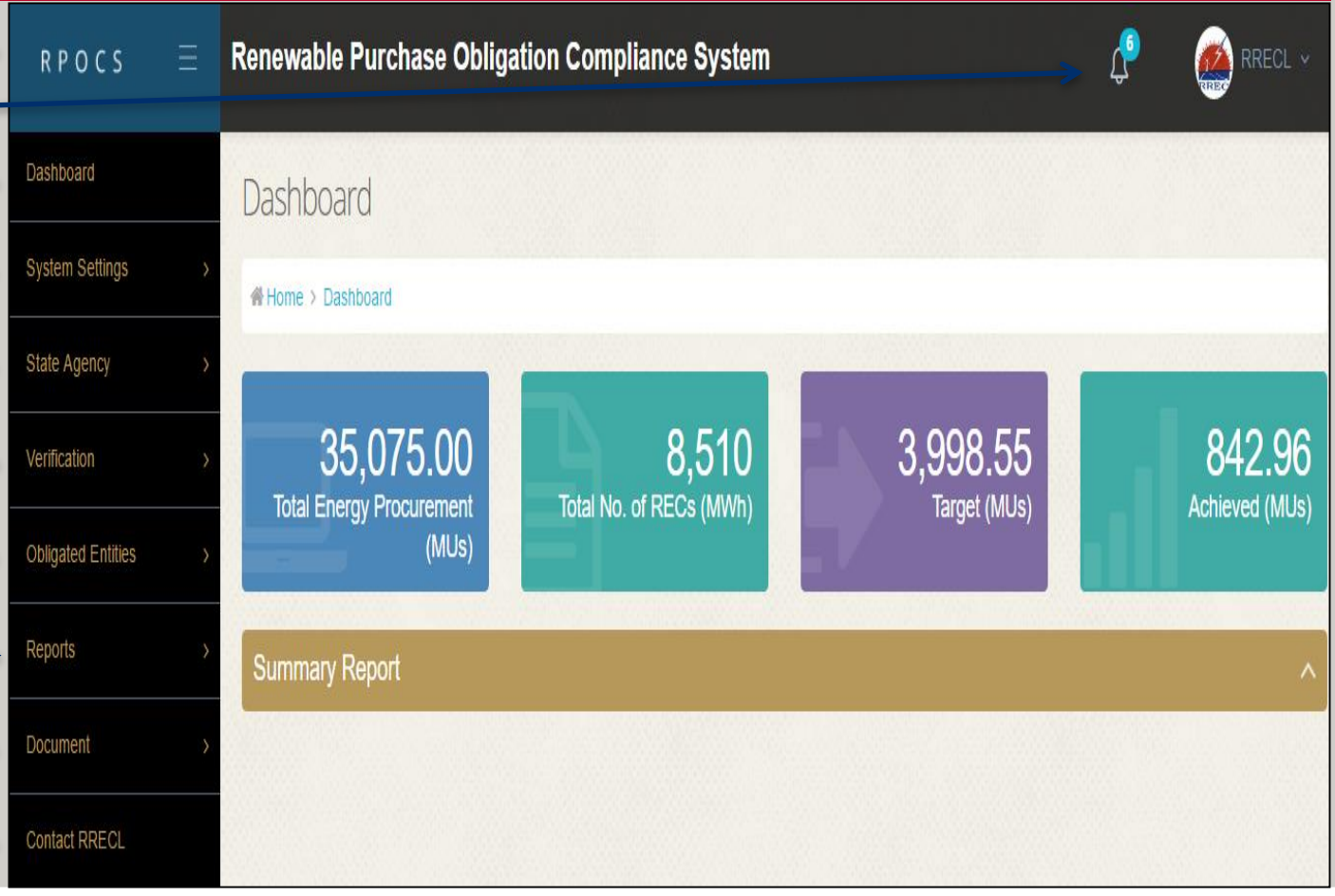
Energy Contracts & Consumptions for Verifiers

Vendor Requests & Periodical Consumptions

Obligation Reports of All Users

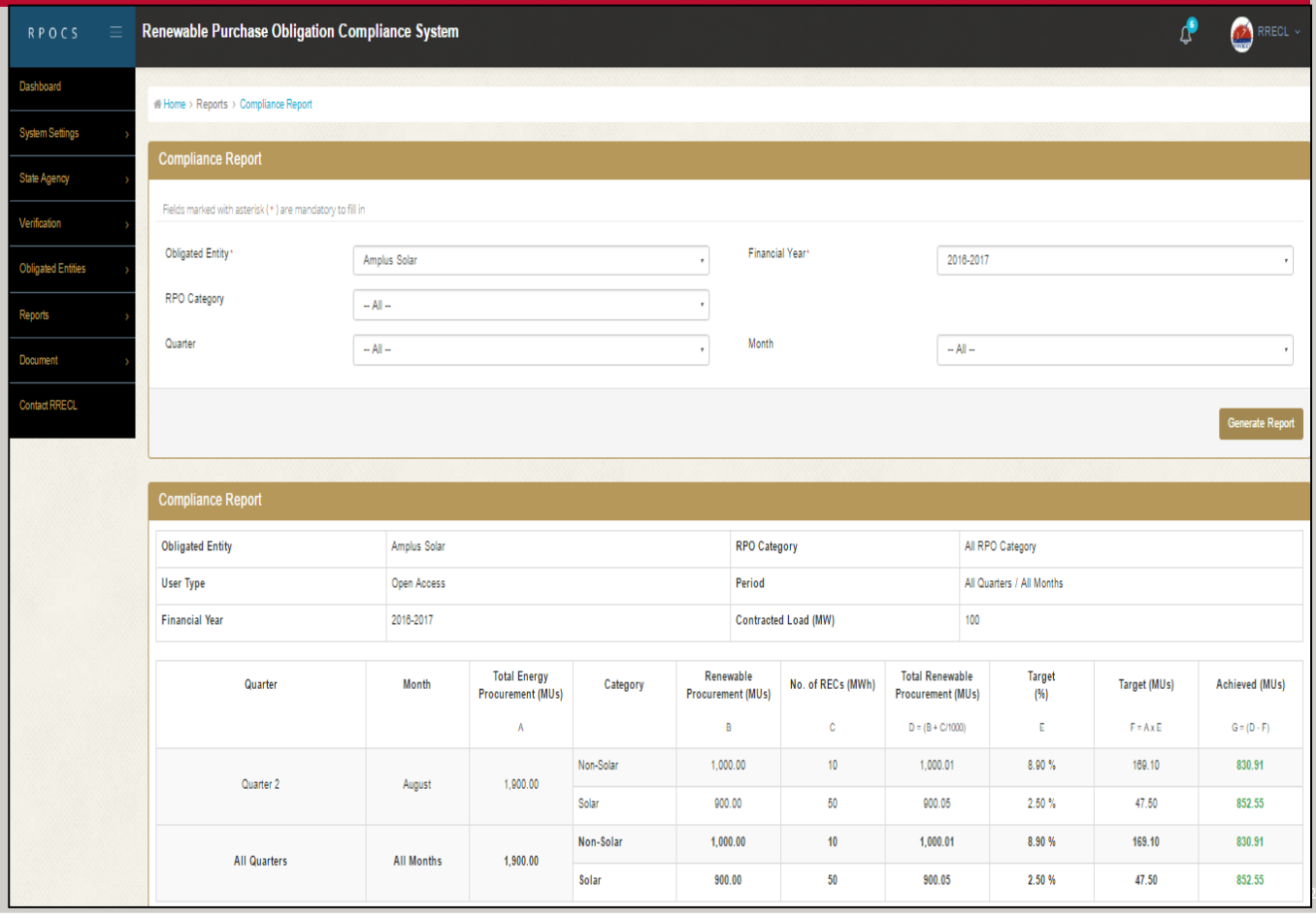
All RPO related Regulatory Documents for Help

RRECL Contact Details



Demonstration of RPO Compliance Web Tool: Compliance Report for All Users

- All users will have access to generate compliance report based on:
  - ✓Financial Year
  - ✓RPO Category
  - ✓Quarter
  - ✓Month
- Compliance Report will give the following information:
  - ✓Total Energy Procurement
  - ✓Total RE Procurement
  - ✓No. of RECs Procured
  - ✓RPO Target: Both in % & MUs
  - ✓Achieved-Shortfall/Surplus
- Report can be generated in PDF file
- In achieved column, numbers in green denotes surplus compliance & red denotes shortfall



— Key Learnings from Rajasthan

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Key Issues to be Addressed in RPO Compliance Monitoring and Reporting

- Identification of OEs
- Verification of data submission by CPP and OA consumers
- Practical difficulties in monthly data submission
- Lack of standard data formats
- No standard methodology for energy accounting for computing RPO compliance
- Check on double accounting
- Process streamlining for RPO-related data flow between OEs and RRECL
- Lack of awareness among OEs

WEB-BASED TOOL

Monitor, Record & Report

RPO compliance status of OEs to SERCs

Designing/Implementation Challenges in Hosting Web Tool

- **Web Hosting Requirements** (both hardware and software) to be agreed and arranged by the SNA for Web Tool integration.
- Responsibility of **migrating** Web Tool from Test server to RRECL server. **Involvement of multiple agencies** makes the process length & time consuming. In case of Rajasthan, RRECL>RISL>DoIT>Energy Portal Team of Rajasthan.
- **Pilot testing and Launch of Web Tool**: Involvement of IT Resources and dedicated team for pilot testing & preparatory work for hand-over/take-over.
- **Hand over of the tool and** testing the real time data: Expected Launch date?
- Requirement of **security audit** of the web-tool?
- **Ownership and maintenance** of the tool post handover by the Program?
- Planning for **AMC support** for post hand-over for update of Web Tool?

— Next Steps

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Next Steps

Current Status

- RPO Web Tool is ready for Pilot Testing and integration with RRECL website, upon necessary security audit.
- Training program for stakeholders shall be planned alongside launch of RPO Web Tool.

Next Actions

- RPO Web Tool facilitates the State Agency to discharge its responsibilities under RPO Regulations.
- Thus, the proposed RPO-CMR framework & RPO Web Tool is easily scalable.
- State specific customization can be incorporated as per requirement under Regulatory provisions.
- However, it is necessary that RPO Compliance Monitoring framework along with institutional structure is put in place to ensure engagement of stakeholders.
- PACE-D TA Program plans to explore similar initiatives in two Partner States (Karnataka & MP).

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www.pace-d.com www.facebook.com/PACEDTAProgram twitter.com/PACE_DTAProgram

India's RPO Targets – Ambitious, but are they optimal?

September 30, 2016

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+91-988-688-5334

BROOKINGS INDIA

Disclaimer

- Brookings India is an independent not-for-profit Think Tank, affiliated to the Brookings Institution
- I am a scholar of technology and policy
  - Focus on interdisciplinary issues, especially on technology and infrastructure for sustainable development
  - Previously a co-founder of CSTEP, Bangalore
  - Faculty member at Carnegie Mellon University for over a dozen years
- Long-time expert on Smart Grids
  - Founded GoI's Smart Grid Task Force, ISGF, etc. (remain advisor)
- *All views are personal*

Some (selected) relevant work by Brookings India Scholars

- Helped found and Advisor of India Smart Grid Task Force and India Smart Grid Forum
  - Involved with many things including cost-benefit analysis, model regulations, etc.
- Helped rethink definitions of “electrification”
  - Service more than wire alone
    - Seeded plans for feeder monitoring
- Showed shortfall of power is higher than official
  - Average numbers aren’t appropriate or sufficient
- Extensive work on RE financing, and evaluating discoms

3 Main issues for RE for Discussion

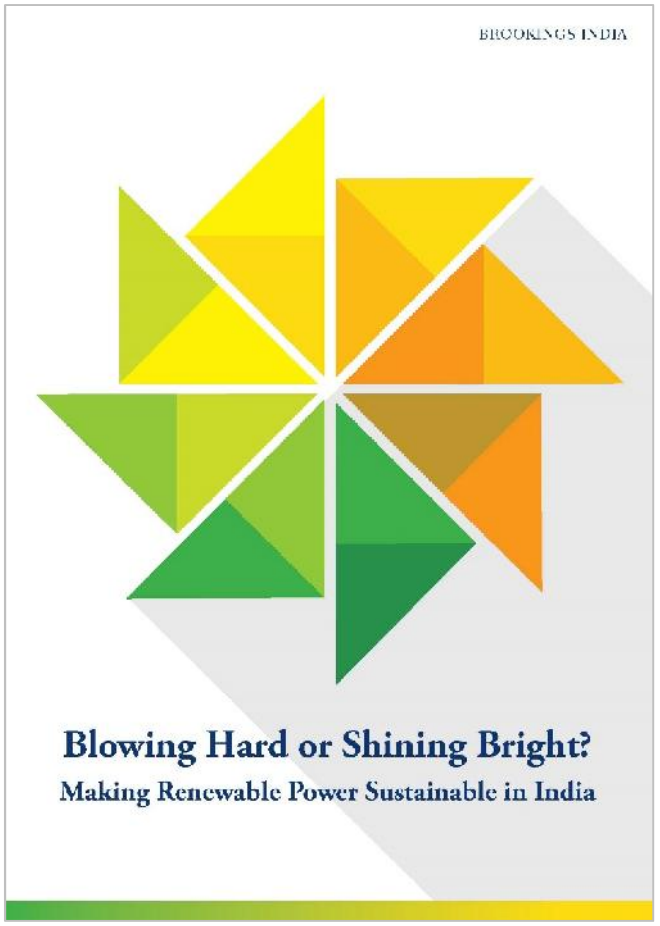
- What should India's RE targets be?
  - 175 GW had been laid down ~two years ago
    - This is a decision outside our scope (and above my pay grade)
- How should they be operationalized?
  - RPO obligations (?)
  - State implications
- What else do we need to figure out?
  - Hidden and even "known" challenges
  - Missing ingredients to make these work

RE's big picture

- Global Challenges
  - Variability and uncertainty
    - These are different!
  - Location-specificity
    - Handful of states have disproportional RE
  - (of course) Economics
- India-specific (additional) challenges
  - Weak grid
    - No spinning reserves,
    - Limited (or no) ancillary services
    - Weak interconnections
  - High cost of capital

Book: Making Renewables Sustainable

- Cannot consider RE in isolation
  - *Broader transformations matter* (just like with Smart Grids)
    - Pricing (incl. Time of Day)
    - Alternative supply
    - Workforce
    - Land, *etc.*
  - This is before considering issues such as Open Access, privatization etc.



Book on RE launched by H'ble Minister Jan 8, 2015

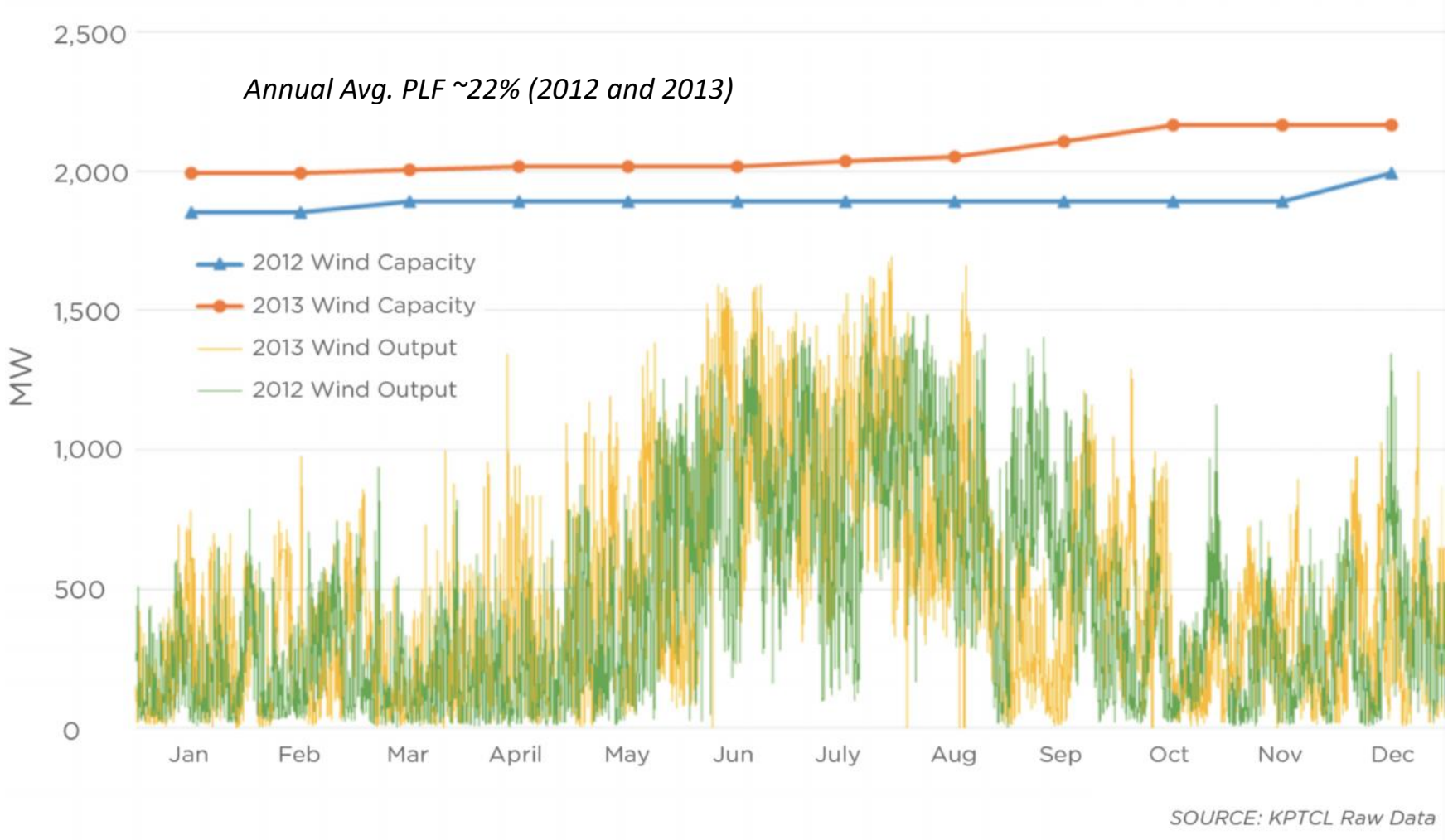
RE is growing…what does that do to the Grid?

- RE is ~6% of power in India (more than double this by capacity)
  - Germany is about 30% of energy
    - Does this mean "no problem" until then?
  - Difference: Germany's Grid is
    - Interconnected to Europe (4x larger)
    - Stronger
    - Not all the RE is solar (lots of biomass/CHP)
  - And they have faced economic challenges from RE

Old Grid vs. Future Grid

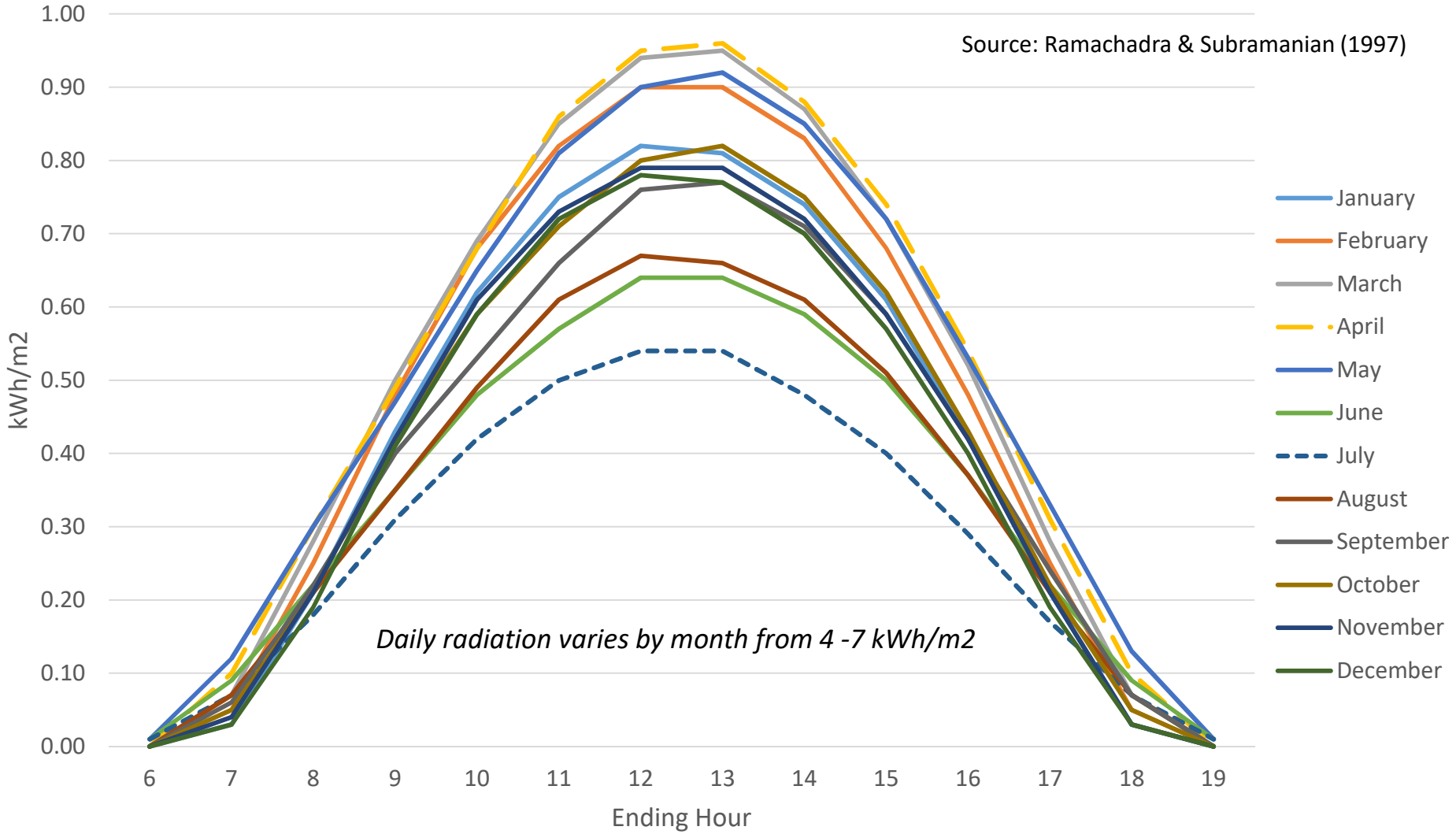
- Old Grid
  - Over-engineer to ensure supply is always equal to (rather, greater than) demand
    - Demand was the uncertainty
- Future Grid
  - Now, supply is itself variable
  - Options are
    - Over-engineer more?
    - Make demand CONTROLLED VARIABLE to match supply
    - Load shed more (most effective but worst balancing mechanism)

Variability of Wind across Karnataka
(1 minute resolution)

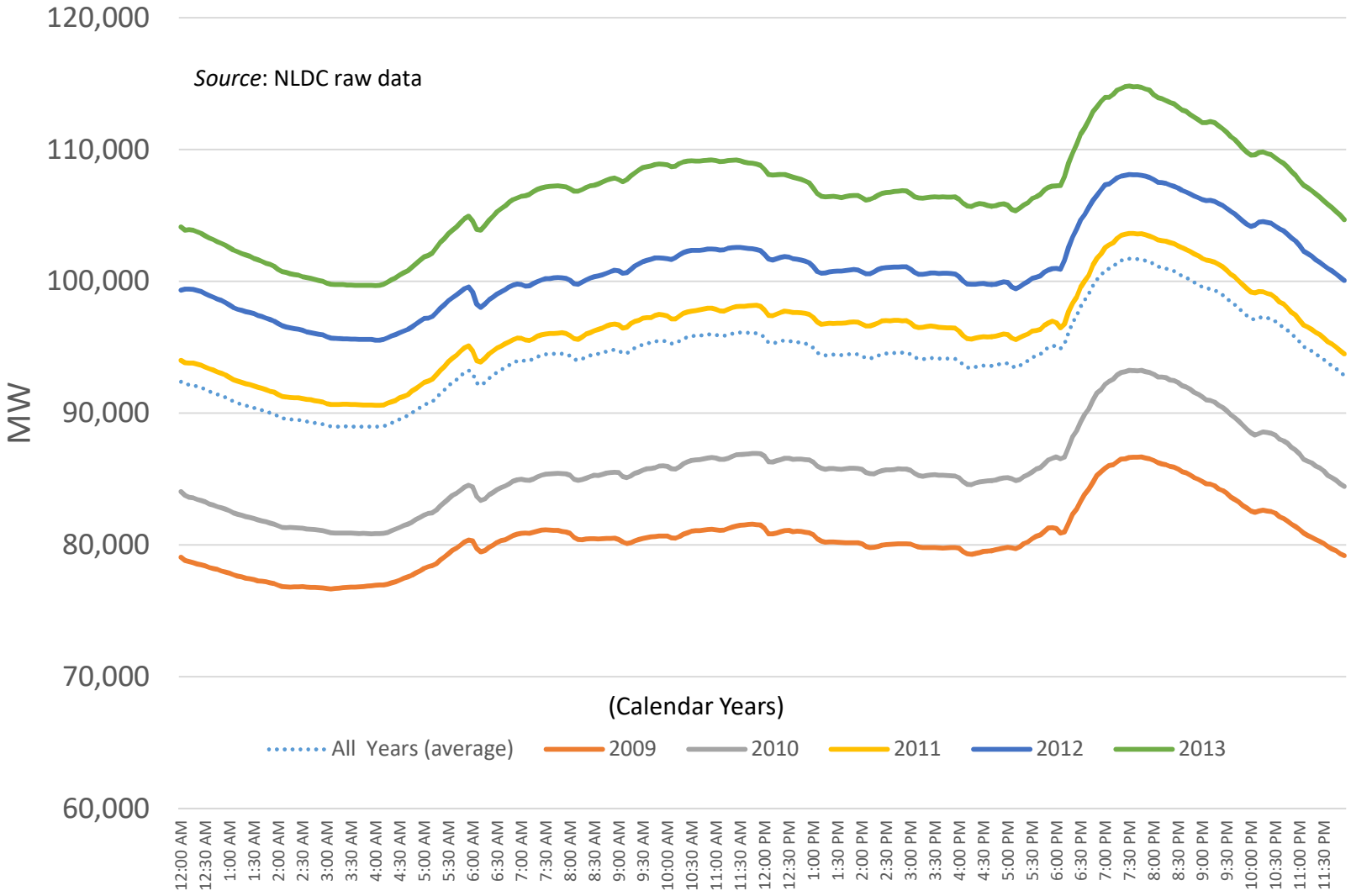


SOURCE: KPTCL Raw Data

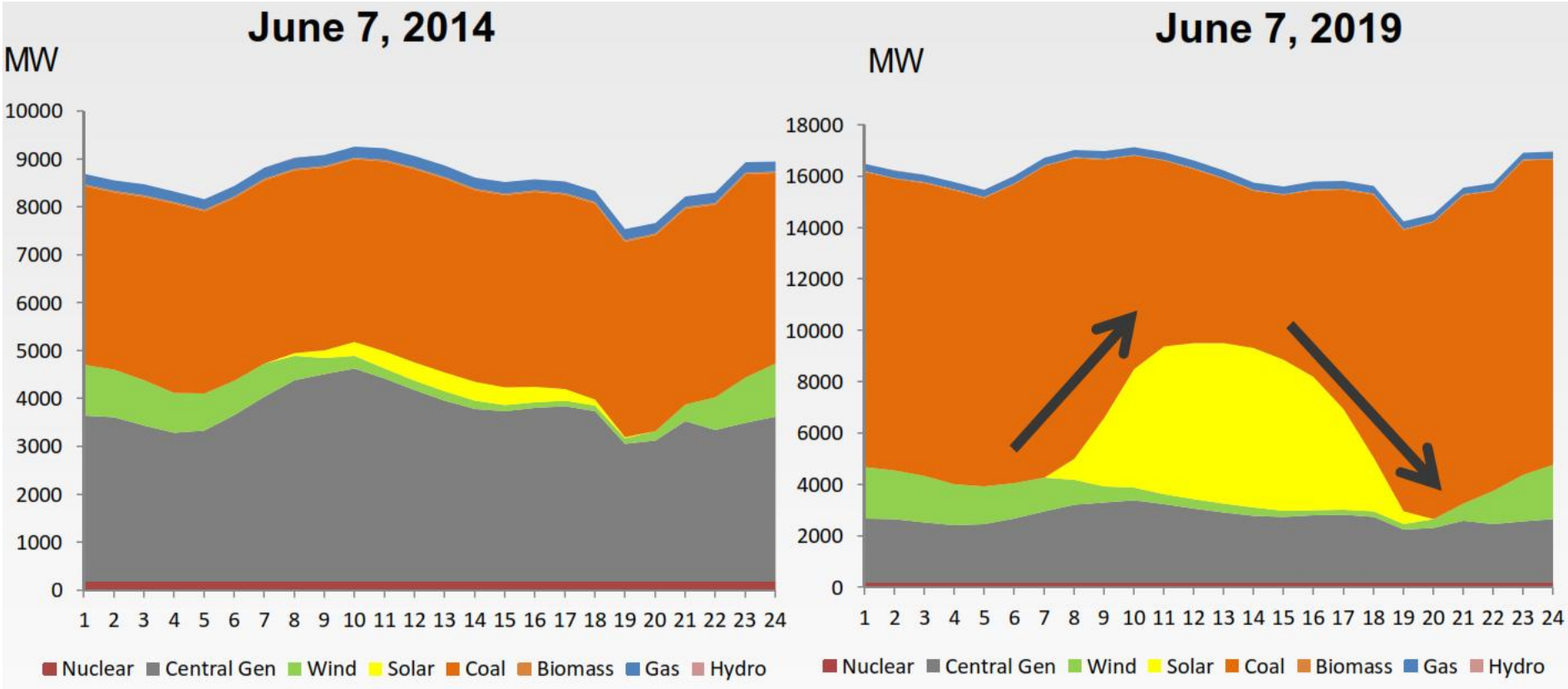
Hourly Solar Input in Goa



Avg. Daily Load Curve: All India Electricity Supply



Sample Rajasthan Load Curve Projection

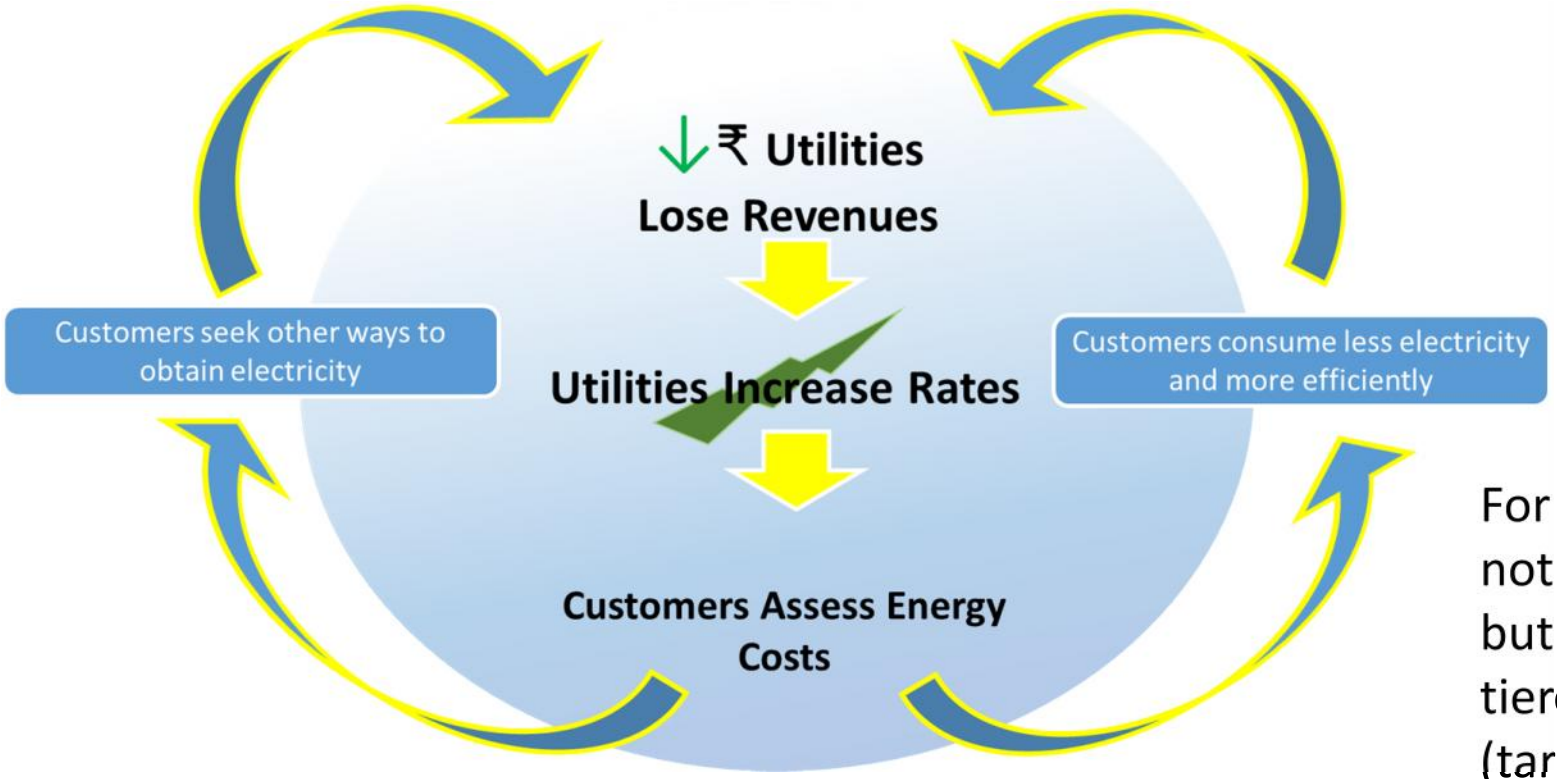


Source: Wartsila

Need flexible generators suitable for ramping

Candidates: Open cycle gas turbine, hydro, and internal combustion engine – plus other storage, and demand response

India is (luckily) not YET the West



Adapted from : The Appalachian Voice

For India, it's not renewables but theft and tiered slabs (tariffs) that can have similar impacts

"Utility Death Spiral"

Indian push for RE – RPO Numbers don't add up

- There have been capacity targets for 2022 announced in 2014-15
  - 60 GW grid solar
  - + 40 GW "rooftop" solar (some lack of clarity here…)
  - + 60 GW wind (already more than half achieved)
  - + 15 GW other = **175 GW total**
- New guidelines for state RPOs (renewable purchase obligations) were declared 2016

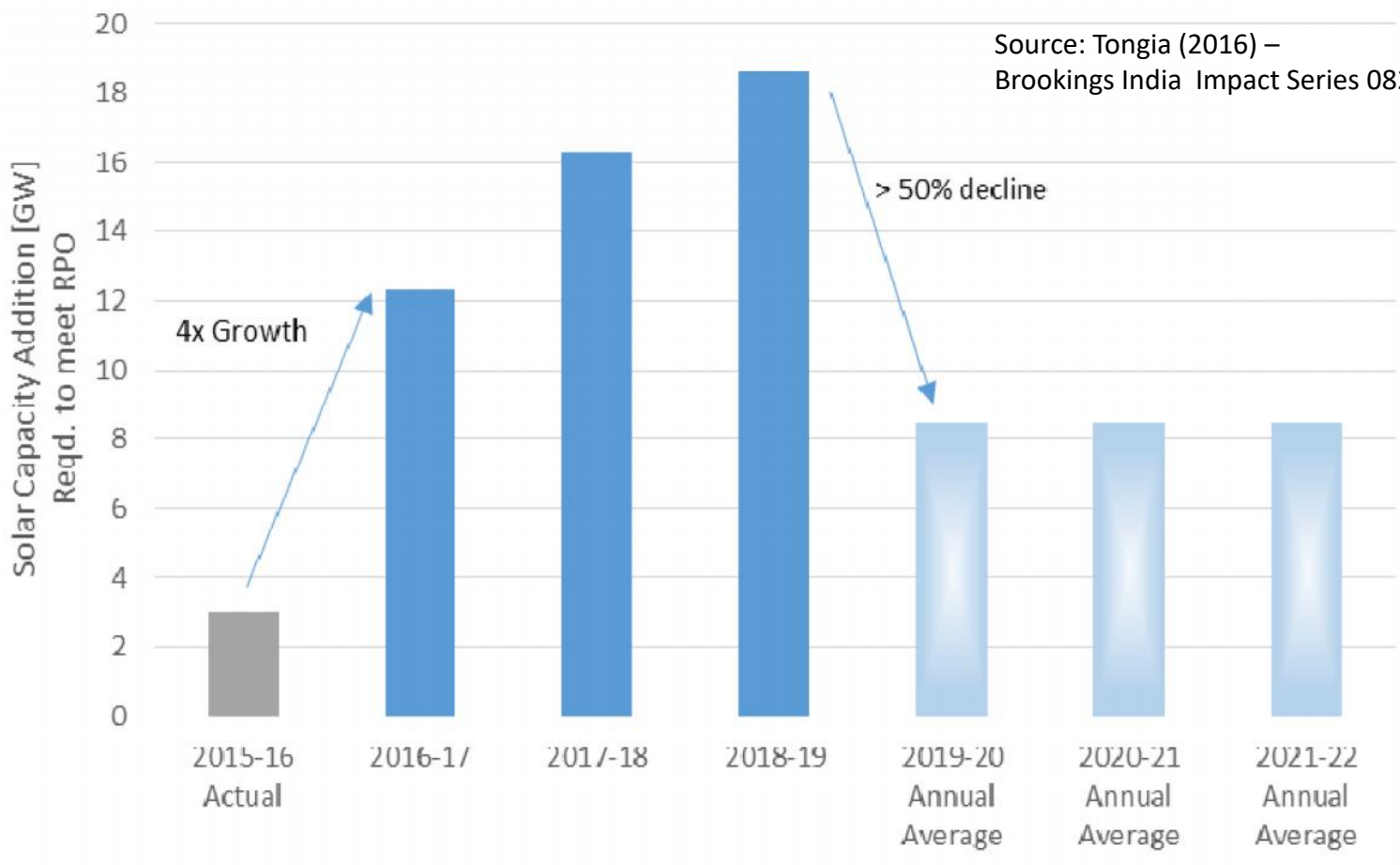
GUIDELINES	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Non-solar	8.75%	9.50%	10.25%	N.A.	N.A.	*(?)*
Solar	2.75%	4.75%	6.75%	N.A.	N.A.	8%
Total	11.50%	14.25%	17.00%	N.A.	N.A.	*(?)*

RE Purchase Obligations (proposed - 2016). Only the portions boxed in red are declared

The targets are VERY aggressive

- Which target matters more – capacity or generation?
  - *Both can only align under specific assumptions of overall demand*
- To meet the targets, India needs ~25% annual growth
- In contrast, even California's 50% RE* is only a ~4% annual growth (by 2030)
  - Similarly China and EU are about 5% only
- It turns out India doesn't need this aggressive targets to meet the carbon targets (Paris INDC declarations)
- RE growth today will displace coal (already suffering by many measures)

The current targets (solar) are front-heavy



Source: Tongia (2016) – Brookings India Impact Series 082016-2.1

This assumes a healthy 7.5% overall power demand growth

Recommendations for RPOs

- States must do their homework in picking the targets
- Consider more flexibility in swapping between solar and non-solar
  - 8% solar pro-rata would have implied 6% “other” (100:75 GW)
- Make the targets more progressive
  - Remove front-loading; allow feedback for updating
- Remove the “excluding hydro” from the denominator (for the solar targets as announced)
  - Adds unnecessary complexity
- India’s need is “peakers” that operate only 500-1,000 hrs./year – which will be neither coal nor solar

Other questions worthy of debate

- What does it mean to "comply" or "not comply"?
  - Annual average? Multi-year?
  - Can we properly know roof-top solar's contribution?
    - "Net metering" may make accurate numbers impossible
- What's the effective PLF of RE capacity? MNRE calculations assume 19%
  - Too high for a growing capacity (since end-of-year nameplate capacity won't be available for earlier parts of the year)
  - During the growth phase, *effective PLF* may be 18% or lower
- How are we handling the hidden costs?
  - Transmission, cross-subsidy waiver, impacts on other sources (backing down or even efficiency), wheeling, ancillary services, etc., plus others for rooftop solar

Challenges of an RE rich future

- India's growth only partially offsets Utility Death Spiral risks
  - Cross-subsidy surcharges heighten the risks
- Most RE wants "air-tight" PPAs = bankable
  - What about the alternative models for the future?
    - More dynamic markets instead of PPAs – competition for *power*, and not just *power plants* (one time bidding)
    - Carriage and Content (wires and retail) separation?
- Absence of mark-to-market (wholesale/pool) pricing hurts RE's value (esp. when RE is "cheaper")
  - In India RE won't lower wholesale prices
  - In many countries, RE makes wholesale prices occasionally dip negative (!)
  - In the long run, RE competes not just with fossil fuels but itself (future RE vs. present RE)

What does RE need?

- A stronger grid!!!
  - Long distance transmission is expensive
  - Need ancillary services and balancing (fast ramping)
    - Hydro is ideal – but limited
    - Natural gas is a good alternative choice – BUT as a open cycle
  - Storage
- Better pricing signals (will encourage things like *procurement* ToD, storage, etc.)
- Smart Grids
  - Definition: A broad transformation of the grid harnessing digital communications and control to make the grid more resilient, nimble, RE friendly, and efficient
  - This enables "Demand Response"
- Suggestion: Redefine RPOs to include storage, enabling solutions (like RE-linked hydro), etc.

We need more data and analysis

- "How much RE can the grid handle"?
  - IT DEPENDS!
  - Any amount is possible – with a cost and effort
- Fundamental Qs
  - What else do you have? Fast ramping?
  - How much risk are you willing to tolerate?

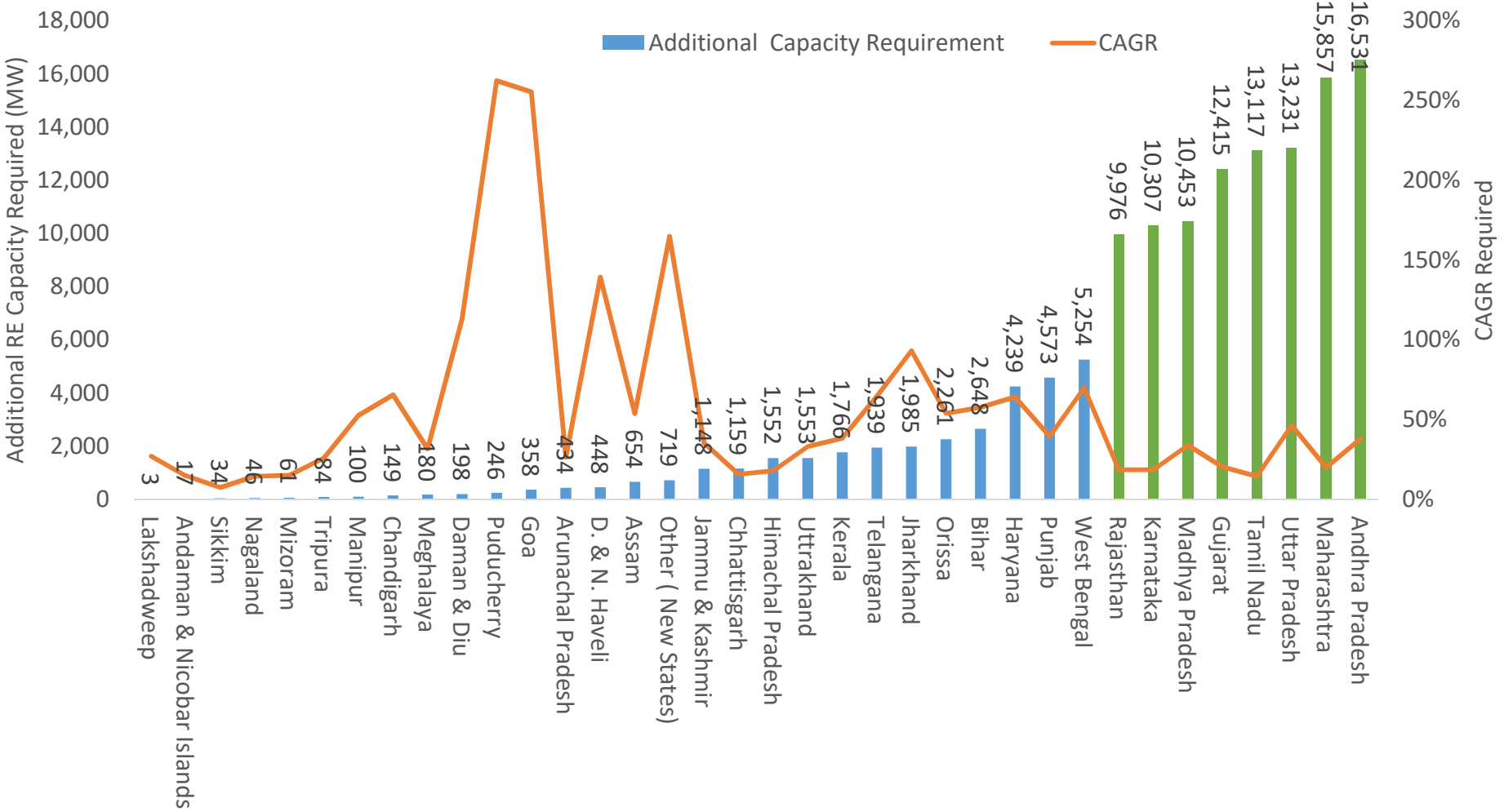
  (If you are allowed to load-shed then no problem…)
- What are the implications from a state load despatcher perspective?
  - Marginal costs? (Treating RE as "negative demand")
  - Granular, and not just average numbers

Doing a state-level deep dive

A few state-level disaggregations of the targets

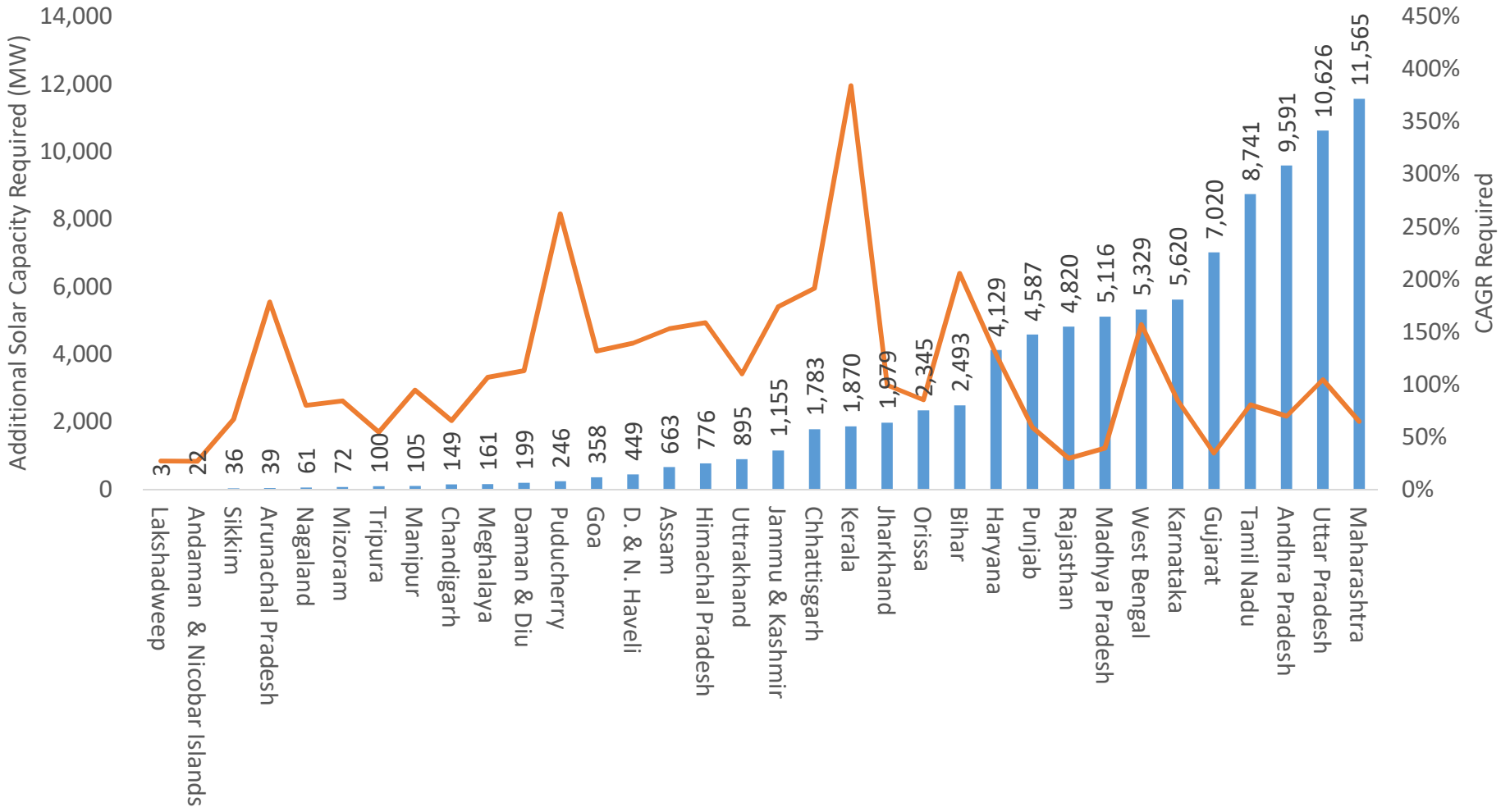
- The subsequent exercise is only **illustrative**, with gross assumptions such as
  - 7.5% overall electricity demand growth rate
  - Modest population growth rate per state
  - Etc.
- The targets are inherently asymmetric across India, partly due to size/scale reasons, partly due to variance in RE potential
- Use MNRE state-wise targets for RE, and CEA data for generation in 2014-15 (base year)

State-wise *additional* RE target and required CAGR



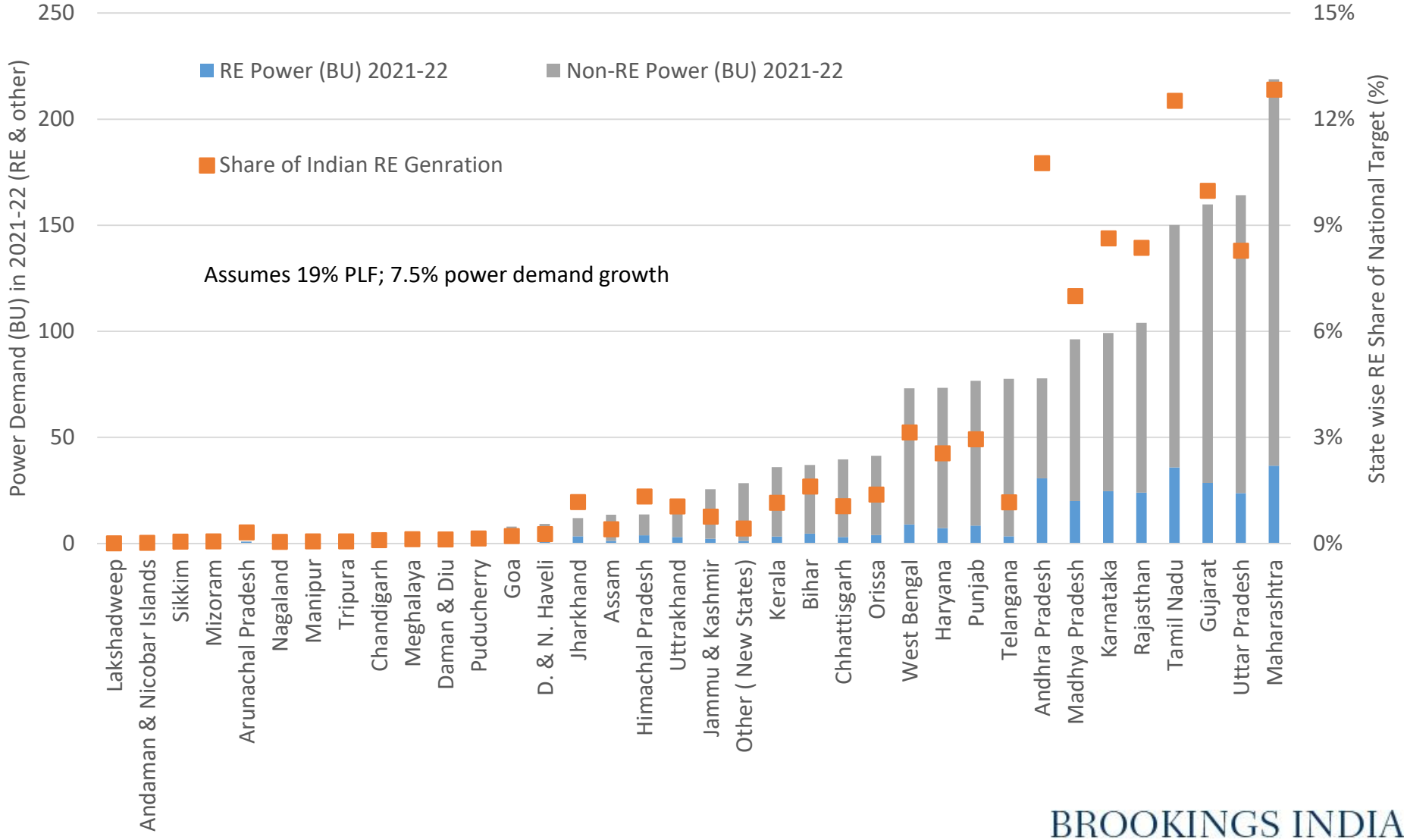
BROOKINGS INDIA

State-wise *additional* solar target and required CAGR



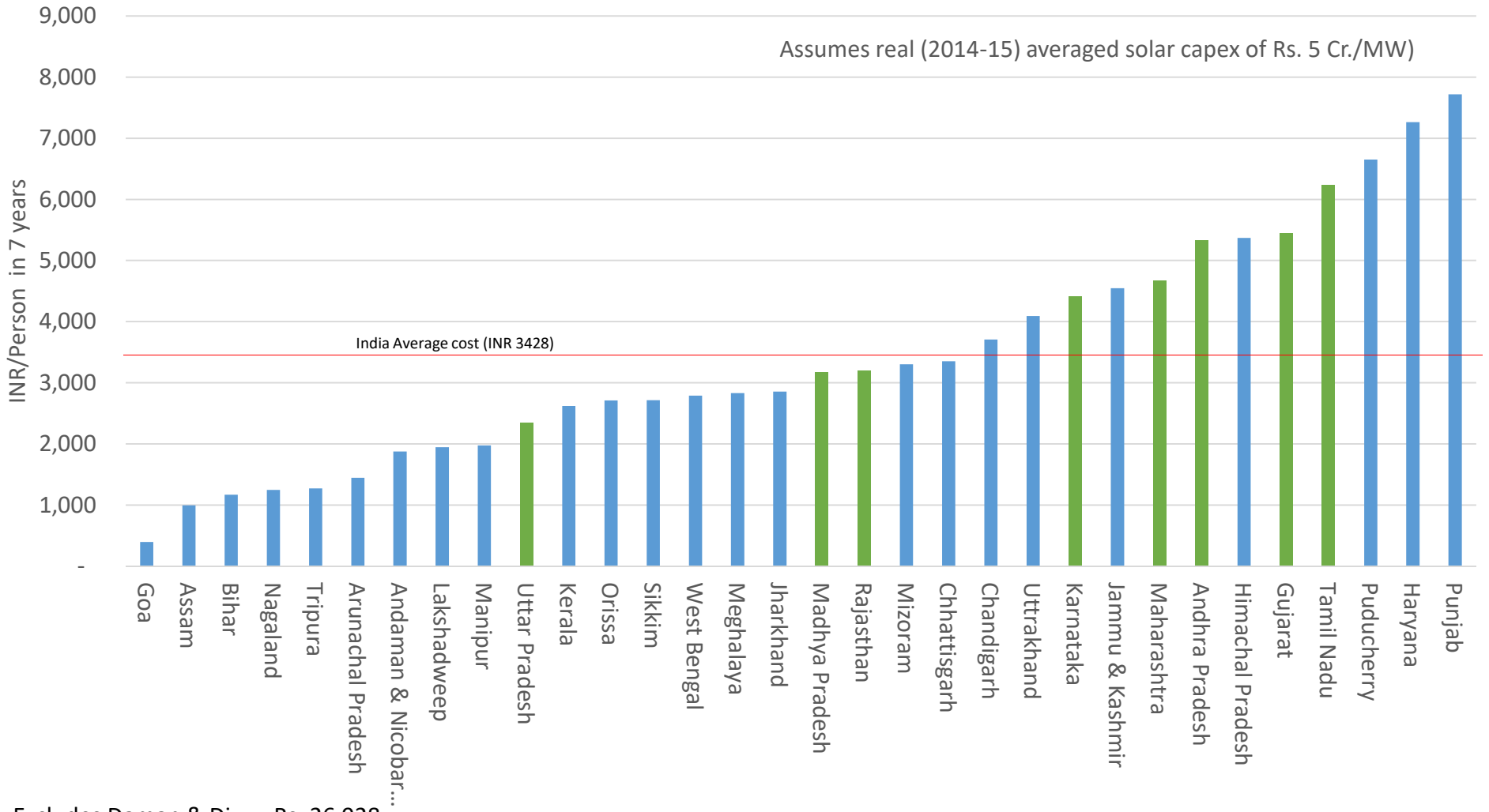
BROOKINGS INDIA

State Comparisons of Shares/Contribution



BROOKINGS INDIA

Per capita investment required for the Solar Targets



Excludes Daman & Diu = Rs. 26,928
& D. & N. Haveli = Rs. 48,384

BROOKINGS INDIA

A better calculation (much harder): incremental cost of RE

- Examine the gap (delta) in RE costs versus other power
  - MAYBE assume only marginal costs for other power (?)
- Complexities of this include
  - Variance in growth rates (demand)
  - Variance in costs
  - Variance in delta over time
  - *Hidden costs (as listed previously)***
  - Etc.

** Not to deny hidden costs or externalities of traditional generation

RE has a bright future…

- Costs continue to fall (RE as well as storage)
- Technology improves (including for RE output prediction)

…How we get there is what we have to work on

We tend to overestimate a technology in the short run, and underestimate its impact in the long run

- Ray Amara

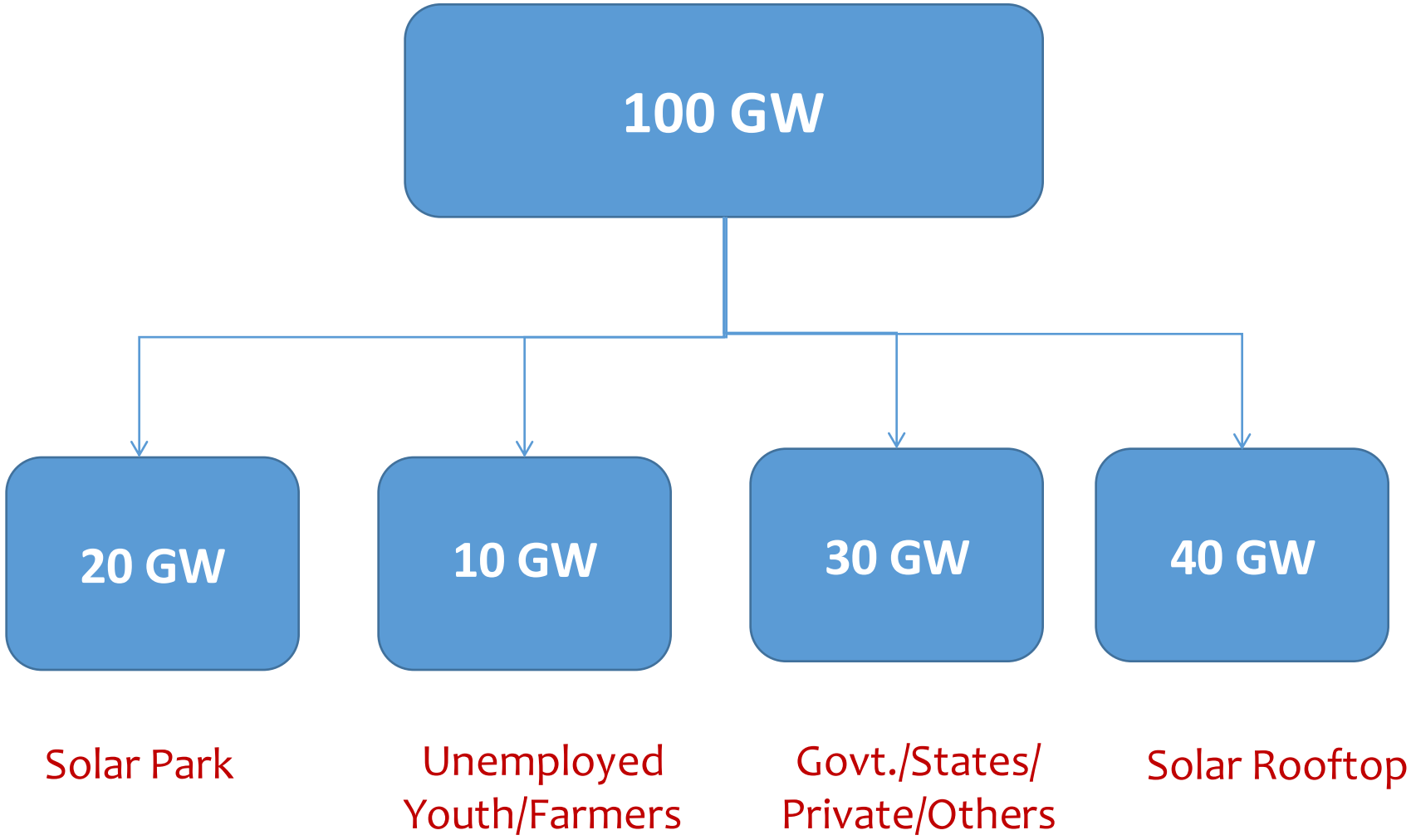
MNRE

Grid Connected Solar Rooftop and Small Solar Power Plants Programme

Ministry of New and Renewable Energy

30.09.2016

Roadmap for Solar Power by 2022



Installation : Basics

- Cost about **Rs.75,000** per kWp discovered through various benchmark/tendering process
  - Preference for Consumption Expenditure

- Grid Connected Rooftop & Small Solar Power Plants Programme
  - Outlay increased from Rs. 600 cr to Rs. 5,000 cr

- Subsidy Pattern for Residential, Institutional & Social Buildings
  - Max 30% of Benchmark Cost for General category States
  - Max 70% for Special Category States & Islands (LKD & ANI)
  - Must Use : Domestic Panels / Modules

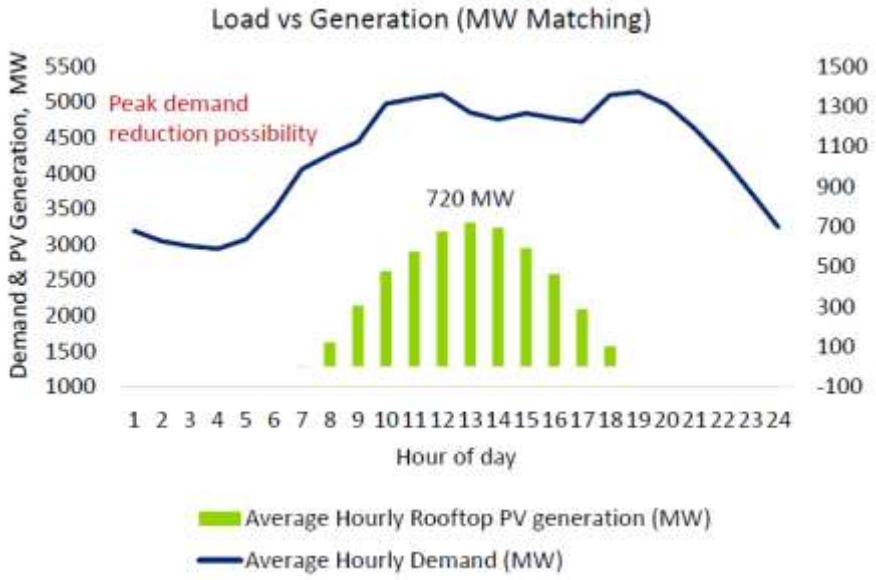
Installations : Basics

Achievement Based Incentive for Govt/PSUs

Achievement against target capacity	Incentives for General Cat. States/UTs (Rs/ kW)	Incentives for Special Cat. States/Uts (Rs/ kW)
80% and above	18,750	45,000
Below 80% and upto 50%	11,250	27,000
Below 50%	7,500	18,000

Advantages of Rooftop Solar : DISCOM / Utility

- Savings in transmission & distribution losses
- Improvement of tail-end grid voltages & reduction in system congestion with higher self-consumption
- Meeting Renewable Purchase Obligations (RPOs)
- Manage daytime peaks – Urban Area



Regulatory Facilitations

- **Supportive Policies**
  - 17 States issued
- **Building Byelaws**
  - MoUD Mandates for States & Cities
- **Net or Gross Metering Regulations**
  - SERCs of 30 States/UTs have notified
  - Arunachal, Jammu & Kashmir, Telangana, Manipur, Mizoram and Nagaland yet to notify
- **Weak operationalization of net-metering regulations**
  - **RTS** : competitive only for commercial/ industrial sectors
  - Additional Work for Field Staff
  - With Net Metering
    - Reduced income from paying customers : Top Slab
    - Indirect Payment to Customers for Energy Exported

Regulatory Facilitations

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राजीव गौबा
सचिव
Rajiv Gauba
Secretary

भारत सरकार
शहरी विकास मंत्रालय
निर्माण भवन, नई दिल्ली-110011
Government of India
Ministry of Urban Development
Nirman Bhawan, New Delhi - 110011

D.O. No. Secy(UD)/Rooftop Solar/2016/ 14470
May 23, 2016

Dear

Kindly refer to our DO letter vide no. Secy(UD)/Rooftop Solar/2014/291 dated 04.12.2014 regarding installation of rooftop grid connected solar photovoltaic (SPV) panel on the buildings (copy enclosed) vide which you were requested to issue necessary instructions to all State departments to use rooftop of buildings under their control for solar power generation on a mandatory basis and also to Local Bodies under your jurisdiction to incorporate the above provision in their Building Bye Laws so that installation of solar photovoltaic on rooftops of all types of buildings in their jurisdiction may become mandatory.

Central Public Work Department (CPWD) under this Ministry has taken initiatives for installation of solar panel on Central government buildings located all over the country under Renewable Energy Service Companies (RESCO) model. 1.5 MWp capacity has already been installed and agreements have been signed for installation of solar panels of 42.5 MWp capacity in central govt. buildings. Under this model, entire capital Expenditure on installation and maintenance of solar photovoltaic panels is made by RESCO. The building owner has to purchase all the green energy generated through solar panels at prescribed rates which are generally less than the rates being charged by discoms.

Suitable provisions for installation of solar photovoltaic (SPV) panel on buildings were also made part of the Model Building Bye Laws, 2016 under Section 10.2 of Chapter Green Buildings and Sustainability Provisions circulated by this Ministry.

In view of the above, I would again request you to kindly issue necessary instructions for mandatory installation of solar panels on all govt. buildings and installation of solar panels in all buildings under the Building Bye Laws of all Urban Local Bodies.

I would be grateful, if you could kindly take necessary action in this regard and apprise me of the progress in this direction.

With regards,

Yours sincerely,
Sd/-
(Rajiv Gauba)

Encl.: As above

Chief Secretaries/Administrators of all States/UTs

Copy to:

Dr. Upendra Tripathy, Secretary, MNRE, Block No. 14, CGO Complex, Lodhi Road, for information.

(Rajiv Gauba)

No. 22/52/2005-5Power.—In exercise of the powers conferred by Section 18 of the Energy Conservation Act, 2001(Central Act 52 of 2001), the Governor of Haryana hereby issues the following directions for efficient use of energy and its conservation in the State of Haryana:

The installation of Solar Photovoltaic Power Plant for the category of buildings/areas mentioned in column 2 as per the capacity mentioned against it under column 3 of the schedule below shall be mandatory:

SCHEDULE

Sr. No.	Category of building/area	Capacity of Solar Photovoltaic Power plant to be installed
1	2	3
1	All residential buildings built on a plot size of 500 Square Yards and above falling within the limits of Municipal Corporations, Municipal Councils, Municipal Committees, Haryana Urban Development Authority (HUDA),Haryana State Industrial and Infrastructure Development Corporation (HSIIDC) sectors	Minimum 1 Kilo Watt peak (KWp) Or 5% of connected load, whichever is higher
2	All private Educational Institutes, Schools, Colleges, Hostels, Technical/Vocational Education Institutes, Universities etc. having connected load of 30 Kilo Watt (KW) and above	Minimum 5 Kilo Watt peak (KWp) Or 5% of connected load, whichever is higher
3	All Government Buildings and Offices, Government Colleges, District Institute of Education and Training (DIET), Government Educational Institutions, Universities, having connected load of 30 Kilo Watt (KW) and above	Minimum 2 Kilo Watt peak (KWp) Or 5% of connected load, whichever is higher
4	All private Hospitals and Nursing Homes, Industrial Establishments, Commercial Establishments, Malls, Hotels, Motels, Banquet Halls and Tourism Complexes, having connected load (i) of 50 Kilo Watt (KW) to 1000 Kilo Watt (KW); (ii) above 1000 Kilo Watt (KW)	(i) Minimum 10 Kilo Watt peak (KWp) or 5% of connected load, whichever is higher; (ii) Minimum 50 Kilo Watt peak (KWp) or 3% of connected load, whichever is higher
5	All new Housing Complexes, developed by Group Housing Societies, Builders, Housing Boards, on a plot size of : (i) 0.5 Acre to 1.0 Acre; (ii) More than 1.0 Acre to 2.0 Acres; (iii) More than 2.0 Acres to 5.0 Acres; (iv) More than 5.0 Acres.	(i) Minimum 10 Kilo Watt peak (KWp) (ii) Minimum 20 Kilo Watt peak (KWp) (iii) Minimum 30 Kilo Watt peak (KWp) (iv) Minimum 40 Kilo Watt peak (KWp)
6	All water lifting stations of Irrigation Department having connected load of 100 Kilo Watt (KW) and above	Minimum 50 Kilo Watt peak (KWp) Or 3% of connected load, whichever is higher

Based on MoUD's Advisory, States are amending Building Bye-laws

➔ Haryana, Chandigarh and Chhattisgarh

Mandate for Smart Cities

Smart City
MISSION TRANSFORM-NATION

Mission Statement & Guidelines

सत्यमेव जयते

Ministry of Urban Development

राजीव गौबा
सचिव
Rajiv Gauba
Secretary

भारत सरकार
शहरी विकास मंत्रालय
निर्माण भवन, नई दिल्ली-110011
Government of India
Ministry of Urban Development
Nirman Bhawan, New Delhi-110011

D.O. No. K-15016/205/2015-SC-I
May 10, 2016

Dear Shri Sharma,

As you are aware, increasing the use of renewable energy is one of the essential features of a Smart City. All Smart Cities have to source a minimum of 10% of their energy requirements from renewable sources, including solar. One quick way of increasing solar energy use is to converge with the Roof Top Solar (RTS) project initiated by the Ministry of New and Renewable Energy (MNRE).

2. Unlike ground mounted solar projects, the Roof Top Solar projects do not require pooling of land or separate transmission facilities. The Ministry of New and Renewal Energy (MNRE) provides financial assistance for developing RTS projects. The details of the scheme are available on the Mission's website (www.smartcities.gov.in). Importantly, the MNRE has just brought out an incentive cum award scheme for RTS systems in Government/PSU buildings. This is an opportunity for Smart Cities to use funds provided by the MNRE to install RTS on residential, social and institutional buildings.

3. The MNRE has invited bids through the Solar Energy Corporation of India (SECI) for RTS projects. The Smart Cities can use the vendors procured by the SECI to ground RTS projects. Alternatively, Smart Cities can also use model Bid Documents of SECI to develop RTS projects. The Smart Cities may choose any one of the methods.

4. I, therefore, urge you to operationalize the RTS projects in your Smart Cities expeditiously. For any assistance, States/Cities may contact Mr. Santosh D. Vaidya, Joint Secretary (MNRE) at 011 24362288 or Mr. Rakesh Kumar, Director, SECI at 011 71989205/9818567800.

With regards,

सत्यमेव जयते

उपेन्द्र त्रिपाठी
Upendra Tripathy

सचिव
भारत सरकार
नवीन और नवीकरणीय ऊर्जा मंत्रालय
SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

D.O.No.3/88/2015-16/GCRT

11th May, 2016

Dear Secretary,

Sub: Implementation of decisions taken in Cabinet Secretariat on 5th/6th April 2016 and presentation of Green Energy Rooftop Certificate to Cabinet Secretary on 30.05.2016 at Pan India Solar Rooftop Workshop.

....

Achieving 100 GW solar power is part of India's commitment before the United Nations Framework Convention on Climate Change (UNFCCC). Thus Prime Minister has been stressing on expeditious installation of Roof Top Solar (RTS) Projects in Government building premises as these projects do not require pooling of land or separate transmission facility and also have low technical losses.

2. Accordingly, this Ministry (MNRE) has bene collating data about RTS potential of rooftops and surplus areas of Government building premises of various Ministries/Departments. Based on the data available till now for about 50 Ministries/Departments, about 5900 MW power and annual financial savings of Rs.830 crores can be achieved by these Ministries/Departments.

3. MNRE has notified an Award-cum-Incentive scheme for developing RTS projects on rooftops and surplus areas of Government/PSU building premises. It provides for incentive of upto 25% of standard project cost and also for various awards for achievements and innovations (Annexure A).

4. The Cabinet Secretariat recently conducted series of meetings with individual Departments on 5th and 6th April for fast tracking development of RTS projects. As agreed in the meetings, MNRE has already developed model tender documents and these can be accessed at weblink http://mnre.gov.in/schemes/decentralzed-systems/solar-rooftop-grid-connected/. These can be used by Ministries for developing projects on their own. These were also given to the nodal officers of the Departments during the Cabinet Secretariat meetings. Alternatively, MNRE has developed a panel of expert PSUs for facilitating Departments in bidding process (Annexure B and C). Departments may also choose to implement RTS projects through their own PSUs. These PSUs are expected to survey potential, submit brief feasibility report, collate RTS projects of various Departments, undertake bidding in model chosen by Department and facilitate signing of agreement between selected developer and the Department. The 3% service/Project Management Consultancy(PMC) charges for such PSUs will be provided by MNRE.

Empanelled PSU
Solar Energy Corporation of India
Central Electronics Ltd
India SME Technology Services Limited
PEC Limited
Rajasthan Electronics & Instruments Limited
Bharat Heavy Electrical Ltd.
Bharat Electronics Ltd.
Punjab Communication Limited
Railway Energy Management Company (REMC)
Centre for Development of Imaging Technology
Kerala State Electronics Development Corporation (KELTRON)
RITES Limited
Gujarat Industries Power Company Limited
UP Industrial Co-Operative Limited
REC Power Distribution Company Limited
NTPC Vidyut Vyapar Nigam (NVVN)

Letter for allocation of funds & commitment Certificates

सचिव
भारत सरकार
नवीन और नवीकरणीय ऊर्जा मंत्रालय
SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

उपेन्द्र त्रिपाठी
Upendra Tripathy

No.3/88/2015-16/GCRT

21th June, 2016

Subject: Request to States/UT's to propose for allocation of funds for rooftop projects during 2016-17 and 2017-18

Dear Sir/Madam,

Achieving 100 GW solar power is part of India's commitment before the United Nations Framework Convention on Climate Change (UNFCCC). Thus Prime Minister has been stressing on expeditious installation of Roof Top Solar (RTS) Projects in Government building premises as these projects do not require pooling of land or separate transmission facility and also have low technical losses. This segment has target of 40 GW. Promoting roof top solar requires coordinated efforts of various departments/agencies of State/UT Government especially urban development, town planning and power departments as also DISCOMs and State Nodal Agencies for renewable energy.

2. Accordingly, this Ministry (MNRE) has been collating data about RTS potential of rooftops and surplus areas of Government building premises of various Ministries/Departments. Based on the data available till now for about 50 Ministries/Departments, about 5900 MW power and annual financial savings of Rs.830 crores can be achieved by these Ministries/Departments. These Ministries have also submitted commitment certificate in this regard. Now this effort is required to be taken further at State level of collation of data about RTS potential of rooftops and surplus areas of Government building premises of State Government.

3. **Matter for mandating Roof Top Solar in Government building came up for discussions during recently held Power Minister Conference on 16-17 June 2016 where the blank commitment certificates were distributed to all State Power Minister/Officials for early consideration and submission.**

4. MNRE has notified an Award-cum-Incentive scheme for developing RTS projects on rooftops and surplus areas of Government/PSU building premises. It provides for incentive of upto 25% of standard project cost and also for various awards for achievements and innovations (Annexure A). MNRE has already developed model tender documents and these can be accessed at weblink http://mnre.gov.in/schemes/decentralized-systems/solar-rooftop-grid-connected/. These can be used by State Governments for developing projects on their own.

5. Alternatively, MNRE has developed a panel of expert PSUs for facilitating Ministries/State Governments in bidding process (Annexure B). State Government may also choose to implement RTS projects through their own PSUs/other notified designated agencies in the scheme such as State Nodal Agencies, DISCOMS, ULBs, channel partners for commercial and industrial and their own PSUs. These PSUs are expected to survey potential, submit brief feasibility report, collate RTS projects of various Departments, undertake bidding in model chosen by Department and facilitate signing of agreement between selected developer and the Department. The 3% service/Project Management Consultancy (PMC) charges for such PSUs/designated agencies (except channel partners) will be provided by MNRE.

6. If you need any assistance in this regard, you may contact Ms. Veena Sinha, Director at 011-24362706 and at email veena.sinha@nic.in for undertaking RTS projects. Accordingly, to expedite development of RTS project, it is requested to kindly give suitable instructions to the concerned States/UT agencies for the following:

(a) Assessment of Root Top potential of various residential, institutional, Government, colleges and socio-cultural centres;
(b) Sending the duly filled certificate to MNRE by 10th of July 2016 for Government sector so that these certificates can be presented to Cabinet Secretary by the end of July 2016;
(c) Undertaking RTS projects for institutional, residential, social sector, Government buildings through PSUs/MNRE designated agencies;
(d) Adoption of model building bye-laws for ensuring roof top solar for new residential projects;
(e) Developing incentive schemes for solar rooftop in residential, commercial and social sector;
(f) Developing a strong mandate for ensuring roof top solar on all new structures in the State;
(g) Utilising funds from MNRE scheme for grid connected and roof top projects and also from GoI releases based on 13th Finance Commission for promoting RTS project.

With warm regards,

Yours sincerely,

(Upendra Tripathy)

Encl: 1. Green Certificate for return to MNRE
2. Incentive and reward scheme (Annexure A)
3. Annexure B (List of PSUs)

To

All Chief Secretaries of States/UTs

Copy for kind information:

1. Cabinet Secretary, Cabinet Secretariat, New Delhi.
2. Secretary (Coordination), Cabinet Secretariat, New Delhi.
3. Director, Prime Minister's Office, South Block, New Delhi.

Formulation of Standard Documents:-

•Draft for **Memorandum of Understanding (MoU)** for execution between Organisation/ULB/Ministry/Departments and PSU's has been prepared**,**

•Draft for **Engineering, Procurement and Construction Agreement** for CAPEX /Ownership mode RTS projects where investment is made by Rooftop owner and bids are invited on project cost has been prepared;

•Draft for the **Power Purchase Agreement for** RESCO /PPA mode RTS projects where project investment is made by 3rd party and bids are invited on tariff to be charged by developer for recovering the investment has been prepared**;**

•All the above have been vetted by the Ministry of Law and Finance;

•The above initiative may help in formulating a standard of agreements in RTS project implementation.

Financing/CFA options

- No subsidy for commercial & industrial
  - Accelerated Depreciation
- Departments / Corporates preferring RESCO
  - High Cost + Lack of Budgeting and Expertise in Solar
- RESCO developer capacity needs strengthening
  - Long tenure of PPAs : 25 years
  - PPAs considered less bankable
    - Residential & Commercial sector
- **Activities Initiated**
  - Negotiations with World Bank, ADB & NDB
  - Approvals for Concessional Multilateral Finance
  - DEA : Reduction of Guarantee Fees

International Financing

- **KfW –**
  - 1 billion loan for Roof top/off-grid Solar/Solar parks/Solar Zones
  - 1 billion loan for Green Energy Corridor
- **World Bank**
  - US$ 625 million loan to SBI
- **JICA**
  - J Yen 30,000 million (Rs 1800 Crores app.) to IREDA
- **EIB – Luxemburg**
  - Euro 200 million (Rs 1700 Cr app.) - IREDA
- **AFD-2nd Line of Credit**
  - Euro 100 million (Rs 850 Crores app.)- IREDA

Activities Initiated

- Development of Expert Developers / Partners
  - 862 agencies empaneled
  - Targets notified for all categories of Partners
- 500 MW tender issued by SECI :
  - Bids Received for all States/ UTs
  - High Response from SMEs
- 1000 MW tender
  - Call Centre for Demand Collation
  - Site Assessments for 1000 MW Tender
- Interest Installation Form & App
  - SPIN portal : Consumers & Developers
  - AUDIT for shifting to NIC server
  - Mobile APP by NIC : Being developed

STATE WISE LIST OF LOWEST DISCOVERED PRICES (TENTATIVE) FOR SECI 500 MW ROOFTOP TENDER

S.No	Name of the State	State wise lowest Price discovered		
		PART A (Rs./kW)	***PART B (Rs/kWhr)***	***PART C (Rs./kW)***
1	Andaman & Nicobar Islands			74950
2	Andhra Pradesh	59950	5.25	62100
3	Bihar	71900		71270
4	Chandigarh	55500	3	64130
5	Chhattisgarh	67800	5.916	68500
6	Dadra & Nagar Haveli	_	_	68400
7	Daman & Diu	_	_	_
8	Delhi/NCR	55100	4.75	57000
9	Goa	60000	_	_
10	Gujarat	53000	6.123	64000
11	Haryana	56900	5.23	58000
12	Himachal Pradesh	56500	3	64950
13	Jammu & Kashmir	70000	_	73000
14	Jharkhand	72000	5.473	64000

15	Karnataka	53000	4.559	59000
16	Kerala	68320	_	65000
17	Lakshadweep	_	_	74950
18	Madhya Pradesh	55498	5.38	59498
19	Maharashtra	53000	4.459	59000
20	North Eastern States/Sikkim	45100	4.81	65000
21	Odisha	69400	4.9	70121
22	Puducherry	70500	3	69950
23	Punjab	64123	6.2	67500
24	Rajasthan	57550	4.5	59850
25	Tamil Nadu	53000	5.55	62100
26	Telangana	59700	5.35	61000
27	Uttar Pradesh	59498	5.473	60000
28	Uttarakhand	56500	3	64950
29	West Bengal	67800	5.55	62500

Software “SPIN” & website solarrooftop.gov.in

State Achivements

Sr.no.	States	Target Total (MWp) by Year 2022	Approval/Sanction (MWp)	Acheivement (MWp)
1	Andhra Pradesh	2000	39.5	9.58
2	Bihar	1000		0.60
3	Chhattisgarh	700	11.2	18.80
4	Delhi	1100	92	29.50
5	Gujarat	3200	61.75	37.00
6	Haryana	1600	75	18.30
7	Himachal Pradesh	320	10	0.20
8	Jammu & Kashmir	450	7	1.00
9	Jharkhand	800	55	0.40
10	Karnataka	2300	10.935	18.73
11	Kerala	800	15	2.00
12	Madhya Pradesh	2200	115	4.10
13	Maharashtra	4700	100	11.70
14	Odisha	1000	4	0.90
15	Punjab	2000	25	33.40
16	Rajasthan	2300	31	9.00
17	Tamil Nadu	3500	312	62.00
18	Telangana	2000	74	16.40
19	Uttarakhand	350	51	6.10

20	Uttar Pradesh	4300	7	17.80
21	West Bengal	2100	7	7.90
22	Arunachal Pradesh	50	0	0.00
23	Assam	250	14	0.25
24	Manipur	50	8.4	0.00
25	Meghalaya	50	0	0.00
26	Mizoram	50	0	0.10
27	Nagaland	50	0	0.00
28	Sikkim	50	0	0.01
29	Tripura	50	0	0.00
30	Chandigarh	100	30.5	8.00
31	Goa	150	2	0.00
32	Dadra and Nagar Haveli	300	0	0.28
33	Daman & Diu		0	0.00
34	Puducherry	100	0.02	0.00
35	Andaman & Nicobar Islands	30	1	0.00
36	Laskhadweep		1	0.00
A	Total	40000	1160.305	314.05
	Solar Energy Corporation of India*		899.6	46.46
B	Ministry of Railways		502.5	3.70
C	PSUs/Govt. Departments		482	11.37
D	By non Channel Partner*			14.51
			3044.405	341.87

* Achievements of SECI/Non Channel Partners is included in the State-wise list above
All Channel Partners/New Entrepreneurs were requested to submit projects details by 22.09.2016

Recent Developments

- Subsidy & Loan Financing unified
  - Tenders : IREDA & SECI
  - Banks
- DGS&D Process Initiated
  - Rate Contracts for Panels, Inverters, etc
- Priority Sector Lending
  - Rs. 10 lakhs for individuals & upto Rs. 15 cr for Projects
  - Bank loans as a part of home /improvement loan
- Mobile App for Locating Surya Mitras

Continued…

- Identification of rooftop & vacant areas in Govt / PSU buildings
- Data of about 55 Ministries indicates RTS potential of 5900 MW

- 8 meetings held in the Cabinet Secretariat with Departments
- Model bidding documents were developed for both CAPEX and RESCO modes

- Commitment certificates obtained
- Expert PSUs empanelled
  - Project management consultancy charges (3%) : by MNRE
  - PSUs have created Solar Cells + site assessments
  - Bidding process for RESCO & CAPEX being started

Performance Enabling Support for DISCOMs

Proposal for the Scheme:

- Provide support of Rs. 500 cr to the willing DISCOMs for supporting capacity of 1350 MWp by 2019-20.
- DISCOMs shall be allowed a financial assistance in the form of a grant up to a maximum of Rs. 37.5 lakh per MW of installed RTS projects.
- The scheme will also focus on identifying best practices of DISCOMs / SNAs and on awarding the best performance at DISCOM, Division (EE), Zone (AE) and individual levels.
- Support the DISCOMs for upgradation and modernization of their:
  i. distribution network;
  ii. demand aggregation;
  iii. developing consumer awareness;
  iv. developing enabling forms/ processes;
  v. meter/ equipment procurement;
  vi. capacity development.

STATES	Maximum percentage of sanctioned load	Maximum allowed capacity	Minimum capacity	Allowed cumulative capacity at DT
		(in MW)	(in kW)	
Delhi	NA	NA	1	20%
Uttar Pradesh	100%	1	1	15%
Chhattisgarh	NA	1	50	
Jharkhand	100%	1	1	15%
Punjab	80%	1	1	30%
J&K	50%	1	1	20%
Assam	67%	1	1	15%
Bihar	100%	1	1	15%
Haryana	105%	1	NA	15%
Maharashtra	100%	1	NA	40%
Himachal Pradesh	30%	NA	NA	30%
Goa and UTs	100%	NA	1	30%
Odisha	100%		NA	30%
Rajasthan	80%	1	1	30%
Kerala	80%	1	1	
Manipur (cap on only energy)		0.5	1	30%
Tamil Nadu (cap on only energy)				30%
Meghalaya		1	1	15%

Regulation Perspective

States	Maximum percentage of sanctioned load
Punjab	80%
J&K	50%
Assam	67%
Himachal Pradesh	30%
Gujarat	50%

- If capacity is limited to less than 100% of the connected load it limits the potential for installation in ***residential sector***
- Chhattisgarh has minimum size of ***50 kWp***
- Allowed cumulative capacity at DT ***less than 30%*** limits the installation in institutional and social sector
- Cap in energy generation ***below 90%*** limits the size and increase the complexity to asses how to size the plant based on 90% of the energy consumption

Grid Connectivity Time

STATES	MINIMUM TIME REQUIRED	MINIMUM TIME REQUIRED	MINIMUM TIME REQUIRED
	(in Days)	(in Days)	(in Days)
Delhi	103	Maharashtra	43
		Himachal Pradesh	53
		Goa and UTs	58
Uttar Pradesh	73	Odisha	43
Chhattisgarh	73	Rajasthan	38
Jharkhand	73	Kerala	73
Punjab	53	Manipur	73
J&K	58	Tamil Nadu	53
Assam	73	Meghalaya	73
Bihar	73	Madhya Pradesh	64
Haryana	58	Gujarat	88

Average time required for Grid Connectivity is more than 64 Days

State Regulatory Issues:

1. **Definition of Solar Rooftop**_ should also include solar PV power plant on the ground or any other mounting structure in the customer's premises
2. **Injection Voltage** _lower level and multiple injection points may be allowed
3. **PV system capacity limitation due to Consumer's contract demand/sanctioned load**_ may be increased up100%
4. **PV system capacity limitation to distribution transformer capacity**_ may be increased appropriately

State Regulatory Issues:

5. **Cost of augmentation of distribution network**-Customer should not not bear the cost
6. **Simple and efficient interconnection process**
7. **Time bound safety requirement certification** - Making of inspection by CEI optional for lower capacity/voltages (e.g. Haryana, Andhra Pradesh and Rajasthan)
8. **Timelines for utility approvals**
9. **Public domain & FIFO**-online platform for simplicity and transparency
10. **Treatment of surplus power fed into the grid-** rate of purchase of surplus RTS power by DISCOM should be the same as retail tariff

State Regulatory Issues:

11. **Banking of solar power** – for 12 months without any banking charges
12. **Clarity on duration of exemption from wheeling / banking charges and cross-subsidy surcharge**
13. **Capacity building-** skilling and certifying installers
14. **Group of net-metering- As in Delhi policy**
15. **Virtual net metering- As in Delhi policy**
16. **Developing comprehensive system for monitoring & evaluation**

State Regulatory Issues:

17. Limit above which 3 phase inverter is required for ensuring grid stability

19. Regulations may cover solar-wind hybrid components also.

20. Captive solar plants (with or without net metering /gross metering may be allowed

(I) Proposal of the Scheme

- Provide support of Rs. 500 cr to the willing DISCOMs for supporting capacity of 1350 MWp by 2019-20.

- DISCOMs shall be allowed a financial assistance in the form of a grant up to a maximum of Rs. 37.5 lakh per MW of installed RTS projects.

- The scheme will also focus on identifying best practices of DISCOMs / SNAs and on awarding the best performance at DISCOM, Division (EE), Zone (AE) and individual levels.

- Support the DISCOMs for upgradation and modernization of their: (i) distribution network;
  (ii) demand aggregation;
  (iii) developing consumer awareness;
  (iv) developing enabling forms/ processes;
  (v) meter/ equipment procurement;
  (vi) capacity development.

THANK YOU

Fact Sheets – Net-metering Regulations & Solar Policies

State	Haryana
RTS Policy	Yes
Net Metering Regulation	Notified
Minimum & Maximum Capacity	Lower limit not specified – 1000 kWp
Max Installable-Capacity Connected Load/ Contract Demand allowed	Not to exceed connected load/ contract demand (100%)
Maximum Cap on energy accounting from RTS System	Capped at 90% of the electricity consumption from the date of connection (to the grid) to the end of the financial year. No carry forward to the next financial year.
Interconnection of RTS System	As per HERC Electricity Supply Code or the voltage level at which the consumer has been given supply by the licensee
Metering Arrangement	• Meters shall be provided as specified in CEA Regulation, 2oo6 • The cost of new/additional meter including the cost of replacement, shall be borne by the eligible consumer. • Meter(s) shall be installed and maintained by the licensee. No meter rentals shall be charged from the consumer. • The meters installed shall be jointly inspected and sealed on behalf of both the parties and shall be tested or checked only in the presence of the representatives of the consumer and the licensee and as per procedure specified in the Electricity Supply Code
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill or ambit to time of day tariff (as applicable)
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Shall be levied
Distribution Transformer	Upto 15% of the peak capacity of DT allowed
Open Access Consumers	The facility of net metering is not available
Exemptions/ Incentives	• All electricity taxes & cess, electricity duty, wheeling charges, cross subsidy charges, T&D charges and surcharges to be

State	Punjab
RTS Policy	Yes
Net Metering Regulation	Notified – May 2015
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable-Capacity Connected Load/ Contract Demand allowed	Not to exceed 80% of the Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Capped at 90% of the total consumption from the licensee's supply by the consumer in a Settlement Period. No carry forward to the next financial year.
Interconnection of RTS System	As per CEA metering regulations or State Grid code. Allowed in house auto synchronization or de synchronization with distribution system of the licensee at generation voltage level. •Up to 7 KW at Single Phase LT 230 V •More than 7KW & up to 100 KW at Three Phase LT •More than 100 KW at Three Phase HT (11 KV)
Metering Arrangement	• Meters shall be provided as specified in CEA Regulation, 2oo6 • Meter(s) shall be installed and maintained by the licensee at the cost of the consumer. • The meters installed shall be jointly inspected and sealed on by the licensee in the presence of the consumer as per procedure specified in the Supply Code
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Shall not be levied if the generated energy from solar plant or banked solar energy is up to or more than the MMC level in any billing period.
Distribution Transformer	Up to 30% of the peak capacity of DT allowed
Open Access Consumers	Exempted from open access regulations
Exemptions/ Incentives	Exemption from Banking and wheeling charges, losses, cross subsidy and additional surcharges

State	Bihar
RTS Policy	No
Net Metering Regulation	Notified –July 2015
Minimum & Maximum Capacity allowed for RTS Installation	1 kWp – 1000 kWp
Max Installable-Capacity Connected Load/ Contract Demand allowed	Not to exceed connected load/ contract demand (100%)
Maximum Cap on energy accounting from RTS System	Capped at 90% of the total consumption from the licensee's supply by the consumer in a Settlement Period. No carry forward to the next financial year.
Interconnection of RTS System	As per CEA metering regulations 2013, CEA Regulation 2010
Metering Arrangement	• The metering system shall be as per the provisions of CEA Regulations, 2006, 2010 and 2013 as amended from time to time • The Net Meter shall be installed at the interconnection point of the eligible consumer with the network of distribution licensee. • The licensee shall provide meters as per provision in Bihar Electricity Supply Code, 2007. • Check meters shall be mandatory for rooftop solar systems having capacity more than 20 kW. For installations size of less than and equal to 20 kW, the solar Check meters would be optional.
Regulatory Tariff	Not Specified
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Not Specified
Distribution Transformer	Upto 15% of the peak capacity of DT allowed
Open Access Consumers	Not Specified
Exemptions/ Incentives	Not Specified

State	Jharkhand
RTS Policy	Yes (Draft)
Net Metering Regulation	Not Notified
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Not Specified. At the end of each settlement period, any unadjusted electricity credits, shall be paid at a rate of Rs 0.50/kWh by the Licensee
Interconnection of RTS System/Voltage	As per specifications, standards and provisions as provided in the JSERC (Electricity Supply Code) Regulations, 2010. •Up to 5 kW Single phase at 230 V •5 kW and above up to 50 kW / 63 kVA 3 Phase, 4 wire at 415 V •Above 50 kW and up to 1 MW 3 Phase at 11 kV
Metering Arrangement	• All the meters shall adhere to the standards and provisions specified in CEA Regulations, 2006. • Meters shall be procured, installed and maintained by the Distribution Licensee at the cost of the eligible consumer. However if consumer wishes to procure the appropriate Meter(s), he may procure such meter(s) and present the same to the Distribution Licensee for testing and installation • The installation of check meters shall be mandatory for rooftop solar PV system having rated capacity more than 50 kWp. The Distribution Licensee shall own the check meter.
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Not Specified
Distribution Transformer	Upto 15% of the peak capacity of DT allowed
Open Access Consumers	Not Specified
Exemptions/ Incentives	• Exemption from wheeling and cross subsidy surcharge.

State	Rajasthan
RTS Policy	Yes
Net Metering Regulation	Notified – February 2015
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed 80% of the Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Not Specified, however when a Consumer leaves the system, that customer's unused credits for excess energy shall be paid to the Consumer at the feed in tariff determined by the Commission
Interconnection of RTS System/Voltage	• Upto 5 kW at 240 V single phase • Above 5 kW and upto 18.65 kW at 415 V-Three phase • Above 18.65 kW and upto 50 kW/kVA at 415 V-Three phase • Above 50 kW/kVA at HT/EHT level
Metering Arrangement	• The metering system shall be as per the Regulations for installation & operation of meters for rooftop solar systems under net-metering arrangement specified in the regulations • Cost of meter and replacement shall be borne by the consumer • Check meters shall be mandatory for rooftop solar systems having capacity more than 250 kW. For installations size of less than and equal to 250 kW, the solar check meters would be optional • The meters installed shall be jointly inspected and sealed on behalf of both the parties and shall be interfered/tested or checked only in the presence of the representatives of the consumer and distribution licensee
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill and time of day tariff basis (as applicable)
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Shall be levied
Distribution Transformer	Upto 30% of the peak capacity of DT allowed
Open Access Consumers	Not Specified
Exemptions/ Incentives	• Exemption from banking and wheeling charges and cross subsidy surcharge

State	Jammu & Kashmir
RTS Policy	No – Solar Power Policy
Net Metering Regulation	Draft Notification
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed 50% of the Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Capped at 90% of the electricity consumption from the date of connection (to the grid) to the end of the financial year. No carry forward to the next financial year.
Interconnection of RTS System/Voltage	As per the technical specifications and standards for connectivity provided in the Central Electricity Authority Regulations, 2013 •Upto 5 kW at 240 V Single Phase •Above 5 kW upto 1o0 kW at 415 V Three Phase •Above 100 kW at HT/ EHT
Metering Arrangement	• The metering system shall be as per the Regulations for installation & operation of meters for rooftop solar systems under net-metering arrangement specified in the regulations • Cost of meter and replacement shall be borne by the consumer • Check meters shall be mandatory for rooftop solar systems having capacity more than 250 kW. For installations size of less than and equal to 250 kW, the solar check meters would be optional • The meters installed shall be jointly inspected and sealed on behalf of both the parties and shall be interfered/tested or checked only in the presence of the representatives of the consumer and distribution licensee
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill and time of day tariff basis (as applicable)
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Shall be levied
Distribution Transformer	Upto 20% of the peak capacity of DT allowed
Open Access Consumers	Exemption under provisions of JKSERC(Terms & Conditions for Intra State Open Access) Regulations, 2015
Exemption/ Incentives	Not Specified

State	Uttar Pradesh
RTS Policy	Yes
Net Metering Regulation	Notified, 2015
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Not Specified, at the end of each settlement period, any unadjusted electricity credits, shall be paid at a rate of Rs 0.50/kWh by the Licensee
Interconnection of RTS System/Voltage	As per standards and provisions as provided in the UPERC Regulations, 2010 and CEA Regulations, 2013 •Up to 5 Kw - Single phase at 230 V •5 kW and above up to 50 kW / 63 kVA 3 Phase, 4 wire at 415 V •Above 50 kW and up to 1 MW at 3 Phase at 11 kV
Metering Arrangement	• All the meters shall adhere to the standards and provisions specified in CEA (Installation and Operation of Meters), Regulations, 2006 • Meter will procured, installed and maintained by the Distribution Licensee at the cost of the consumer. However if the eligible consumer wishes to procure the appropriate Meter(s), he may procure such meter(s) and present the same to the Distribution Licensee for testing and installation. Cost of meter and replacement shall be borne by the consumer • The installation of check meters shall be mandatory for rooftop solar PV system having rated capacity more than 50 kWp. The Distribution Licensee shall own the check meter.
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill and time of day tariff basis (as applicable)
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Shall be levied
Distribution Transformer	Upto 15% of the peak capacity of DT allowed
Open Access Consumers	Not Specified

State	Andhra Pradesh
RTS Policy	Yes and Solar Energy Policy
Net Metering Regulation	
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Can install SPV plant of more capacity than their contracted load whereas maximum allowable capacity under: •Single-phase service is 3 kWp •LT category is 56 kWp.
Maximum Cap on energy accounting from RTS System	• Energy limit may be computed by using 20% CUF/PLF of the installed SPV capacity. Any surplus injection above this shall be treated as inadvertent and no payment shall be made for it.
Interconnection of RTS System/Voltage	• upto 56 kW at LT level • 56 kW above and up to 1000 kW at 11 kV or 33 kv
Metering Arrangement	• All meters must be Smart Meters as per the standards specified by the CEA, CERC/APERC regulations where ever applicable • AP Discoms shall provide net metering on cost basis. • Consumers shall be free to procure Meters, Current Transformers (CT), and Potential Transformer (PT) either from open market or DISCOM. If the metering equipment is purchased by the Developer, the same is to be tested at standard laboratory at the cost of Consumer only
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export
Solar RPO Qualification	Not Specified
Minimum Metering Charges	Not Specified
Distribution Transformer	Not Specified
Open Access Consumers	Not Specified for RTS projects
Exemptions/ Incentives	No Distribution losses and charges will be collected from the Eligible Developers /Group /Society /Individuals by the DISCOMs.

State	Gujarat
RTS Policy	Solar Energy Policy
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed 50% of Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Not Specified, at the end of each settlement period, any unadjusted electricity credits, shall be paid at a rate of Rs 0.50/kWh by the Licensee
Interconnection of RTS System/Voltage	• 1KW to 6KW at 230 V • 6KW to 100 KW at 415 V • 100KW to 4MW at 11 KV • Above 4MW at 66/132/220/400 KV
Metering Arrangement	Not Specified
Regulatory Tariff	• APPC rate of the year of SPG installation, if the renewable attribute on solar energy is given to DISCOM • 85% of APPC rate of the year in which the SPG is commissioned if renewable attribute is not given to the DISCOM
Billing & Payment	Net import/export bill and time of day tariff basis (as applicable)
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Not Specified
Distribution Transformer	Not specified
Open Access Consumers	Not Specified
Exemptions/ Incentives	Exemption from Banking and wheeling charges, losses, cross subsidy and additional surcharges

State	Assam
RTS Policy	No
Net Metering Regulation	Notified – May 2015
Minimum & Maximum Capacity	1 kWp – 1000 kWp
Max Installable Capacity Connected Load/ Contract Demand allowed	Not specified
Maximum Cap on energy accounting from RTS System	Not Specified, at the end of each settlement period, any unadjusted electricity credits, shall be paid at the average pooled purchase cost of electricity as approved by the commission that year
Interconnection of RTS System/Voltage	As per CEA Regulation 2013, CEA Regulation 2010 and CEA Regulation 2006
Metering Arrangement	• Meters shall be provided as specified in CEA Regulation, 2oo6 • The meters installed shall be jointly inspected and sealed on behalf of both the parties and shall be tested or checked only in the presence of the representatives of the consumer and the licensee • The installation of check meters shall be mandatory for rooftop solar PV system having rated capacity more than 20 kWp. For installations size of less than and equal to 20 kW, the solar Check meters would be optional.
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill and time of day tariff basis (as applicable)
Solar RPO Qualification	Yes (i.e. consumer or licensee)
Minimum Metering Charges	Not Specified
Distribution Transformer	Up to 30% of the distribution transformer
Open Access Consumers	Not Specified
Exemptions/ Incentives	Exemption from Banking and wheeling charges, electricity tax and demand cut

State	Tamil Nadu
RTS Policy	Solar Energy Policy
Net Metering Regulation	Notified – 2013
Minimum & Maximum Capacity	Not Specified
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed 30% of Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Capped at 90% of the electricity consumption from the date of connection (to the grid) to the end of the financial year. No carry forward to the next financial year.
Interconnection of RTS System/Voltage	As per CEA Regulation 2013 •Upto 4kW at 240V single phase or 415V three phase •Above 4kW upto 112kW at 415 V three phase •112kW at HT/EHT Level
Metering Arrangement	• Meters to be installed by the solar power generator. Licensee to host the list of manufactures of the meters on their website. • Meters shall be provided as specified in CEA Regulation, 2oo6 and CEA Regulation, 2013 • The installation of check meters shall be mandatory for rooftop solar PV system having rated capacity more than 20 kWp. For installations size of less than and equal to 20 kW, the solar Check meters would be optional. The cost of new/additional meter(s) provided for the net-metering and the installation and testing charges shall be borne by the eligible consumers.
Regulatory Tariff	Not Specified
Billing & Payment	Net import/export bill and time of day tariff basis (as applicable)
Solar RPO Qualification	Yes
Minimum Metering Charges	Not Specified
Distribution Transformer	Not less than the limit specified by the Commission from time to time
Open Access Consumers	Not Specified
Exemptions/ Incentives	Exemption from Banking and wheeling charges, losses, cross subsidy and additional surcharges

State	West Bengal
RTS Policy	Solar Policy
Net Metering Regulation	Notified – March 2013
Minimum & Maximum Capacity	Not less than 5 kW
Max Installable Capacity Connected Load/ Contract Demand allowed	Not to exceed 30% of Sanctioned Load or Contract Demand
Maximum Cap on energy accounting from RTS System	Capped at 90% of the electricity consumption from the date of connection (to the grid) to the end of the year. No financial settlement
Interconnection of RTS System/Voltage	Allowed connectivity at LV or MV or 6 KV or 11 KV or any other voltage of the distribution system of the licensee as considered technically and financially suitable by the licensee.
Metering Arrangement	• Meter for measuring the energy injected from Solar PV sources shall be provided by the licensee against applicable meter rent along with the connection of the meter up to the nearest technically suitable point in the distribution system of the licensee. • The connectivity from the roof-top Solar PV sources up to the meter shall be at the cost and responsibility of the consumer(s) and shall be in accordance with the guidance of the licensee so that the licensee's distribution system is not affected by any fault in the system owned by the consumer(s).
Regulatory Tariff	Not Specified
Billing & Payment	No financial settlement
Solar RPO Qualification	Yes
Minimum Metering Charges	Not Specified
Distribution Transformer	Not Specified
Open Access Consumers	Not Specified for net metering