

**MINUTES OF THE SEVENTEENTH MEETING OF
FORUM OF REGULATORS (FOR)**

VENUE: Hotel Polo Towers, Shillong

DATE: 20-21 April, 2010.

The list of participants is at **Annexure-I**.

The Chairperson, Forum of Regulators welcomed Mr. S.I. Longkumar, Chairperson, Nagaland ERC and Mr. M.R. Sreenivasa Murthy, Chairman, Karnataka ERC to the Forum as they were attending the Forum meeting for the first time.

Agenda Item No.1: Presentation by Ministry of New & Renewable Energy (MNRE) on “National Solar Mission”

A presentation was made by Mrs. Gauri Singh, JS, MNRE on National Solar Mission, a copy of which is at **Annexure-II**. Secretary, FOR also briefed the Forum on the recommendations of the 13th Finance Commission regarding incentives to the States who promote capacity addition based on renewable energy. An extract of the recommendations as circulated in the meeting is at **Annexure-III**. A brief summary of the discussions is given below:

- a) Specifying a separate RPO for solar energy would be a key requirement for supporting the initiatives in the National Solar Mission. Some states like Gujarat and Rajasthan have already specified a separate RPO for solar energy. At the same time, Ministry of Power may be requested to expedite the proposed amendment to Tariff Policy for providing a separate RPO for solar energy. The Forum was briefed that CERC had already advised the Central Government to keep some flexibility in the quantum of solar RPO keeping in view the likely availability of solar based installed capacity in coming years.
- b) In view of the fact that sale of solar based electricity under the National Solar Mission initiative would be a preferential tariff, these generators would not be eligible for Renewable Energy Certificate (REC) mechanism.

- c) JS, MNRE clarified that the amount of GBI fixed for the projects commissioned in a particular year would continue to be the same for the period of 25 years for such projects. In other words, the escalation of 3% on the base price of Rs.5.5 per unit would be applied for determining GBI for the projects to be commissioned in the subsequent years and so on.
- d) After considering the recommendations of the 13th Finance Commission requiring the states to provide access to competitive markets to the renewable energy generators and fixing reasonable levels of transmission charges and losses for renewable energy, and the stipulation in the draft regulation of CERC for completely waiving the transmission charges and losses for the solar power projects to be commissioned in next 3 years for the whole life of these projects, there was a broad consensus in the Forum that the transmission charges and losses for wheeling renewable energy on the state level transmission and distribution networks should either be exempted or kept at a minimal level keeping in view the fact that electricity from decentralized generation facilities based on renewable energy would in fact relieve the burden on the transmission and distribution networks. Accordingly, SERCs would take appropriate decision in this regard taking into account any special local condition and after consulting the various stakeholders.
- e) The conditionalities in the recommendations of 13th Finance Commission regarding access to competitive markets would be applicable for those generators who have not already entered into power purchase agreements.
- f) It was emphasized that MNRE should ensure timely availability of adequate budgetary resources to make payments for the committed GBI amount.

Agenda Item No.2: Presentation by M/s. CRISIL – on Assessment of various Renewable Energy Resources Potential in Different States, Determination of Renewable Purchase Obligation (RPO) Trajectory and its Impact on Tariff.

A presentation was made by M/s. CRISIL, the consultant engaged by the Forum on the study, a copy of which is at **Annexure-IV**. After discussions, the Forum

directed that the study should be finalized after incorporating the following modifications:

- a) The boundary conditions for various scenarios (as indicated in the study) should be reconciled with the existing installed capacity.
- b) The assumptions regarding CUF for the new capacities in various scenarios should be reworked keeping in view the projects in pipeline in various states and the CUF available in the respective states.
- c) While comparing the incremental impact in various scenarios, time value of money should also be taken into account.
- d) In addition to the incremental impact on power purchase cost, the incremental impact on the average cost of service should also be worked out on the basis of past correlation between the average power purchase cost and average cost of service.
- e) The North-Eastern States and the Union Territories should be re-grouped taking into account geographical similarities and other aspects relevant to the study.
- f) The data about RPO in various states should be updated.

During the discussions on this agenda item, the following other issues also came up:

- a) The present model of RPO and impact on consumer tariff would be relevant till the time RPOs reach about 15%. After that stage further enhancement of RPO would depend whether cost of renewable energy achieves grid parity with other sources of electricity.
- b) Gujarat has notified final regulations on REC mechanism. In addition, Himachal Pradesh, Maharashtra, Orissa, Jharkhand, Uttar Pradesh and Madhya Pradesh have circulated draft REC regulations which were expected to be finalized soon. FOR Secretariat requested the SERCs that progress on REC regulations may be updated from time to time as this would facilitate implementation of REC mechanism.

- c) FOR was apprised that MNRE has agreed to provide financial assistance of the order of Rs. 9 crore in next 3 years towards implementation of REC mechanism. This financial support would be for software, hardware and manpower additionalities in central agency and the state agencies. This was approved by FOR.
- d) Most of the SERCs present in the meeting felt that SNA (the agencies looking after renewable energy in the State) should be designated as State Agency for the purpose of REC mechanism.
- e) Chairperson, BEREC sought clarification on biomass tariff as proposed by CERC for FY 2010-11. Shri S.K. Chatterjee, Dy. Chief (Regulatory Affairs), CERC clarified that the proposal contained levelled fixed charge and variable charge for the first year to be escalated in the subsequent years.

Agenda Item No. 3: Confirmation of the Minutes of the 16th Meeting of “FOR” held on 01st February, 2010 at Lucknow (U.P.)

The Forum confirmed the minutes and perused the Action Taken Report.

Agenda Item No. 4: “FOR” Budget for the year 2010-11

After deliberations, the proposed budget was approved.

Agenda Item No. 5: Training Schedule for the year 2010-11.

The proposed schedule and the institutions were approved with the following suggestions:

- a) The faculty proposed for a course should familiarize themselves with the ground realities prevailing in the states before they conduct training course.
- b) Some Chairpersons/Members of ERCs should be invited to the training courses for interaction with the participants.

Agenda Item No. 6: Consideration of the Draft Electricity Regulatory Commission Compliance Audit Regulation

After discussions, FOR directed that the model regulations be finalized after incorporating the following modifications:

- a) Payment to the consultant/auditor should be made by the ERC and later on it could be recovered from ARR of the regulated entity.
- b) Before initiating an audit, ERC should frame the terms of reference and also give advance notice to the regulated entity.
- c) In clause 6.1, the inspection should not be kept limited to just the books of account but the auditors should have access to all relevant documents.

The Forum also recalled the latest judgement by the Supreme Court that had confirmed that under the Electricity Act, ERCs have wide powers to frame regulations for carrying out the provisions of the Act.

Agenda Item No.7: Discussion on Subsidy – Implementation of Section 65 of the Electricity Act.

The Forum considered the agenda note. Chairperson, FOR also apprised that a preliminary proposal was being looked at by the Planning Commission whether deduction from Plan allocation to a state could be made and the payments made directly to the utility in case a State Government failed to pay the amount of subsidy.

After discussions, there was a consensus in the Forum that the tariff order of SERCs should invariably give tariff as determined by SERC without any subsidy so that this tariff could be used for billing the consumers in case State Government does not pay the subsidy. It was also agreed that the SERCs should periodically (may be annually) review the status of the payment of subsidy by the State Government.

Agenda Item No. 8: Presentation by M/s ABPS on “Demand Side Management Regulations”

A presentation was made by M/s. ABPS, the consultant engaged by Bureau of Energy Efficiency on the draft DSM regulations. A copy of the presentation is at **Annexure-V**. After discussions, the Forum directed that the model DSM regulations be finalized with the following modifications:

- a) The consultation with BEE should not be made mandatory and there should be only an enabling provision in the regulations providing for such consultation.
- b) Clause 13.5 needed to be rephrased and placed in clause 9. The draft regulations should provide in this regard that various DSM programmes (including multi-state programmes) developed by BEE could be included in DSM plan to be submitted for approval to SERC. If such standard DSM programmes are included in DSM Plan, the requirement of furnishing details would be simpler.
- c) The list provided in clause 12.2 of the draft regulations should be pruned keeping in view the ground realities.
- d) In clause 9.1, ‘adoption’ should be rephrased as ‘notification’.
- e) Various provisions have been made mandatory in the draft regulations by using word ‘shall’. This may be reviewed and the provisions may be made optional at appropriate places.
- f) In clause 17, the periodicity of the reports on expenses should also be made six monthly.

During the discussions, the following other issues also came up:

- a) Financial support from various developmental international agencies could also be explored for DSM programmes as the associated technical assistance would facilitate better implementation.

- b) The newly formed (by BEE) company EESL (Energy Efficiency Services Limited) can play a major role in implementation of DSM programmes in the states.
- c) Some amendments to Energy Conservation Act would be required if SERCs are to play a wider role in DSM programmes to be implemented by agencies other than distribution licensees.
- d) The consultant appointed by BEE would also shortly provide model templates for various guidelines to facilitate implementation of DSM regulations.

Agenda Item No.9: Presentation by M/s. Wartsila on “Optimal Power Generation Mix for India”

A presentation was made by M/s. Wartsila, a copy of which is at **Annexure-VI**. It was highlighted that the peaking plants would not only result in higher efficiency even at part load but would also lead to savings in land, water, CO₂ emissions and cost of new transmission lines.

After presentation, it was felt by the Forum that the suggested model could be first considered for urban areas like Ahmedabad and Greater Noida where separate distribution licensees are functioning. For wider application of the model, resolving the issues of (i) availability of gas with contracts permitting variable quantities for different hours in a day and (ii) a feasible tariff model consistent with the provisions of the Electricity Act would be a prerequisite.

Other Discussions

Kerala ERC offered to host the next meeting of the Forum sometimes in September 2010.

The Forum appreciated the efforts of Meghalaya ERC for the arrangements made for the meeting.

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

LIST OF PARTICIPANTS ATTENDED THE SEVENTEENTH MEETING
OF

FORUM OF REGULATORS (FOR)

HELD DURING 20TH – 21ST APRIL, 2010

AT HOTEL POLO TOWERS, SHILLONG (MEGHALAYA)

S. No.	NAME	ERC
01.	Dr. Pramod Deo Chairperson	CERC – in Chair.
02.	Shri A. Raghotham Rao Chairperson	APERC
03.	Shri Jayanta Barkakati Chairperson	AERC
04.	Shri B.K. Halder Chairperson	BERC
05.	Shri Manoj Dey Chairperson	CSERC
06.	Dr. P.K. Mishra Chairperson	GERC
07.	Shri Bhaskar Chatterjee Chairperson	HERC
08.	Shri Yogesh Khanna Chairperson	HPERC
09.	Shri S. Maria Desalphine Chairperson	J&KSERC
10.	Shri Mukhtiar Singh Chairperson	JSERC
11.	Dr. V.K. Garg Chairperson	Joint ERC for Goa & all UTs except Delhi
12.	Shri Hemam Bihari Singh Chairperson	Joint ERC for Manipur & Mizoram
13.	Shri M.R. Sreenivasa Murthy Chairperson	KERC
14.	Shri V.P. Raja Chairperson	MERC
15.	Shri P.J. Bazeley Chairperson	MSERC

16.	Shri S.I. Longkumar Chairperson	NERC
17.	Shri D.C. Samant Chairperson	RERC
18.	Shri Manoranjan Karmakar Chairperson	TERC
19.	Shri V.J. Talwar Chairperson	UERC
20.	Shri Rajesh Awasthi Chairperson	UPERC
21.	Shri Prasad Ranjan Ray Chairperson	WBERC
22.	Shri M.P. Aiyappan Member	KSERC
23.	Shri K.K. Garg Member	MPERC
24.	Shri Alok Kumar Secretary	CERC
25.	Shri Sushanta K. Chatterjee Deputy Chief (Regulatory Affairs)	CERC

NATIONAL SOLAR MISSION

Forum Of Regulators Meeting

20.04.10

Jawaharlal Nehru Solar Mission

National Action Plan on Climate Change:

- Solar Mission envisaged to give boost to solar power – launched on 11 January 2010
- Large-scale solar power generation an identified thrust area

Solar Mission Aim:

- Rapid and large-scale diffusion of solar power generation technologies
- Building local manufacturing, R&D and human resource capability
- Reduction of cost to move towards grid parity.

Proposed targets (2022):

- 20,000 MW grid-power installed capacity
- 2,000 MW off-grid power
- 20 mln. sq.m thermal collectors

Road Map

Application segment	Target for Phase I (2010-13)	Cumulative Target for Phase 2 (2013-17)	Cumulative Target for Phase 3 (2017-22)
Grid solar power incl. roof top	1,000 MW	4000 MW	20000 MW
Off-grid solar applications (incl. rural solar lights)	200 MW	1000 MW	2000 MW
Solar collectors	7 million sq meters	15 million sq meters	20 million sq meters

Utility scale Grid Connected solar plants

- 1000MW in phase 1 and NRVN designated as nodal agency
- Bundling of power- 1Mw of solar with 1 MW of thermal power
- 50:50 for solar PV and Solar thermal.
- Evacuation at 33kV and higher
- Minimum capacity – 5 MW. For solar thermal the maximum per project is 50 MW and 100 MW for group
- Net worth- Rs 2 cr/ MW main criteria for short listing.
- Location and agreement for evacuation required for EoI
- Point of interconnection - SPV plants shall be line isolator on outgoing feeder on HV side of the pooling sub-station
ST projects the, inter-connection point shall be line isolator on outgoing feeder on HV side of generator transformer

Progress so far

- Tariff policy being amended for providing a Solar specific RPO
- Migration guidelines under implementation
- Draft guidelines for new projects placed for comments and stakeholder discussions held
- Roof top and smaller ground mounted guidelines finalised
- Solar tariff for 2010-11 declared by CERC
- Report on domestic content finalised and submitted

Main Issues wherein comments were received

- Phasing allocation of capacity within Phase 1
- Maximum and Minimum capacity for SPV and Solar thermal projects.
- Local content
- Land arrangement.
- Connectivity with the grid.
- Role of States
- Shortlisting of projects and selection amongst shortlisted projects ,if applicants have offered to set up more capacities than that which is on offer.

Batches within phase 1

- In order to prevent bunching of capacity , allow time for manufacturing base to get strengthened and to allow the financial institutions time to build their capacities for appraising solar projects, phasing of capacity allocation within the 3 years of Phase 1 is proposed.
- The call for expression of interest in *2010-11* proposed as – 150 MW in SPV and 450 MW in ST . **Local content** – PV modules (if crystalline Silicon) be made in India and 30% of Solar thermal.
- In *2011- 2012*, call for expression of interest for the remaining capacity in SPV

Shortlisting

- First filter – networth criterion
- If applications in excess of the capacity on offer, each applicant would be asked to enter into a MoU(wherein bank guarantee of Rs 25 lakh/ MW) would be taken and would be eligible to offer a discount on the tariff.
- The applicants so chosen will proceed for obtaining Financial closure based on a letter of Intent. PPA to be signed after Financial closure – 6 months to be provided.
- Full possession of Land required at the time of PPA
- Next batch in Phase 1 would be on offer in 2011-12. Only PV would be on offer and with condition of cell and module made in India. Maximum capacity offered would be 20 MW and through bidding.

Main drivers

- Solar specific RPO notified by State
- Bundled power in larger utility scale plants and GBI in smaller plants
- Declaration of solar tariff

Proposed Guidelines for Rooftop PV and Small Solar Generation Programme (RPSSGP) under

Jawaharlal Nehru National Solar Mission



Solar Mission Targets

- Total target for 1st Phase (2013) : 1,300 MW
 - Grid Connected (33 kV) : 1,000 MW
 - **“Rooftop PV and Small Solar” : 100 MW**
 - Off-Grid Applications : 200 MW

Classification of Project Schemes

- **Two categories of Project Schemes**
 - **Category-1:** 100 kW and upto 3 MW
 - Typically connected at HT distribution network (below 33 kV)
 - **Category-2:** < 100 kW
 - Typically connected at 440 V (3-ph) / 230 V (1-ph)

- **Capacity allocation amongst two categories**
 - Category-1 : 90 MW
 - Category-2 : 10 MW

- **Applicability of Proposed Guidelines**
 - Proposed Guidelines to address Category-1 schemes.
 - Issues of Grid integration, metering, energy accounting at LT level are complex. CEA to formulate appropriate standards for grid integration of all RE technologies incl. RE system connectivity at LT level.

Note: Reference to Watt (W) under Guidelines shall mean (Wp) for solar PV and (We) for solar thermal

Features of Roof Top PV and Small Solar Generation Based Incentive (GBI) Scheme

- Programme would be led by the States.
- States to declare a Competent Authority for the scheme.
- Competent Authority to ascertain fulfillment of Eligibility Conditions.
- Projects to be designed for completion before March 31, 2013.
- PPAs to be entered into by Project Proponent and concerned DISCOM where power plant is interconnected with distribution network.
- Applicable Tariff Rate under PPA shall be as determined by SERC.

Normative Generation Based Incentive

- Generation based incentive will be payable to the utilities equivalent to CERC tariff less Rs. 5.50 per kwh (Base Rate) with 3% annual escalation.
- Base Rate once determined for particular project shall remain constant over duration of 25 years.
- GBI shall be available for period of 25 years from the date of commissioning.
- The metering and billing arrangement between the utilities and Project Proponent will be as per state level regulations.
- DISCOMs to agree to pay to Project Proponent, based on energy units generated (including captive consumption met by solar power), at the Tariff Rate determined by SERC.
- DISCOMs to enter into MoU with IREDA for availing GBI.

State level Activities

- Appointment of Competent Authority by respective State Government
- Pre-registration of Projects by Competent Authority at State level to enable eligible projects to participate under this programme (RPSSGP)
- Issuance of Tariff Order by concerned SERCs for applicable tariff for Rooftop PV and small solar power plants within State
- Distribution Utility to undertake following:
 - Confirmation of Grid connectivity, access to distribution system and ensure suitable metering arrangements.
 - Execution MoU with Project Proponent to confirm willingness to purchase power upon pre-registration of project.
 - Execution of Power Purchase Agreement with Registered Projects
 - MOU with IREDA to avail GBI

Methodology for Selection of Project Schemes-1/4

- **Pre-registration by Competent Authority at State level**
 - Following criteria shall apply for scrutinising Applications of Project Proponents:
 - **Technical:** PV modules & Inverter systems proposed to be deployed shall be compliant with relevant IEC/BIS/CEA standards. (*Module manufactured in India*).
 - **Financial:** Equity commitment equiv. to Rs 4 Cr/MW
 - **Land availability:** Confirmation of compliance of conditions as outlined by State Competent Authority
 - **Grid connectivity:** Confirmation letter by concerned DISCOM.
 - Pre-registration Certificate to be issued by Competent Authority to Project Proponent.
 - Project Proponent and concerned DISCOM to enter into MOU for sale/purchase of power.

Methodology for Selection of Project Schemes-2/4

- **Registration by Programme Administrator (IREDA)**
 - **Eligibility Conditions for Registration:**
 - MOU with DISCOM
 - Pre-registration Certificate from Competent Authority
 - Issuance of Tariff Order by concerned SERC for Rooftop/small Solar systems
 - Commitment Guarantee (in the form of irrevocable BG from scheduled commercial bank) valid for duration of at least 24 months.
 - Rs 10 L/ MW or part thereof (for installed capacity of 1 MW and above)
 - Rs 5 L (for installed capacity of 100 kW and less than 1 MW)
 - **Web-based portal for Online Application Process**
 - Registration process to commence from July 1, 2010 to enable States to undertake preparatory activities such as designation of Competent Authority at State level, issuance of relevant Tariff Order by SERC.
 - Online Acknowledgement Number (date & time stamp) and submission to Programme Administrator alongwith enclosures within 7 days.
 - Shortlisting of projects upon physical verification based on principle of 'first-cum-first-served'.
 - Process of registration to be closed upon reaching capacity of 110 MW projects.

Methodology for Selection of Project Schemes-3/4

- **Registration by Programme Administrator (IREDA)**
 - **Project Milestones**
 - Milestone-1: Signing of PPA with concerned DISCOM
 - Milestone-2: Project Commissioning
 - **Confirmation Letter for Registration & eligibility for GBI to be issued upon accomplishment of Milestone-1 for projects until cumulative capacity of 90 MW (all India basis) and restricted to 20 MW per State.**
 - **Project Proponent to submit Additional Commitment Guarantee (four BGs of equal value).**
 - Rs 40 L/ MW or part thereof (for installed capacity of 1 MW and above)
 - Rs 20 L (for installed capacity of 100 kW and less than 1 MW)
 - **Registration Process : Timelines and Web based online Application**
 - Announcement of Initial shortlist by 31st July, 2010
 - Intimation of accomplishment of Milestone-1 and generation of Unique Project Code
 - Confirmation of Registration within 1 month from submission of PPA & Additional BGs
 - Project Commissioning within 12 months from date of Registration.

Methodology for Selection of Project Schemes-4/4

■ Registration by Programme Administrator (IREDA)

□ Delay in accomplishment/Non-accomplishment of Milestone-2 (Project Commissioning)

- Milestone-2 to be accomplished within 12 months from date of Registration
- For delay beyond 12 months , 20% of commitment guarantee (1 BG) to be forfeited
- For delay of 2 months beyond 12 months , 20% of commitment guarantee (1 BG) to be forfeited
- For delay of 4 months beyond 12 months , 20% of commitment guarantee (1 BG) to be forfeited
- For delay of 6 months beyond 12 months , remaining commitment guarantees (2 BGs) to be forfeited and Project to be eliminated from Registered List for eligibility of GBI
- For part commissioning of project (not lower than 100 kW) upto 18 months from date of registration, partly commissioned capacity to be continued to be eligible for GBI subject to confirmation of suitable metering arrangement and un-commissioned part to be ineligible for GBI.

□ Upon elimination of project from Registered List, new projects to be considered out of Initial shortlist with valid BG on similar principles.

Role of IREDA

- Designated Agency (Programme Administrator) for:
 - ❑ Registration of projects seeking GBI.
 - ❑ Maintain a transparent system of applications for registration and monitoring of progress against milestone events.
 - ❑ Issuance of Registration Certificate for entitlement of GBI
 - ❑ Disbursement of generation based incentive to DISCOMs.

Modalities of disbursement of GBI

■ Certificate of Generation

- ❑ To claim GBI, DISCOM to submit Certificate of Generation to Programme Administrator based on monthly meter readings.
- ❑ Claim to be lodged on quarterly basis by 15th Jul (for Q1), 15th Oct (for Q2), 15th Jan (for Q3) and 15th Apr (for Q4).
- ❑ To claim the GBI, DISCOM to enclose documentary evidence of payment of electricity bills to Project Proponent for relevant monthly period.

■ Processing and disbursement of GBI

- ❑ At least 90% of the claimed amount for current quarter to be released to concerned DISCOM on ad-hoc basis along with settlement/adjustment of claims for previous quarter within 15 days from claim date.
- ❑ To ensure timely payment to DISCOMs, MNRE to provide 50% of annual fund requirement to Programme Administrator in advance based on estimated fund requirement at beginning of fiscal year and balance 50% upon submission of Utilisation Certificate for utilisation of 50% of funds for first tranche.
- ❑ Access to standby funding arrangement to ensure timely release of funds to DISCOMs
- ❑ Programme Administrator entitled to receive service charges/fund administration charges as per prevalent norms of Ministry. Interest earned on surplus funds, if any, to be credited to the Fund Account by Programme Administrator.

Thank You

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Thirteenth Finance Commission

three years of the award period shall be subject to the following release and monitoring mechanism:

- i) The grants shall be linked to progress on approval of working plans. The entire amount should be released after approval of more than 80 per cent of the working plans of the state. Till this is achieved, releases shall be in the ratio of number of working plans approved to 80 per cent of the number of working plans for the state.
- ii) Twenty-five per cent of the grants shall be over and above the non-plan revenue expenditure (NPRE) projected in Annex 12.3 and the same shall be monitored as explained therein.

12.48 The Ministry of Environment and Forests (MoEF) shall assign to the Forest Survey of India the task of developing a uniform inventory design for information on growing stock and related parameters like bio-diversity and Non Timber Forest Produce (NTFP) as well. This would help bring clarity to the role of the country's forest wealth in climate change mitigation and also help to base fiscal transfers on more robust parameters in future.

12.49 Large forest areas in many of the north-eastern states are privately/community owned. The respective State Governments should play the role of facilitator in the management of these forests through the working plans.

Incentive for Grid Connected Renewable Energy

12.50 The power sector has great potential for reduction of greenhouse gases. There is, hence, a need to incentivise states to promote clean energy. With this objective, we recommend an incentive grant for generation of grid electricity from renewable sources. ~~We have allocated Rs 5000 crore for this purpose.~~

12.51 The grant is configured after taking into consideration the following issues:

- i) Renewable resources are limited to certain states. Often the states achieve a certain threshold of capacity and are, thereafter,

reluctant to encourage more development. This is particularly true in the case of wind.

- ii) Several states have small or negligible potential.
- iii) The consuming states are located far from the generating states. Access to markets in the consuming states is an issue.
- iv) Even as the law requires setting of Renewable Purchase Obligations (Section 86 of Electricity Act, 2003), there is no national level target that has been set. However, at the state level, some State Electricity Regulatory Commissions (SERCs) have initiated action in this regard and these Renewable Energy Obligation targets are being set at the state level.
- v) The costs of renewable energy sources are often higher than those of conventional sources. This results in reluctance of cash-strapped state utilities to procure from these sources.

12.52 To overcome these difficulties, we have proposed the following guidelines for implementation of the incentive scheme, with the objective of broad-based development of renewable energy sources across states.

- i) The incentive is to be based on states' achievement in renewable energy capacity addition in MW from 1 April 2010 to 31 March 2014.
- ii) The incentive component will comprise of two sub-components:
 - a) Incentive for achievement in installed capacity addition (over a four-year period) relative to unachieved potential. This will be accorded a weightage of 25 per cent. This factor has been considered in view of the fact that renewable energy potential is unevenly distributed. The following formula has been used:

$$\frac{CA_i}{\sum CA_i}$$

where $CA_i = \frac{X_i}{Y_i - A_i}$

and for the *i*th state

CA_i = Capacity addition achieved as a percentage of unachieved capacity as on 31 March 2009

X_i = Installed capacity addition during 2010-14

A_i = Total achievement in installed capacity as on 31st March 2009

Y_i = Total renewable energy potential as assessed by MNRE

For a particular state whose total achievement in installed capacity of renewable energy as on 31 March 2009 equals or exceeds its total potential of renewable energy, we assign the same figure as that of the state which will achieve the highest capacity addition as percentage of total unachieved capacity between 1 April 2010 and 31 March 2014.

- b) Incentive for achievement in installed capacity addition (over a four year period) relative to the aggregate of installed capacity addition across all states. This will be accorded a weight of 75 per cent, in order to ensure accelerated capacity addition. The following formula has been used:

$$\frac{X_i}{\sum_i X_i}$$

- iii) We recommend a cap on the incentive reward in the following manner:

- a) A cap of Rs. 1.25 crore/MW of X_i for general category states.
- b) A cap of Rs. 1.50 crore/MW of X_i for special category states, to account for factors related to access and consequent cost disability.

- iv) The performance review will be based on data published by the Government of India on capacity addition by states.

- v) The achievement in installed capacity addition may be on account of any/all renewable energy sources of electricity generation (namely, wind, biomass, small

hydro, bagasse based cogeneration, geothermal energy and any other resource as defined as 'renewable energy' by the Ministry of New and Renewable Energy (MNRE).

- vi) The state should permit renewable energy developers/projects access to competitive power markets. Charges for such access in any form should not exceed the levels specified by the Central Electricity Regulatory Commission (CERC) as guidance for such market access.

- vii) Transmission charges and losses applicable for renewable energy targets are not to exceed a level of Rs. 0.25/kwh and 5 per cent, or, the state transmission utility should have implemented rational alternate transmission pricing frameworks (including point of connection tariffs) If so recommended by the CERC, within 12 months of such recommendation.

12.53 Upon submission of the details on achievement of results by the states to the Ministry of Finance, GoI, the ministry may seek validation of the data from MNRE before the incentives are disbursed. Validation would be based on publicly available information on achievements and adequate proof of the policy measures required to be implemented.

12.54 The incentives proposed by us for grid-connected renewable energy generation will be over and above the existing incentives by the Central and State Governments. A sample of calculations for assumed levels of X_i is given in Annex 12.4.

Grants for Water Sector Management

12.55 Injudicious inter-sectoral and intra-sectoral distribution of water amongst various categories of water users, low water use efficiency, fragmented approach to water resources planning and development, low water user charges and meagre recovery are some of the major problems associated with the management of water resources in the country. A statutory autonomous institution at the state level could help in addressing these issues.

Sample Calculations for Assumed Achievement during Award Period

S. States No.	Total Potential (MW)	Total Achieved in Installed Capacity (as on 31 March 2009) (MW)	Un-Capacity achieved (MW)	Un-Capacity of State (MW)	Assumed Achievement (MW)	Capacity Addition as Ratio of Un-achieved Capacity (MW)	State's Share (%)	Grants Rs. cr. (I)	Capacity Added as % of Total Capacity Addition	State's Share (%)	Grants Rs. cr. (II)	Total Grants Before Cap (1+II)	Incentive per MW (Rs. cr.)	Caps /MW (Rs. cr.)	Total Grant Rs. cr. After Cap (1+II)
1 Andhra Pradesh	9174	638	8536	500	0.056	1.78	8.33	22.22	8.33	8.33	111.20	334.50	0.606	0.606	334.51
2 Arunachal Pradesh	1243	01	1182	150	0.17	3.85	2.50	48.15	2.50	2.50	93.68	141.84	0.946	0.946	141.84
3 Assam	120	27	93	10	0.105	3.27	0.17	40.83	0.17	0.17	0.25	47.05	4.705	1.500	15.00
4 Bihar	149	55	94	20	0.22	0.43	0.33	80.36	0.33	0.33	22.40	62.85	4.643	1.250	25.00
5 Chhattisgarh	704	174	530	100	0.186	5.73	1.67	71.59	1.67	1.67	62.46	134.65	1.340	1.250	125.00
6 Goa	5	0	5	1	0.202	6.13	0.02	76.63	0.02	0.02	0.62	77.25	77.253	1.250	1.25
7 Gujarat	10992	1440	9552	800	0.084	2.54	13.32	31.77	13.32	13.32	400.67	531.44	0.664	0.664	531.44
8 Haryana	1341	69	1272	100	0.075	2.39	1.67	29.81	1.67	1.67	52.46	62.77	0.923	0.923	62.27
9 Himachal Pradesh	2019	240	1779	200	0.112	3.41	3.33	42.64	3.33	3.33	224.92	167.56	0.836	0.836	167.56
10 Jammu & Kashmir	1294	112	1182	125	0.106	3.21	2.08	40.11	2.08	2.08	78.07	118.19	0.945	0.945	118.19
11 Jharkhand	170	4	166	20	0.121	3.66	0.33	45.71	0.33	0.33	12.49	58.21	2.910	1.250	25.00
12 Karnataka	9510	2022	7488	800	0.107	3.24	13.32	40.53	13.32	13.32	490.67	540.19	0.675	0.675	540.19
13 Kerala	2349	157	2192	200	0.091	2.77	3.33	34.61	3.33	3.33	124.92	159.32	0.798	0.798	159.32
14 Madhya Pradesh	7076	260	6816	500	0.073	2.23	8.33	27.82	8.33	8.33	302.29	340.12	0.680	0.680	340.12
15 Maharashtra	5916	2205	3711	500	0.135	4.09	8.33	51.10	8.33	8.33	302.29	363.39	0.727	0.727	363.39
16 Manipur	92	5	87	5	0.058	1.75	0.08	21.91	0.08	0.08	3.12	25.04	5.007	1.500	7.50
17 Meghalaya	197	31	166	20	0.121	3.66	0.33	45.71	0.33	0.33	12.49	58.20	2.910	1.500	30.00
18 Mizoram	136	24	112	10	0.090	2.72	0.17	34.01	0.17	0.17	6.25	40.26	4.026	1.500	15.00
19 Nagaland	149	29	120	10	0.083	2.52	0.17	31.52	0.17	0.17	6.25	37.77	3.777	1.500	15.00
20 Orissa	1918	44	1874	100	0.053	1.62	1.67	20.24	1.67	1.67	62.46	82.70	0.827	0.827	82.70
21 Punjab	3415	152	3263	200	0.061	1.86	3.33	23.25	3.33	3.33	124.92	148.17	0.741	0.741	148.17
22 Rajasthan	6428	726	5702	500	0.088	2.66	8.33	33.26	8.33	8.33	322.29	345.55	0.691	0.691	345.55
23 Sikkim	214	47	167	30	0.180	5.45	0.50	68.18	0.50	0.50	18.74	86.92	2.897	1.500	45.00
24 Tamil Nadu	4390	4531	0	600	0.212	6.43	9.99	80.41	9.99	9.99	344.75	455.16	0.759	0.759	455.16
25 Tripura	31	16	15	3	0.200	6.07	0.05	75.86	0.05	0.05	1.87	77.74	25.912	1.500	4.50
26 Uttar Pradesh	2567	398	2169	200	0.092	2.80	3.33	34.97	3.33	3.33	124.92	159.89	0.799	0.799	159.89
27 Uttarakhand	1478	128	1350	200	0.148	4.50	3.33	56.19	3.33	3.33	124.92	181.11	0.906	0.906	181.11
28 West Bengal	1034	100	935	100	0.107	3.25	1.67	40.59	1.67	1.67	62.46	103.05	1.030	1.030	103.05
Total	74111	13695	60516	6004	3.295	100.00	100.00	1250.00	100.00	100.00	3750.00	5000.00	0.833	0.833	4572.90

Note: Assumptions regarding Xi's are purely for illustrative purposes.



Assessment of various Renewable Energy resources potential in different States, determination of RPO trajectory and its impact on Tariff

CRISIL Risk & Infrastructure Solutions Limited (CRIS)

Presentation before the Members of Forum of Regulators (FOR)
April 20, 2010

Key messages

1. Objective to give RPO scenarios considering supply and impact on tariffs

2. RE capacity projected to be 43663 MW by 2015 (even in a conservative case)

3. Pan-India target of 10% could be achieved without much impact on tariffs

i. RE supply not a constraint in meeting RPO trajectories

ii. Even with CERC tariff in all states assumed, incremental impact of RPO on tariffs is 1.5 to 4.1 paise/unit/year during 2011- 2015

- Higher RPO initially helps in reducing impact on tariff by investment in good sites during lower tariff periods
-

4. State segregated in three baskets- high, medium and low

- Each State to contribute to RE (with own and through REC mechanism)
 - Impact of RE tariffs to be spread to different states
-

Key messages

-
1. Objective to give RPO scenarios considering supply and impact on tariffs
-

Objective to give RPO scenarios considering supply and impact on tariffs

- Approach and Methodology was presented in XVIth meeting of FOR at Lucknow
 - To follow pan-India target of 10% by 2015 as per the NAPCC
 - Can help in mitigating deficit in self sufficient manner
 - No recommendatory RPO trajectories for states
 - To give scenarios for RPO trajectory that States may consider
 - To consider impact on tariffs based on initial aggressive scenario
 - RE tariffs to get revised/increased in later years
 - Regulations to be revisited
 - Section 61 (a) requires SERC to follow CERC Regulations
 - Good sites are captured first (lower CUF and higher tariffs later)

Key considerations for the assignment

RE Scenario	National Action Plan on Climate Change	FOR suggestions	REC Mechanism	National Solar Mission
<ul style="list-style-type: none"> ▪ Potential ▪ Installed Capacities ▪ Likely Capacity additions from SNA, industry and trend ▪ Existing RPO scenario 	<ul style="list-style-type: none"> ▪ RPO of 5% starting FY10 ▪ Increase by 1% every year for 10 years ▪ SERCs may set higher % than this minimum ▪ REC mechanism to be set up 	<ul style="list-style-type: none"> ▪ RPO level of 5% as suggested by NAPCC ▪ Increase of 1% every year till it touches 10% ▪ RPO fixation to consider impact on average PPC ▪ RPO applicable also to captive consumers & open access users ▪ Non fulfillment of RPO may attract imposition of financial liability 	<ul style="list-style-type: none"> ▪ To counter issue of State specific RE availability ▪ Inter-State transfer of RE power's Green component ▪ Solar & Non solar REC ▪ Mechanism under implementation 	<ul style="list-style-type: none"> ▪ To establish India as global leader in Solar Energy ▪ 1000-2000 MW in phase 1 (2013) ▪ 4000-10000 MW in phase 2 (2017) ▪ 20000 MW in phase 3 (2022) ▪ Possibility of Solar REC ▪ Solar RPO may start with 0.25% in phase 1; go to 3% by 2022

Approach and Methodology

Approach & Methodology

Estimation of RE potential & installed capacities in different States and review of RPO orders & RE tariff orders

- Data/reports from MNRE, CERC, State Renewable Agencies, IREDA, Ministry of Power, etc
- RE tariff as per regulations issued by CERC & different SERCs
- RPO orders issued by SERCs

Estimation of likely RE capacity additions in next 5 years

- As per discussion with various stakeholders (State Renewable Agencies, Power Developers and Industry Experts)
- Considering past growth rates

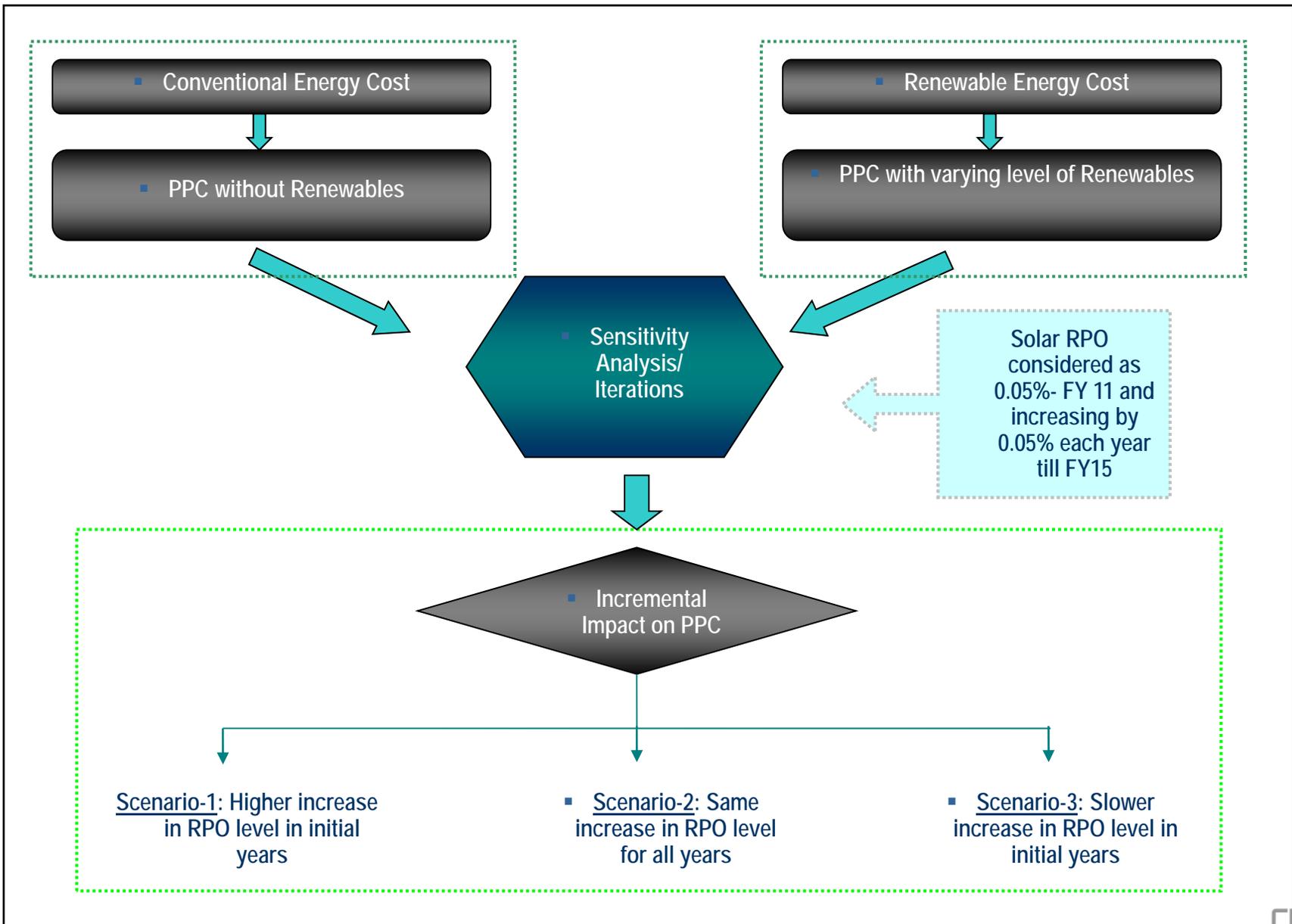
Assessment of projected demand of Energy & Power Purchase Cost (PPC) for different states

- Energy requirement: actual figure for FY09, growth as per 17th EPS
- PPC: review of tariff orders by SERCs
- RE power cost: RE tariff regulations by respective States and CERC

Sensitivity analysis & determination of incremental impact of varying level of RPO on PPC (along with pan India aggregation)

- Solar & Non solar RPO
- Sensitivity analysis using varying levels of Non solar RPO
- Impact assessment for next 5 years

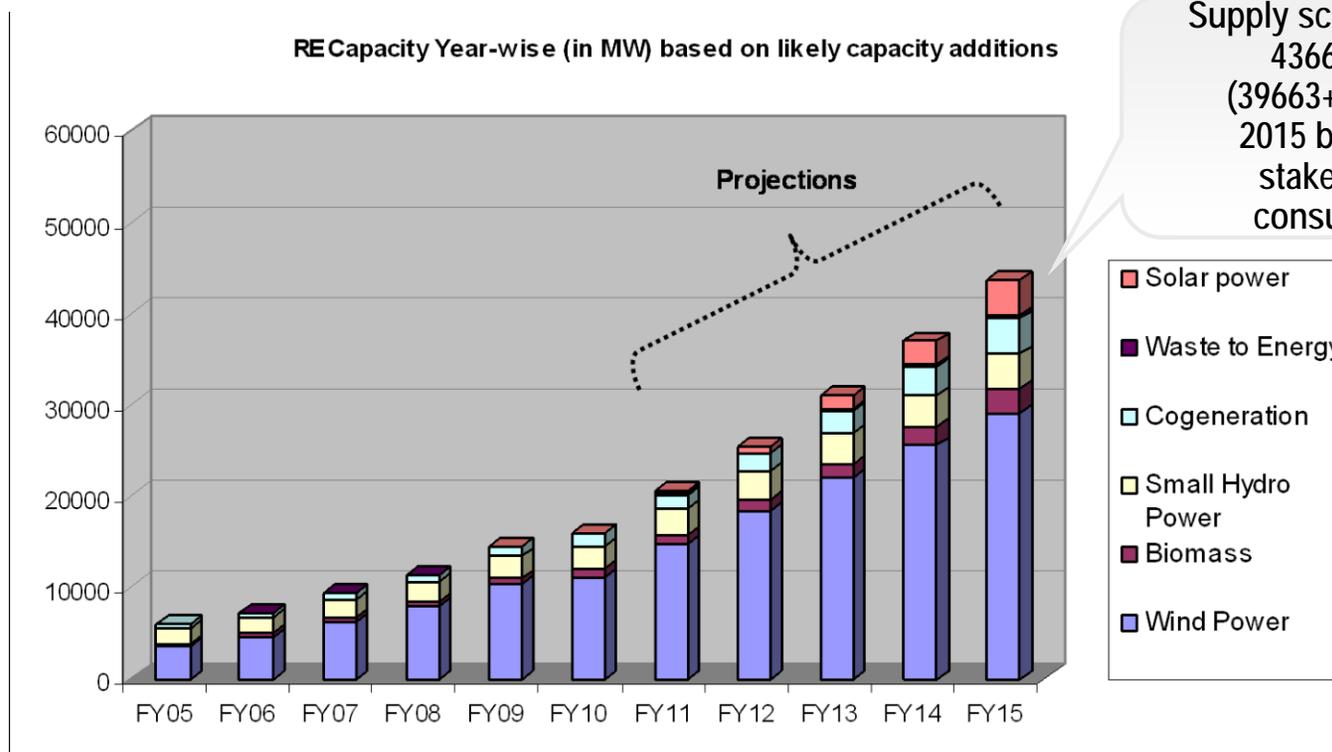
Framework



Key messages

1. Objective to give RPO scenarios considering supply and impact on tariffs
2. RE capacity projected to be 43663 MW by 2015 (even in a conservative case)

RE capacity projected to be 43663 MW by 2015 (even in a conservative case)



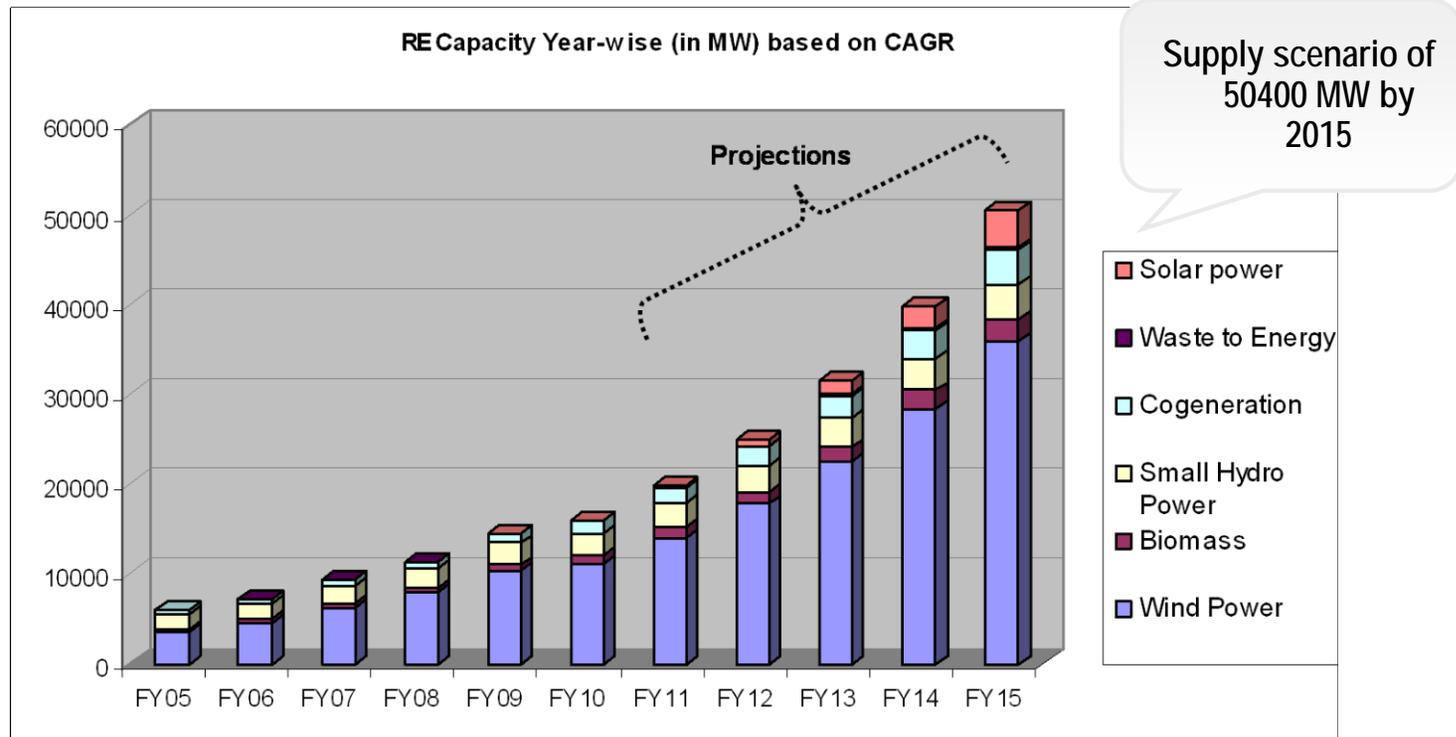
Estimation of RE supply scenario considering

- RE potential of 84776 MW
- Past trend
- Stakeholder consultation including with SNA & industry

- RE supply scenario of 39663 MW by 2015 estimated as against trend scenario of **46400 MW** (excluding solar)
- Solar would add another 4000 MW by 2015 considering various schemes and the pipeline envisaged by the industry (& NAPCC)

10. CERC tariffs & RPO trajectory would be able to trigger better RE supply scenarios

RE Supply will not be a constraint in meeting 2015 target



Estimation of RE supply scenario considering

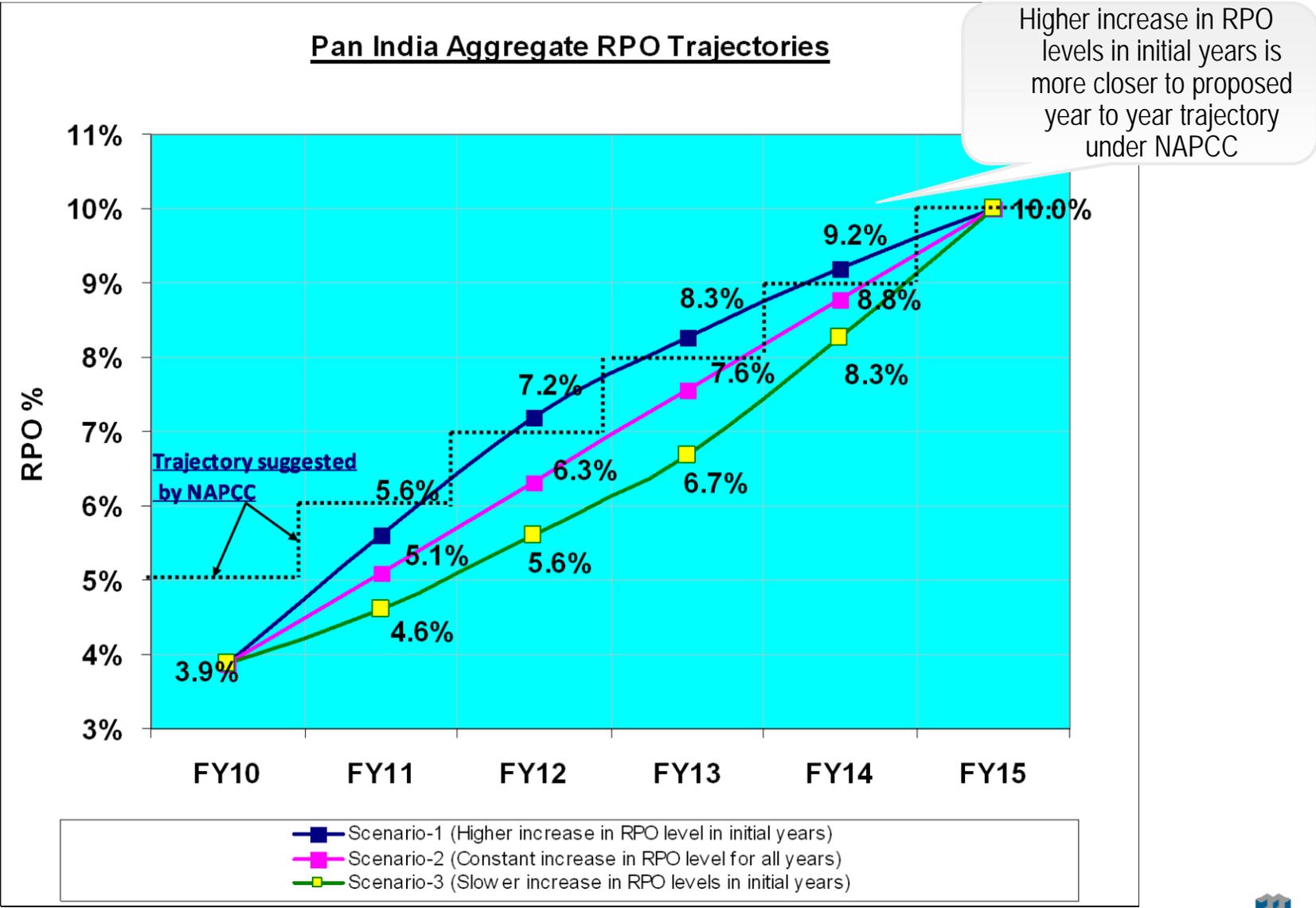
- RE potential of 84776 MW
- Past trend
- Stakeholder consultation including with SNA & industry

- RE supply scenario of 46400MW by 2015 estimated as against potential of 84776 MW (excluding solar)
- Solar would add another 4000 MW by 2015 considering various schemes and the pipeline envisaged by the industry (& NAPCC)

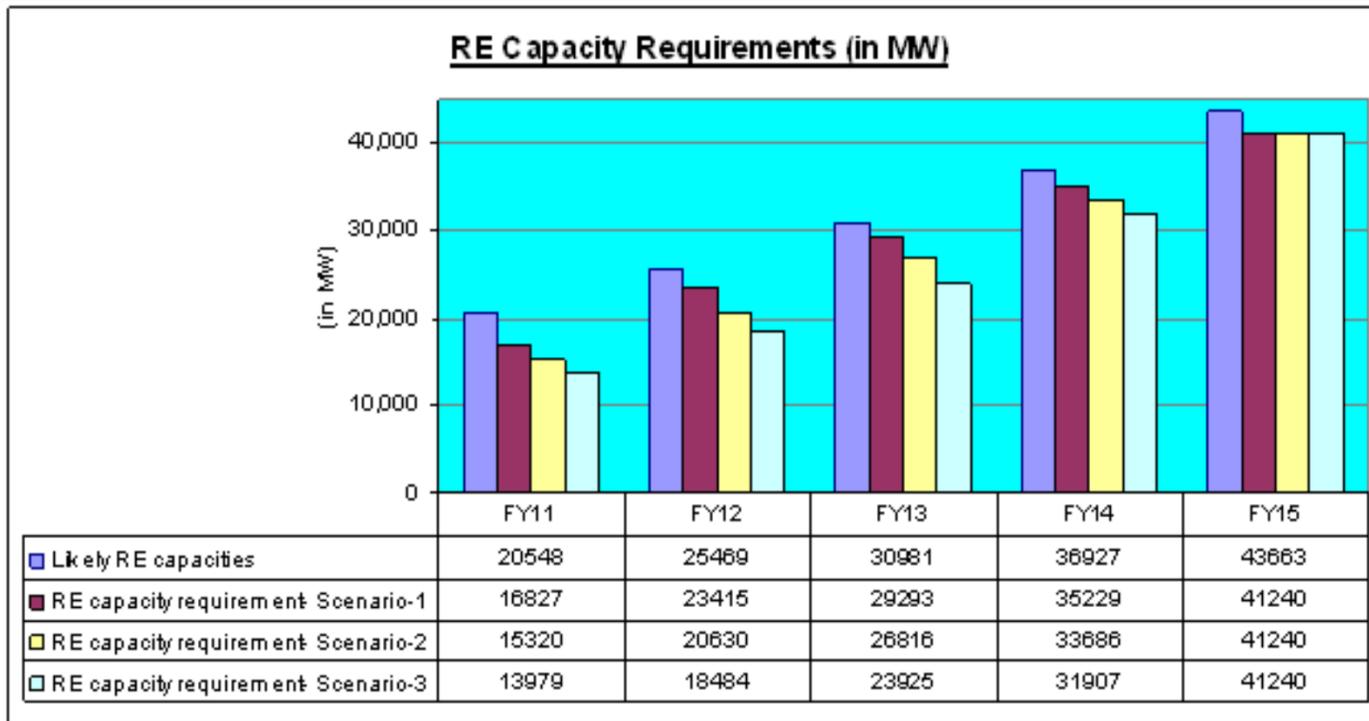
Key messages

1. Objective to give RPO scenarios considering supply and impact on tariffs
 2. RE Supply will not be a constraint in meeting 2015 target (even in conservative case)
 3. Pan-India target of 10% could be achieved without much impact on tariffs
 - i. RE supply enough to meet supply requirement under 3 scenarios
 - ii. Even with CERC tariff in all states assumed, incremental impact of RPO on tariffs is 1.5 to 4.1 paise/unit/year during 2011- 2015
 - Higher RPO initially helps in reducing impact on tariff by investment in good sites during lower tariff periods
-

Higher, constant and slower increase scenario assumed for meeting Pan India Aggregate RPO Trajectories of 10% target by 2015



RE supply enough (even in a conservative case) to meet all scenarios



- Sufficient RE capacities expected to be added to facilitate meeting requirements for each of 3 scenarios
- Even the conservative figure of likely RE capacities is more than the requirements
- RE energy (MUs) has been calculated using average CUF for each source weighted by source-wise capacities

What is the Impact?

- Drivers

- Existing and projected Power Purchase Cost in each State
- Existing and projected RE tariffs in each State
- Quantum/volumes that would be required to meet the demand (through RE as well as other sources)

- Phenomenon

- Good sited to be targeted first
- Capital Cost (and fuel in case of Biomass) is increasing for RE technologies (besides Solar)
- RE tariffs to be revisited in states
 - Section 61 (a)
 - Regulations are getting over
 - CUFs to be re-looked
- *RE tariffs in later years would be higher*

Overall impact on tariffs would be lower in case of Scenario 1

Based upon CERC tariff and increasing RE tariff

Item	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Total Energy (In MUa)	624869	677375	735424	799584	869818	940288	1010620
RE energy (In MUa)	22508	26235	41274	57433	71850	86408	101154

SCENARIO-1

RPO %	3.6%	3.9%	5.6%	7.2%	8.3%	9.2%	10.0%
Increase in RPO			1.7%	1.6%	1.1%	0.9%	0.8%
Impact of Inclusion of RE (paise/unit)	5.7	7.1	8.8	12.2	18.1	20.1	24.2
Incremental impact (paise/unit)		1.4	1.5	3.6	3.8	4.0	4.1

SCENARIO-2

RPO %	3.6%	3.9%	5.1%	6.3%	7.6%	8.6%	10.0%
Increase in RPO			1.2%	1.2%	1.2%	1.2%	1.2%
Impact of Inclusion of RE (paise/unit)	5.7	7.1	8.3	11.5	15.3	18.6	24.4
Incremental impact (paise/unit)		1.4	1.1	3.3	3.8	4.3	4.8

SCENARIO-3

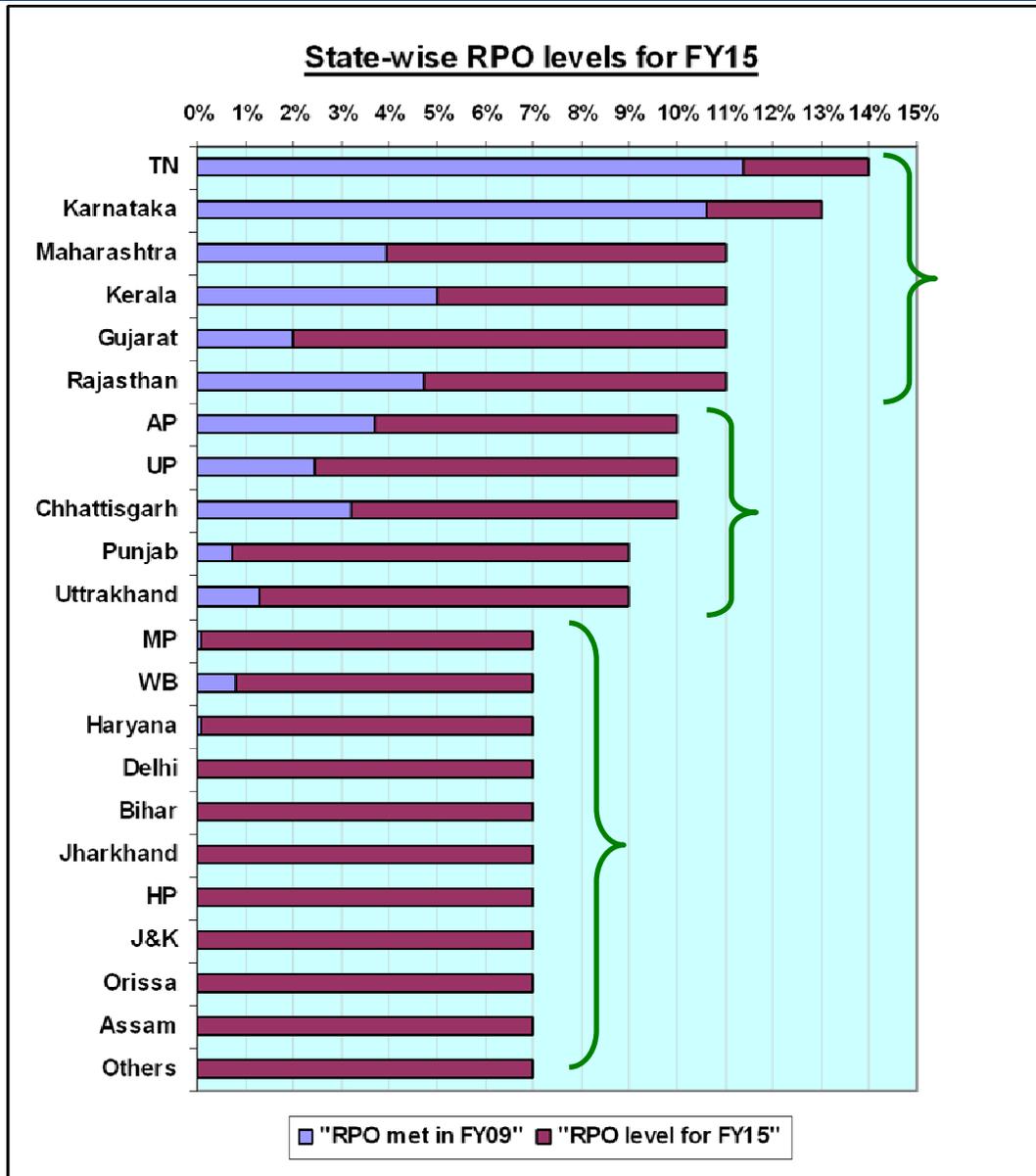
RPO %	3.6%	3.9%	4.6%	5.6%	6.7%	8.3%	10.0%
Increase in RPO			0.7%	1.0%	1.1%	1.6%	1.7%
Impact of Inclusion of RE (paise/unit)	5.7	7.1	8.1	11.2	14.9	19.4	24.8
Incremental impact (paise/unit)		1.4	1.0	3.1	3.7	4.5	5.4

- Even with CERC tariff in all states assumed, incremental impact of RPO on tariffs is 1.5 to 4.1 paise/unit/year during 2011- 2015

Key messages

1. Objective to give RPO scenarios considering supply and impact on tariffs
 2. RE Supply will not be a constraint in meeting 2015 target (even in conservative case)
 3. Pan-India targets could be achieved without much impact on tariffs
 - i. RE supply enough to meet supply requirement under 3 scenarios
 - ii. Even with CERC tariff in all states assumed, incremental impact of RPO on tariffs is 1.5 to 4.1 paise/unit/year during 2011- 2015
 - Higher RPO initially helps in reducing impact on tariff by investment in good sites during lower tariff periods
 4. State segregated in three baskets- high, medium and low
 - Each State to contribute to RE (with own and through REC mechanism)
 - Impact of RE tariffs to be spread to different states
-

Possible targets for each State based depending on high, medium & low potential



- **Group-I: High target states;**
 - States have higher potential and can contribute for other states also (seller of REC)
 - Already bearing some impact on tariffs

- **Group-II: Medium targets;**
 - States have medium potential and
 - Meet RPO requirement own there own or through REC mechanism

- **Group-III: Low targets;**
 - States having less RE potential
 - Will meet requirement through REC considerable

Way forward

- Finalization of report after incorporating comments/suggestions from the Forum
 - Email- vrkumar@crisil.com
 - vhsharma@crisil.com



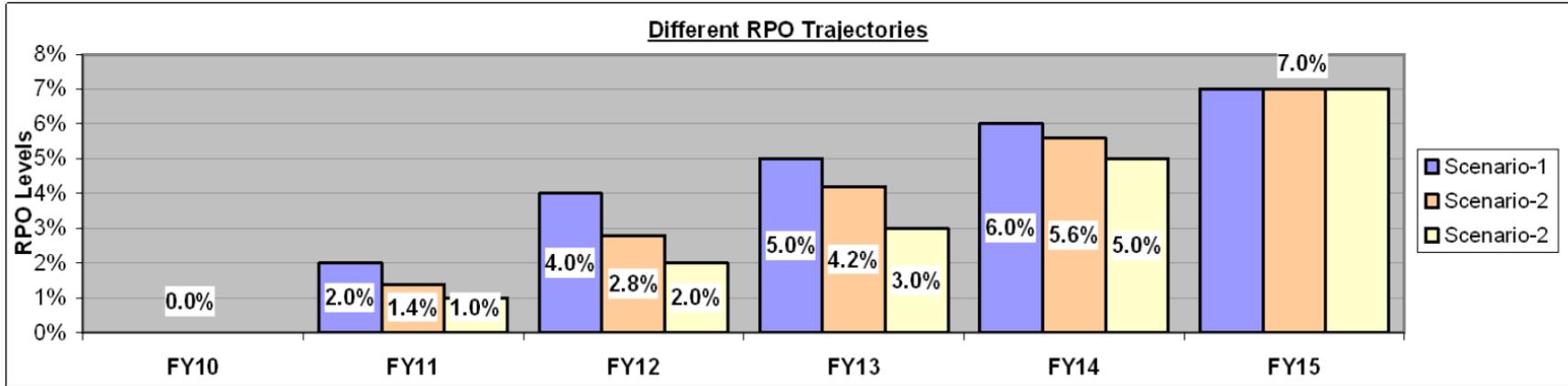
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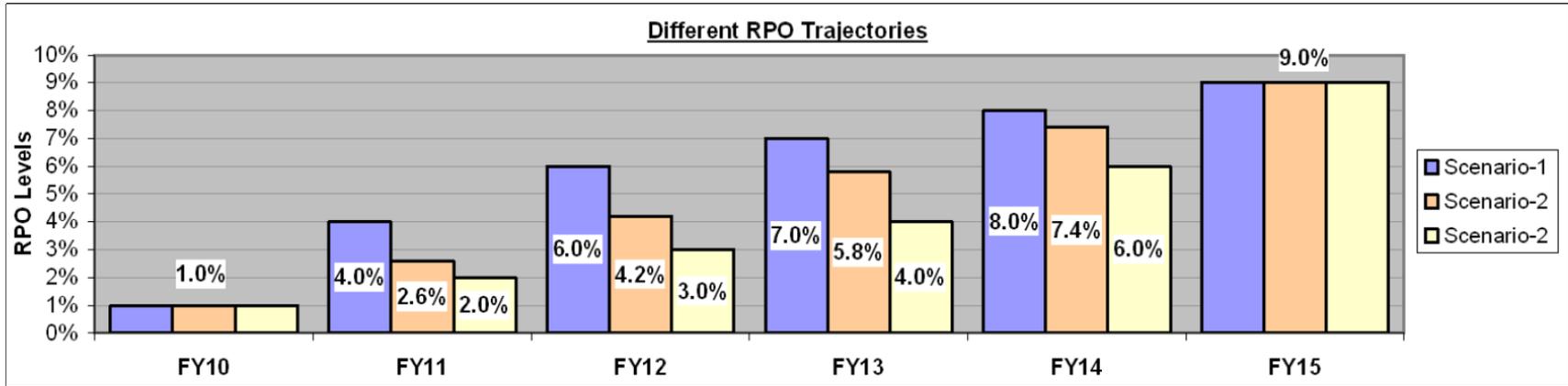
TRAJECTORY SCENARIOS



Item	Unit	FY09	FY10	FY11	FY12	FY13	FY14	FY15
SCENARIO-1 Increase in RPO Level:				2.0%	2.0%	1.0%	1.0%	1.0%
RPO Level	%	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
Impact on PPC	Paisa/ unit	-	-	3.8	6.9	7.9	8.5	8.5
Incremental impact on PPC	Paisa/ unit		0.0	3.8	3.1	1.0	0.5	0.0
SCENARIO-2 Increase in RPO Level:				1.4%	1.4%	1.4%	1.4%	1.4%
RPO Level	%	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
Impact on PPC	Paisa/ unit	0.0	0.0	2.9	5.3	7.0	8.1	8.5
Incremental impact on PPC	Paisa/ unit		0.0	2.9	2.4	1.8	1.1	0.4
SCENARIO-3 Increase in RPO Level:				1.0%	1.0%	1.0%	2.0%	2.0%
RPO Level	%	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
Impact on PPC	Paisa/ unit	0.0	0.0	2.3	4.1	5.6	7.5	8.5
Incremental impact on PPC	Paisa/ unit		0.0	2.3	1.9	1.5	1.9	1.0

Punjab

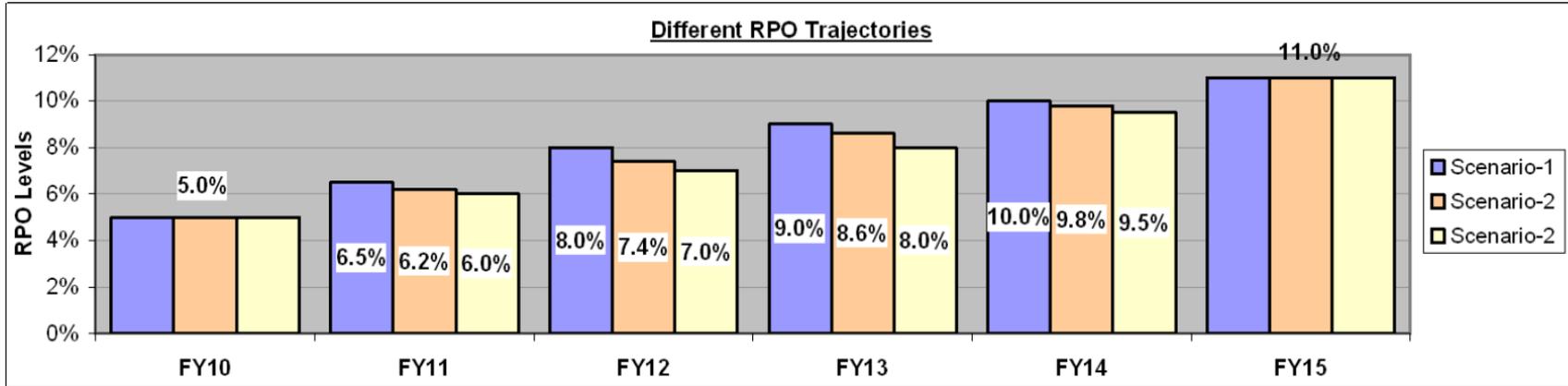
TRAJECTORY SCENARIOS



Item	Unit	FY09	FY10	FY11	FY12	FY13	FY14	FY15
SCENARIO-1 Increase in RPO Level:				3.0%	2.0%	1.0%	1.0%	1.0%
RPO Level	%	0.8%	1.0%	4.0%	6.0%	7.0%	8.0%	9.0%
Impact on PPC	Paisa/ unit	1.0	1.3	5.4	7.8	8.8	9.5	9.8
Incremental impact on PPC	Paisa/ unit		0.3	4.1	2.4	1.0	0.7	0.3
SCENARIO-2 Increase in RPO Level:				1.6%	1.6%	1.6%	1.6%	1.6%
RPO Level	%	0.8%	1.0%	2.6%	4.2%	5.8%	7.4%	9.0%
Impact on PPC	Paisa/ unit	1.0	1.3	3.8	5.9	7.6	9.0	9.8
Incremental impact on PPC	Paisa/ unit		0.3	2.5	2.1	1.8	1.3	0.8
SCENARIO-3 Increase in RPO Level:				1.0%	1.0%	1.0%	2.0%	3.0%
RPO Level	%	0.8%	1.0%	2.0%	3.0%	4.0%	6.0%	9.0%
Impact on PPC	Paisa/ unit	1.0	1.3	3.0	4.6	5.9	7.8	9.8
Incremental impact on PPC	Paisa/ unit		0.3	1.8	1.6	1.3	1.9	2.0

Maharashtra

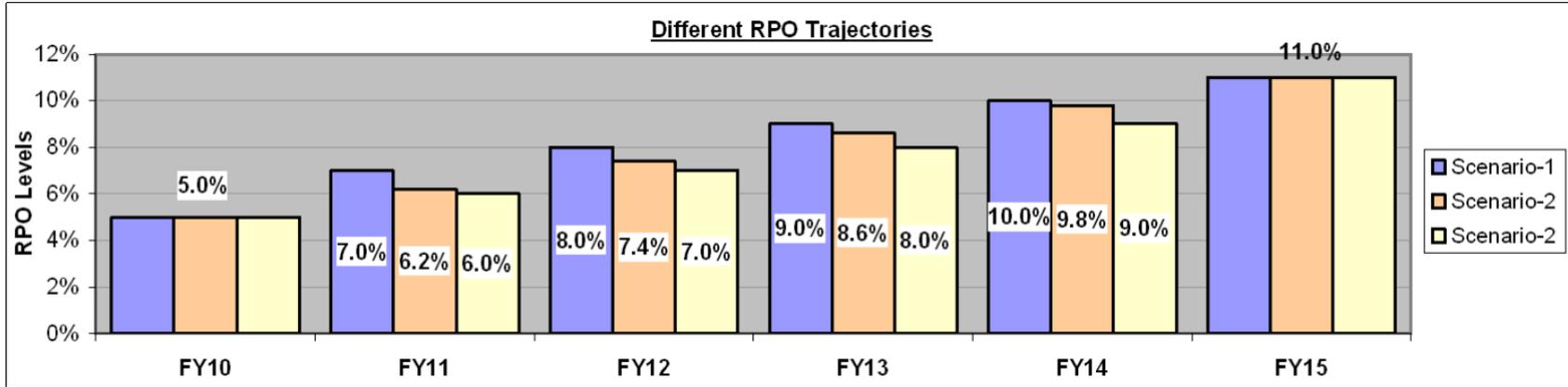
TRAJECTORY SCENARIOS



Item	Unit	FY09	FY10	FY11	FY12	FY13	FY14	FY15
SCENARIO-1 Increase in RPO Level:				1.5%	1.5%	1.0%	1.0%	1.0%
RPO Level	%	4.0%	5.0%	6.5%	8.0%	9.0%	10.0%	11.0%
Impact on PPC	Paisa/ unit	2.5	3.1	4.6	6.0	6.9	7.7	8.3
Incremental impact on PPC	Paisa/ unit		0.6	1.5	1.4	0.9	0.8	0.6
SCENARIO-2 Increase in RPO Level:				1.2%	1.2%	1.2%	1.2%	1.2%
RPO Level	%	4.0%	5.0%	6.2%	7.4%	8.6%	9.8%	11.0%
Impact on PPC	Paisa/ unit	2.5	3.1	4.5	5.7	6.7	7.6	8.3
Incremental impact on PPC	Paisa/ unit		0.6	1.3	1.2	1.1	0.9	0.7
SCENARIO-3 Increase in RPO Level:				1.0%	1.0%	1.0%	1.5%	1.5%
RPO Level	%	4.0%	5.0%	6.0%	7.0%	8.0%	9.5%	11.0%
Impact on PPC	Paisa/ unit	2.5	3.1	4.3	5.4	6.4	7.5	8.3
Incremental impact on PPC	Paisa/ unit		0.6	1.2	1.1	1.0	1.1	0.8

Rajasthan

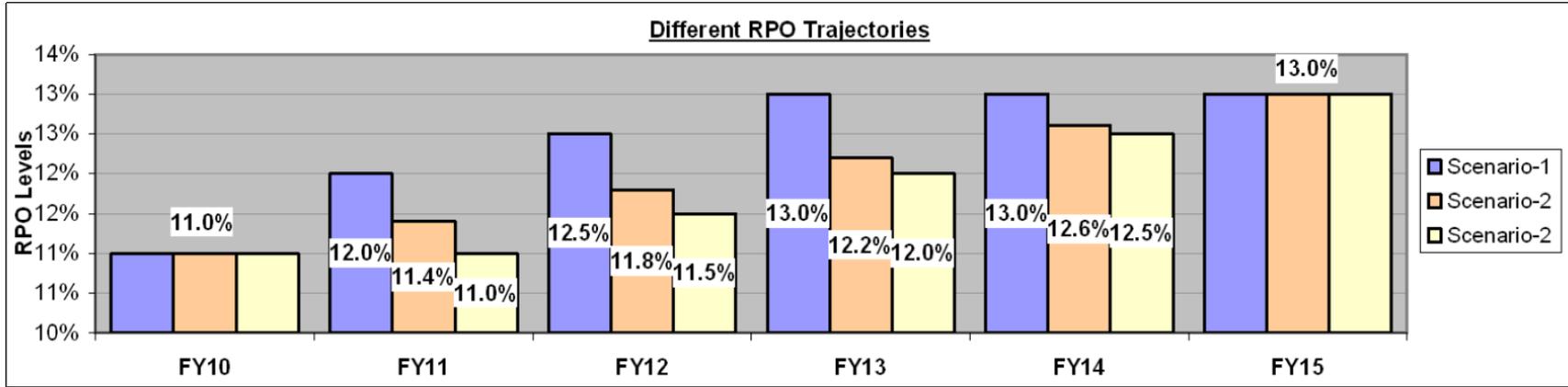
TRAJECTORY SCENARIOS



Item	Unit	FY09	FY10	FY11	FY12	FY13	FY14	FY15
SCENARIO-1 Increase in RPO Level:				2.0%	1.0%	1.0%	1.0%	1.0%
RPO Level	%	4.7%	5.0%	7.0%	8.0%	9.0%	10.0%	11.0%
Impact on PPC	Paisa/ unit	7.4	7.3	9.8	10.6	10.9	10.8	10.2
Incremental impact on PPC	Paisa/ unit		-0.1	2.6	0.7	0.3	-0.1	-0.6
SCENARIO-2 Increase in RPO Level:				1.2%	1.2%	1.2%	1.2%	1.2%
RPO Level	%	4.7%	5.0%	6.2%	7.4%	8.6%	9.8%	11.0%
Impact on PPC	Paisa/ unit	7.4	7.3	8.8	9.9	10.5	10.6	10.2
Incremental impact on PPC	Paisa/ unit		-0.1	1.5	1.1	0.6	0.1	-0.5
SCENARIO-3 Increase in RPO Level:				1.0%	1.0%	1.0%	1.0%	2.0%
RPO Level	%	4.7%	5.0%	6.0%	7.0%	8.0%	9.0%	11.0%
Impact on PPC	Paisa/ unit	7.4	7.3	8.5	9.4	9.9	10.0	10.2
Incremental impact on PPC	Paisa/ unit		-0.1	1.3	0.9	0.5	0.1	0.2

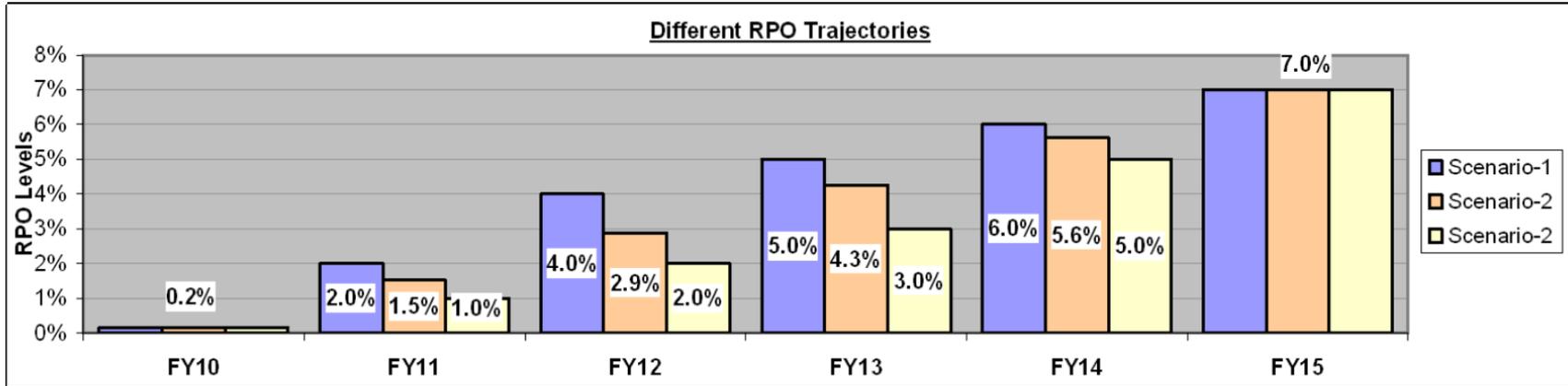
Karnataka

TRAJECTORY SCENARIOS



Item	Unit	FY09	FY10	FY11	FY12	FY13	FY14	FY15
SCENARIO-1 Increase In RPO Level:				1.0%	0.5%	0.5%	0.0%	0.0%
RPO Level	%	10.6%	11.0%	12.0%	12.5%	13.0%	13.0%	13.0%
Impact on PPC	Paisa/ unit	10.5	10.7	10.6	9.8	8.7	7.1	5.3
Incremental impact on PPC	Paisa/ unit		0.2	0.0	-0.8	-1.1	-1.6	-1.8
SCENARIO-2 Increase In RPO Level:				0.4%	0.4%	0.4%	0.4%	0.4%
RPO Level	%	10.6%	11.0%	11.4%	11.8%	12.2%	12.6%	13.0%
Impact on PPC	Paisa/ unit	10.5	10.7	10.1	9.3	8.3	7.0	5.3
Incremental impact on PPC	Paisa/ unit		0.2	-0.5	-0.8	-1.0	-1.3	-1.6
SCENARIO-3 Increase In RPO Level:				0.0%	0.5%	0.5%	0.5%	0.5%
RPO Level	%	10.6%	11.0%	11.0%	11.5%	12.0%	12.5%	13.0%
Impact on PPC	Paisa/ unit	10.5	10.7	9.8	9.1	8.2	6.9	5.3
Incremental impact on PPC	Paisa/ unit		0.2	-0.9	-0.6	-0.9	-1.3	-1.6

TRAJECTORY SCENARIOS



Item	Unit	FY09	FY10	FY11	FY12	FY13	FY14	FY15
SCENARIO-1 Increase In RPO Level:				1.9%	2.0%	1.0%	1.0%	1.0%
RPO Level	%	0.1%	0.2%	2.0%	4.0%	5.0%	6.0%	7.0%
Impact on PPC	Paisa/ unit	0.2	0.3	4.2	7.4	6.9	7.4	7.6
Incremental impact on PPC	Paisa/ unit		0.1	3.9	3.2	-0.6	0.6	0.1
SCENARIO-2 Increase In RPO Level:				1.4%	1.4%	1.4%	1.4%	1.4%
RPO Level	%	0.1%	0.2%	1.5%	2.9%	4.3%	5.6%	7.0%
Impact on PPC	Paisa/ unit	0.2	0.3	3.4	5.8	6.2	7.2	7.6
Incremental impact on PPC	Paisa/ unit		0.1	3.1	2.4	0.4	1.0	0.4
SCENARIO-3 Increase In RPO Level:				0.9%	1.0%	1.0%	2.0%	2.0%
RPO Level	%	0.1%	0.2%	1.0%	2.0%	3.0%	5.0%	7.0%
Impact on PPC	Paisa/ unit	0.2	0.3	2.5	4.4	5.0	6.7	7.6
Incremental impact on PPC	Paisa/ unit		0.1	2.2	2.0	0.6	1.7	0.9

State-wise RPOs- Scenario-1

State	RPO %						
	FY09	FY10	FY11	FY12	FY13	FY14	FY15
AP	3.7%	3.7%	5.5%	7.0%	8.0%	9.0%	10.0%
Maharashtra	4.0%	5.0%	6.5%	8.0%	9.0%	10.0%	11.0%
TN	11.4%	12.0%	13.0%	13.5%	14.0%	14.0%	14.0%
Karnataka	10.6%	11.0%	12.0%	12.5%	13.0%	13.0%	13.0%
Kerala	5.0%	6.0%	8.0%	9.0%	10.0%	10.5%	11.0%
Gujarat	2.0%	2.0%	4.0%	6.0%	8.0%	10.0%	11.0%
Rajasthan	4.7%	5.0%	7.0%	8.0%	9.0%	10.0%	11.0%
MP	0.1%	0.2%	2.0%	4.0%	5.0%	6.0%	7.0%
UP	2.4%	2.5%	4.5%	6.5%	8.0%	9.0%	10.0%
Punjab	0.8%	1.0%	4.0%	6.0%	7.0%	8.0%	9.0%
WB	0.8%	0.9%	2.0%	4.0%	5.0%	6.0%	7.0%
Uttrakhand	1.3%	1.5%	3.5%	5.5%	7.0%	8.0%	9.0%
Haryana	0.1%	0.2%	2.0%	4.0%	5.0%	6.0%	7.0%
Chhattisgarh	3.2%	3.2%	5.0%	7.0%	8.0%	9.0%	10.0%
Delhi	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
Bihar	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
Jharkhand	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
HP	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
J&K	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
Orissa	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
Assam	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%
Others	0.0%	0.0%	2.0%	4.0%	5.0%	6.0%	7.0%

State- wise RPOs- Scenario-2

State	RPO %						
	FY09	FY10	FY11	FY12	FY13	FY14	FY15
AP	3.7%	3.7%	5.0%	6.2%	7.5%	8.7%	10.0%
Maharashtra	4.0%	5.0%	6.2%	7.4%	8.6%	9.8%	11.0%
TN	11.4%	12.0%	12.4%	12.8%	13.2%	13.6%	14.0%
Karnataka	10.6%	11.0%	11.4%	11.8%	12.2%	12.6%	13.0%
Kerala	5.0%	6.0%	7.0%	8.0%	9.0%	10.0%	11.0%
Gujarat	2.0%	2.0%	3.8%	5.6%	7.4%	9.2%	11.0%
Rajasthan	4.7%	5.0%	6.2%	7.4%	8.6%	9.8%	11.0%
MP	0.1%	0.2%	1.5%	2.9%	4.3%	5.6%	7.0%
UP	2.4%	2.5%	4.0%	5.5%	7.0%	8.5%	10.0%
Punjab	0.8%	1.0%	2.6%	4.2%	5.8%	7.4%	9.0%
WB	0.8%	0.9%	2.1%	3.3%	4.6%	5.8%	7.0%
Uttarakhand	1.3%	1.5%	3.0%	4.5%	6.0%	7.5%	9.0%
Haryana	0.1%	0.2%	1.6%	2.9%	4.3%	5.6%	7.0%
Chhattisgarh	3.2%	3.2%	4.6%	5.9%	7.3%	8.6%	10.0%
Delhi	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
Bihar	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
Jharkhand	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
HP	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
J&K	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
Orissa	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
Assam	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%
Others	0.0%	0.0%	1.4%	2.8%	4.2%	5.6%	7.0%

State-wise RPOs- Scenario-3

State	RPO %						
	FY09	FY10	FY11	FY12	FY13	FY14	FY15
AP	3.7%	3.7%	4.5%	5.5%	6.5%	8.0%	10.0%
Maharashtra	4.0%	5.0%	6.0%	7.0%	8.0%	9.5%	11.0%
TN	11.4%	12.0%	12.0%	12.5%	13.0%	13.5%	14.0%
Karnataka	10.6%	11.0%	11.0%	11.5%	12.0%	12.5%	13.0%
Kerala	5.0%	6.0%	6.5%	7.0%	8.0%	9.0%	11.0%
Gujarat	2.0%	2.0%	3.0%	5.0%	7.0%	9.0%	11.0%
Rajasthan	4.7%	5.0%	6.0%	7.0%	8.0%	9.0%	11.0%
MP	0.1%	0.2%	1.0%	2.0%	3.0%	5.0%	7.0%
UP	2.4%	2.5%	3.5%	4.5%	6.0%	8.0%	10.0%
Punjab	0.8%	1.0%	2.0%	3.0%	4.0%	6.0%	9.0%
WB	0.8%	0.9%	1.0%	2.0%	3.0%	5.0%	7.0%
Uttarakhand	1.3%	1.5%	2.5%	3.5%	5.0%	7.0%	9.0%
Haryana	0.1%	0.2%	1.0%	2.0%	3.0%	5.0%	7.0%
Chhattisgarh	3.2%	3.2%	4.0%	5.0%	6.0%	8.0%	10.0%
Delhi	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
Bihar	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
Jharkhand	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
HP	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
J&K	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
Orissa	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
Assam	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%
Others	0.0%	0.0%	1.0%	2.0%	3.0%	5.0%	7.0%

Impact Comparative: State tariff vs. CERC tariff (with reducing CUF)

Based upon CERC tariff and increasing RE tariff

Based upon tariff specified by respective states

Item	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Total Energy (In MJUs)	624869	677375	735424	799584	869918	940288	1010820
RE energy (In MJUs)	22508	26235	41274	57433	71850	86409	101154

Item	FY09	FY10	FY11	FY12	FY13	FY14	FY15
Total Energy (In MJUs)	624869	677375	735424	799584	869918	940288	1010820
RE energy (In MJUs)	22508	26235	41274	57433	71850	86409	101154

SCENARIO-1

	FY09	FY10	FY11	FY12	FY13	FY14	FY15
RPO %	3.6%	3.9%	5.0%	7.2%	8.3%	9.2%	10.0%
Increase in RPO			1.7%	1.6%	1.1%	0.9%	0.8%
Impact of Inclusion of RE (paisa/unit)	5.7	7.1	8.8	12.2	16.1	20.1	24.2
Incremental impact (paisa/unit)		1.4	1.5	3.6	3.8	4.0	4.1

SCENARIO-2

	FY09	FY10	FY11	FY12	FY13	FY14	FY15
RPO %	3.6%	3.9%	5.1%	6.3%	7.6%	8.8%	10.0%
Increase in RPO			1.2%	1.2%	1.2%	1.2%	1.2%
Impact of Inclusion of RE (paisa/unit)	5.7	7.1	8.3	11.5	15.3	19.8	24.4
Incremental impact (paisa/unit)		1.4	1.1	3.3	3.8	4.3	4.8

SCENARIO-3

	FY09	FY10	FY11	FY12	FY13	FY14	FY15
RPO %	3.6%	3.9%	4.6%	5.6%	6.7%	8.3%	10.0%
Increase in RPO			0.7%	1.0%	1.1%	1.6%	1.7%
Impact of Inclusion of RE (paisa/unit)	5.7	7.1	8.1	11.2	14.9	19.4	24.8
Incremental impact (paisa/unit)		1.4	1.0	3.1	3.7	4.5	5.4

Key Messages:

- With CERC tariff and reducing CUF, the incremental impact on PPC ranges from 1 paisa to 5.4 paisa
- For both cases, the impact is more in case of scenario-3



Consultancy support to BEE/FOR on DSM related issues

*Presentation
on
Demand Side Management
Regulations*



Outline of the Presentation

- Background of the study
- Institutionalising DSM Process
- DSM Regulations





Background



Background of the study

- Forum of Regulator (FOR) report on DSM and Energy efficiency made several recommendations on implementation of EE&DSM measures
- FOR requested BEE to assist it in undertaking some of these tasks and to act as Secretariat for FOR on EE/DSM issues
- BEE appointed ABPS Infra to provide consultancy support and to act as a Secretariat for Forum of Regulators
- Work Plan was approved by BEE/FOR which identifies seven tasks for the Consultant.



Activities – Work Plan

- These seven tasks are:
 - Activity A: **Report on Institutionalising DSM Process**
 - Activity B: **Organisation of Workshop**
 - Activity C: **Development of DSM Regulations**
 - Activity D: **Manual on Cost Benefit Analysis of DSM programs**
 - Activity E: **Manual on development of standard process for design, development and implementation of DSM programs**
 - Activity F: **Report on tariff restructuring and impact assessment**
 - Activity G: **Manual on Monitoring and Verification protocol for DSM**

This presentation focuses on the results of
Activity A & C





Activity A

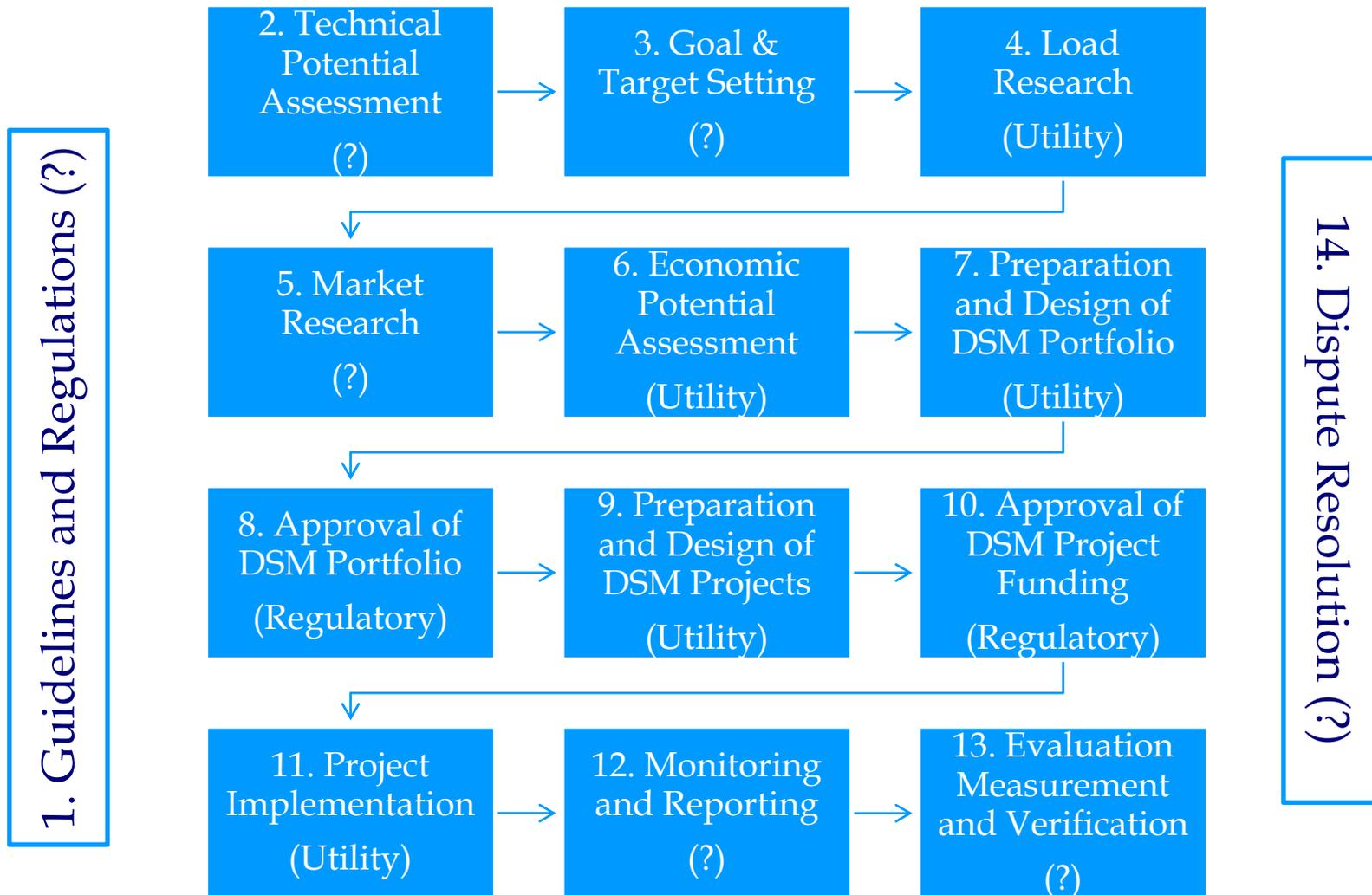
Institutionalising DSM Process

Objectives for Activity 'A'

- To assess institutional set up envisaged under legal and policy framework for DSM activities;
- To identify DSM processes and steps
- To assess existing institutional structures;
- To identify gaps in institutional structure for large scale deployment of DSM in the country;
- To identify appropriate institutional structure to fill the identified gaps.



DSM Processes & Institutional Ownership



The box numbers are meant for activity identification and these may not necessarily flow in the same sequential order. It is an iterative process and the activities are revisited as and when required

Deficiencies in existing institutional framework

- In current setup, following activities are not being undertaken by any institution:
 - Technical Potential Assessment
 - Goal and Target Setting
 - Market Research
 - Development of guidelines for preparation and design of DSM portfolio/projects and project implementation
 - Monitoring and Reporting (M&R)
 - Evaluation Monitoring and Verification (EM&V)
 - Dispute resolution

Hence, it is important to identify an entity to take up these activities. Here, this entity has been referred as DSM Executive Agency.



Options for DSM Executive Agency

- Following 4 options have been analysed for formation of DSM Executive Agency:
 - Separate entity incorporated under appropriate statute
 - As a part of State Electricity Regulatory Commission
 - As a part of State Designated Agency
 - As a part of Distribution Utility
- Analysis and comparison of four options was carried and has been presented in the subsequent slide.

Analysis of Various Options of DSM EA

Parameters	DSM EA: Separate Entity	DSM EA: SERC	DSM EA: SDA	DSM EA: Utility
Specify Guidelines and Regulations	Lacks authority	Best suited	May not have sufficient authority	Lacks authority
Technical Potential Assessment	Depending on resources may develop high competency, though unlikely	Lacks manpower, resources and experience	Although have resources and experience, lacks capability	Best suited
Preparation of Market Research				
Goal setting & Target Setting	Lacks authority	Best suited	Lacks authority	Lacks authority
Evaluation, Measurement & Verification	Independent entity and hence a good option	Not independent, Lacks manpower and capacity	Independent entity with experience, lacks capacity	Not independent agency, not suited
Dispute Resolution	Lacks authority	Best suited	Lacks authority	Lacks authority
Number of dedicated manpower for carrying out above mentioned work	Given limited career opportunities, will not be able to draw good talent	Low	Dedicated officials already working in EE/EC	Some of the States have established DSM Cells, others are following
Knowledge about EE/EC & DSM	Low	Medium	High	Medium/requires capacity building

Analysis of Various Options of DSM EA

- It can be seen that none of the proposed options for DSM EA is fulfilling the entire requirement on its own;
- Distribution Utility considering its reach and access to consumer appears to be better equipped organization;
- However, Distribution Utility lacks the authority to take up tasks such as preparation of guidelines/ dispute resolutions etc.
- Hence, to ensure that all the tasks identified in the gap analysis are performed by appropriate agency, it is proposed to divide the tasks between Distribution Utility and SERC.



Division of Tasks Between SERC & Utility

- State Electricity Regulatory Commission may take up following functions:
 - Preparation of Guidelines & Regulations
 - Goal Setting & Target Setting
 - Evaluation, Monitoring and Verification
 - Dispute Resolution
- Distribution Utility may carryout following activities:
 - Technical Potential Assessment
 - Market Research
 - Monitoring & Reporting

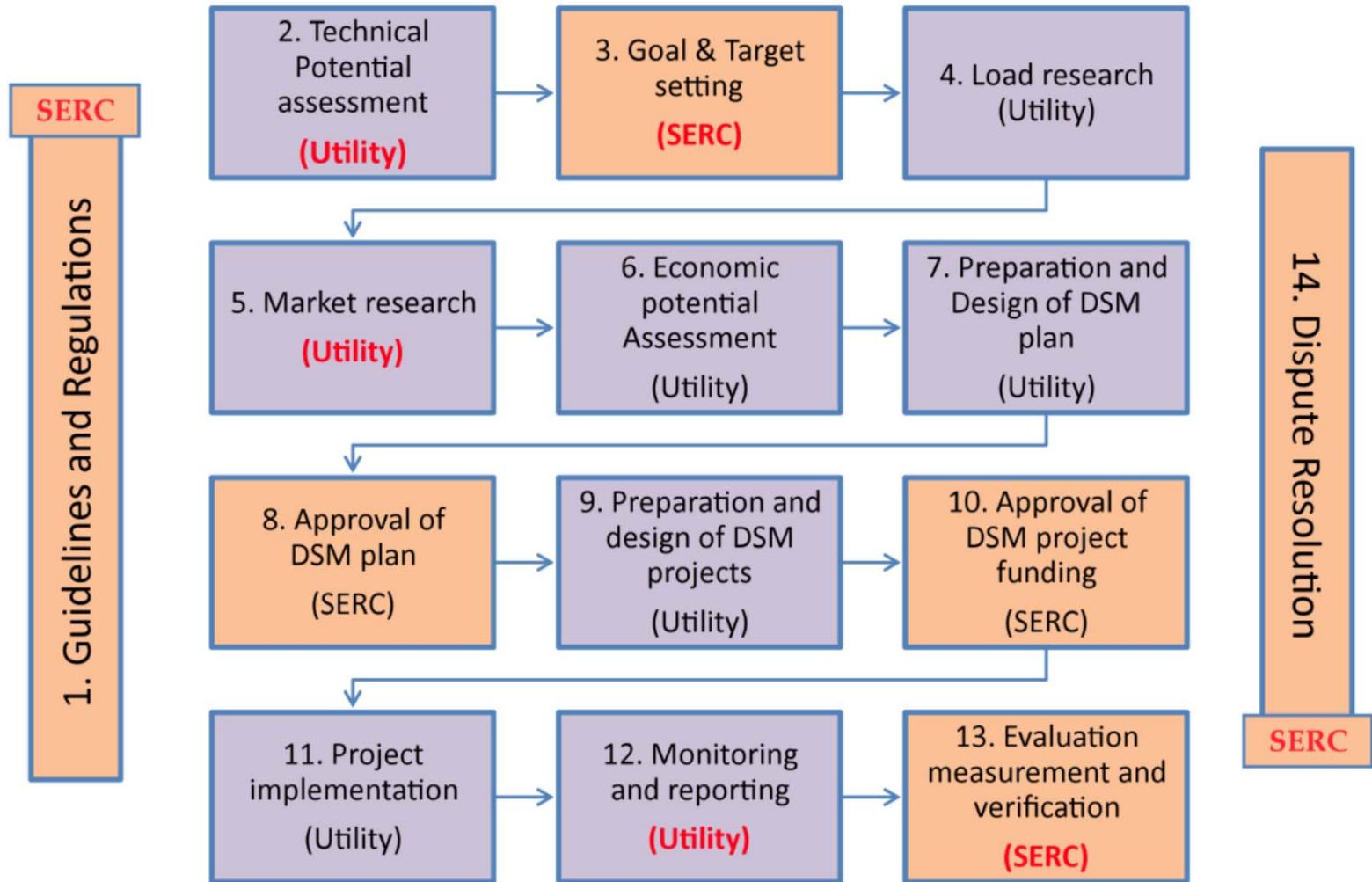


Role of Energy Efficiency Services Ltd (EESL)

- Utility/SERC may not have necessary capacity/ skill set to carry out all activities assigned to them in the proposed framework
- Therefore, it is suggested services of *Energy Efficiency Service Limited (EESL)* may be deployed to carry out these activities;
- *EESL is a joint venture company formed by the State-owned power utilities NTPC, Power Finance Corporation, Rural Electrification Corporation and Power Grid Corporation of India.*
- Primary objective of EESL is to promote EE projects in the country
- Currently located within BEE, EESL is expected to be primary executive arm of the Government in the area of EE.
- Proposal has been discussed with EESL and BEE which have shown keen interest in supporting DSM processes at the State level



Proposed Model DSM framework





Activity B

DSM Regulations

Salient features of DSM Regulations (1/2)

- Regulations provide for DSM Objectives and targets to be set by the SERC for the Distribution Licensee
- Provides for guidelines on various aspects of DSM processes:
 - Load and market research,
 - Implementation of DSM programmes,
 - Cost Effectiveness Assessment of DSM programmes,
 - Monitoring and Reporting and Evaluation,
 - Measurement and Verification of savings through DSM programmes;
 - Eligibility criteria for DSM programmes,
 - Guidelines for setting targets;
 - Database development framework guidelines etc.
- Guidelines may be modified without modifying Regulations.



Salient features of DSM regulations (2/2)

- Provides for various activities to be undertaken in the DSM framework
 - Load research and development of baseline data, formulation of DSM Plan, Commission review and approval of DSM plan, preparation and approval of DSM Programme Document, and implementation of DSM programmes
- Third party intervention in performing the most important task such as Evaluation, Monitoring and Verification is envisaged and responsibility has been kept with SERC;
 - Considering the reach of the Distribution Utility, most of the execution related tasks have been assigned to them. In addition, the responsibility of assessment of technical potential and market research has been placed on them.



Structure of DSM Regulations (1/2)

- Relevant sections of Electricity Act 2003 and National Electricity Policy that provide for creation of DSM regulations are illustrated
- Chapter I: General
 - **Short Title, extent and Commencement**
 - **Definitions**
- Chapter II: DSM Objectives, targets and guidelines
 - **DSM Objectives**
 - **Assessment of technical potential for DSM**
 - **DSM Targets**
 - **Guidelines on DSM process**
- Chapter III: DSM Cell
 - **Constitution of DSM Cell, its roles & responsibilities**



Structure of DSM Regulations (2/2)

- Chapter IV: DSM Process
 - Load and market research and development of baseline data
 - Formulation of DSM Plan
 - Commission review and approval of DSM plan
 - Preparation of DSM Programme Document
 - Approval of DSM Programme Document
 - Implementation of DSM programmes
 - Mechanism for Cost Recovery
 - Monitoring and reporting of DSM Programmes
 - Evaluation Measurement and Verification of DSM Programme
- Chapter V: DSM Plan and Programme Completion Report
- Chapter VI: Incentives
- Chapter VII: Miscellaneous



DSM Regulation (1/2)

- WHEREAS section 23 of the Electricity Act 2003 provides that *“If the Appropriate Commission is of the opinion that it is necessary or expedient so to do for maintaining the efficient supply, securing the equitable distribution of electricity and promoting competition, it may, by order, provide for regulating supply, distribution, consumption or use thereof”*;
- AND WHEREAS Section 42 (1) of the Electricity Act 2003 provides that *“it shall be the duty of a distribution licensee to develop and maintain an efficient, co-ordinated and economical distribution system in his area of supply and to supply electricity in accordance with the provisions contained in this Act”*
- AND WHEREAS Section 61 of the Electricity Act 2003 provides that *“The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-“Clause (c) “the factors which would encourage competition, efficiency, economical use of resources, good performance and optimum investment”*
- AND WHEREAS Section 86(2) of the Electricity Act 2003 provides that *“State Commission shall advise the State Government on all or any of the following matters, namely:-“ Clause (i) “promotion of competition, efficiency and economy in activities of the electricity industry;”*



DSM Regulation (2/2)

- AND WHEREAS Clause 5.9.2 of the National Electricity Policy provides that *“The potential number of installations where demand side management and energy conservation measures are to be carried out is very large. Bureau of Energy Efficiency (BEE) shall initiate action in this regard. BEE would also make available the estimated conservation and DSM potential, its staged implementation along with cost estimates for consideration in the planning process for National Electricity Plan”*;
- AND WHEREAS Clause 5.9.4 of the National Electricity Policy provides that *“In the field of energy conservation initial approach would be voluntary and self-regulating with emphasis on labelling of appliances. Gradually as awareness increases, a more regulatory approach of setting standards would be followed”*;
- AND WHEREAS Clause 5.9.6 of the National Electricity Policy provides that *“In order to reduce the requirements for capacity additions, the difference between electrical power demand during peak periods and off-peak periods would have to be reduced. Suitable load management techniques should be adopted for this purpose. Differential tariff structure for peak and off peak supply and metering arrangements (Time of Day metering) should be conducive to load management objectives. Regulatory Commissions should ensure adherence to energy efficiency standards by utilities*;



Chapter I: General (1/2)

1. Short Title, extent and Commencement

- 1.1 These Regulations may be called the “State Electricity Regulatory Commission (Demand Side Management) Regulations, 2010”.
- 1.2 These Regulations shall be applicable to the Distribution Licensees in the State in their respective areas of supply.
- 1.3 These Regulations shall come into force from the date of its notification in the Official Gazette.

2. Definitions:

- 2.1 In these Regulations, unless the context otherwise requires –
 - i. “Act” means the Electricity Act, 2003 (36 of 2003);
 - ii. “Baseline data” means the initial base level consumption and/or demand for electricity before a DSM programme begins to provide a starting point for comparison for assessing programme impact”;
 - iii. “Bureau” means the Bureau of Energy Efficiency established under sub-section (1) of Section 2 of The Energy Conservation Act, 2001
 - iv. "Commission" means the State Electricity Regulatory Commission constituted under sub-section (1) of Section 82 of the Act;



Chapter I: General (2/2)

- v. Cost Effectiveness Index” means an indicator of the attractiveness of any investment in DSM programme or when compared to the costs of energy produced and delivered in the absence of such an investment
- vi. “Demand Side Management” means the actions of a Distribution Licensee, beyond the customer's meter, with the objective of altering the end-use of electricity - whether it be to increase demand, decrease it, shift it between high and low peak periods, or manage it when there are intermittent load demands - in the overall interests of reducing Distribution Licensee costs.
- vii. “DSM Resource Acquisition” means a mechanism to implement DSM projects through customers, Energy Service Companies, Non-Government Organisations, manufacturers/suppliers, or other private sector organizations, with payment made to them by the Distribution Licensee for the resultant energy and load reductions
- ix. “Energy Services Company” means a company which is in the business of providing energy efficient and load management equipment and/or services to end-use customers and is approved by Bureau
- x. “Evaluation, Measurement and Verification” means activities which evaluate, measure and verify performance or other aspects of DSM/energy efficiency programs or their market environment
- xi. “Monitoring and Reporting” means activities which monitor and evaluate the progress of DSM/energy efficiency programs of the Distribution Licensee



Chapter II: DSM Objectives, targets & guidelines (1/3)

3. DSM Objectives

- 3.1 The Commission, in consultation with Bureau, shall formulate DSM objectives that shall be considered in the advancement and implementation of cost effective DSM initiatives in the State.

Examples of the objectives may include power shortage mitigation, seasonal peak reduction, cost effective energy savings, lowering the cost of electricity, reduction in emissions of greenhouse gases etc.
- 3.2 The DSM objectives shall be consistent with the DSM objectives set out by Bureau as a part of Energy Conservation Plan for the country.

4. Assessment of technical potential for DSM

- 4.1 The Distribution Licensee in the State shall carry out assessment of potential for DSM in the State one year before the start of every MYT Control Period.

Notwithstanding above provision, the first assessment of technical potential for DSM shall be carried out within six months of the notification of these Regulations.
- 4.2 Distribution Licensee shall be guided by methodology developed by Bureau while assessing of technical potential for DSM.



Chapter II: DSM Objectives, targets & guidelines (2/3)

5. DSM Targets

- 5.1 The Commission shall establish DSM targets for each Distribution Licensee in the State.
- 5.2 While setting DSM target for the Distribution Licensee, the Commission will give due consideration to factors such as consumer mix, load profile, etc.
- 5.3 Examples of DSM targets may include the following:
 - Percentage reductions in load growth;
 - Savings in kW, kWh;
 - Savings as a percent of total resources to meet load;
- 5.4 While establishing the targets, the Commission shall be guided by technical potential in the State as assessed by the Distribution Licensee.



Chapter II: DSM Objectives, targets & guidelines (3/3)

6. Guidelines on DSM process

- 6.1 The Commission shall issue guidelines to guide Distribution Licensees in execution of the following activities:
- i. Load and market research
 - ii. Implementation of DSM programmes
 - iii. Cost Effectiveness Assessment of DSM programmes
 - iv. Monitoring and Reporting of DSM Plans and programmes
 - v. Eligibility criteria for DSM programmes
 - vi. Methodology for setting DSM targets and funding levels
 - vii. Database development framework
- 6.2 The Commission shall issue guidelines on these matters from time to time
- 6.3 Issuance of such guidelines shall not be a pre-requisite for preparation and submission of the first DSM Plan by the Distribution Licensee.



Chapter III: DSM Cell

7. Constitution of DSM Cell, its roles & responsibilities

- 7.1 Every Distribution Licensee shall, constitute DSM Cell within one month of adoption of these regulations
- 7.2 The DSM Cell so constituted shall be provided with necessary authority and resources so as to execute the functions assigned to it under these Regulations
- 7.3 The DSM Cell shall be responsible for:
 - i. Load research and development of baseline data
 - ii. Formulation of DSM Plan
 - iii. Design and development of DSM projects including cost benefit analysis, plans for implementation, monitoring & reporting and for EM&V
 - iv. Seeking necessary approvals to DSM Plan and individual programmes
 - v. Implementation of DSM programmes
 - vi. Any other additional function that may be assigned by the Commission



Chapter IV: DSM Process (1/8)

8. Load and market research and development of baseline data

- 8.1 Distribution Licensee shall undertake load research to identify the target consumer segment/s and end uses for DSM programmes to build the necessary database
- 8.2 Distribution Licensee shall undertake market research to estimate market potential for specific energy efficiency technologies and applications, establish key performance indicators, and determine existing baseline market conditions
- 8.3 On the basis of the results of load and market research, the Distribution Licensee shall develop baseline data for its area of supply
- 8.4 Distribution Licensee shall design, develop and implement the initial few DSM programmes on the basis of available data and studies completed by BEE till the complete baseline data is available for its area of supply and establishment of base line data shall not be a pre-requisite for design of such initial DSM programmes by the Distribution Licensee.



Chapter IV: DSM Process (2/8)

9. Formulation of DSM Plan

9.1 Distribution Licensee shall formulate and submit to the Commission a perspective DSM Plan within one year of adoption of these regulations. The Plan shall include

- i. An overall goal for DSM Plan
- ii. Description of DSM programmes to form a part of DSM Plan
- iii. Implementation process and schedule of each programme in the plan as a whole
- iv. Plan for Monitoring and Reporting
- v. Indicative cost effectiveness assessment of programmes

Notwithstanding above, the first DSM Plan shall be prepared within one year of the date of these Regulations and shall be for the period till the end of ongoing MYT Control Period.

9.2 Selection and prioritisation of various DSM programmes in the DSM Plan shall be guided by the following factors:

- i. The Cost effectiveness guidelines issued by the Commission
- ii. DSM Objectives identified in Regulation 3
- iii. Whether the proposed programmes supplement National level efforts adopted by the Bureau
- iv. Programmes with high visibility and therefore potential for creation of awareness within consumers



Chapter IV: DSM Process (3/8)

10. Commission review and approval of DSM plan

- 10.1 Distribution Licensee shall submit the DSM Plan to the Commission for approval at least six months before the start date of the next MYT period.
- 10.2 The Commission may adopt procedures as specified in the Conduct of Business Regulations for according approval to the DSM Plan

11. Preparation of DSM Programme Document

- 11.1 For each DSM programme included in the DSM Plan, a detailed description shall be provided in a separate Programme Document. The description shall include general information, technology, schedule for deployment, budget, cost effectiveness assessment, detailed implementation plan, estimation of savings, etc.
- 11.2 For each DSM programme cost benefit analysis shall be carried out as per guidelines issued by the Commission on Cost effectiveness from time to time



Chapter IV: DSM Process (5/8)

12. Approval of DSM Programme

- 12.1 Prior to implementing DSM programme, Distr Licensee must obtain approval of Commission.
- 12.2 Each Programme Document shall include the following:
- i. Description of the programme;
 - ii. Objectives and rationale for the programme;
 - iii. Consumer segment at which the programme is aimed;
 - iv. Estimated level of programme participation;
 - v. Estimate of baseline;
 - vi. Assessment of programme in line with Cost Effectiveness Guidelines
 - vii. Mechanism for recovery of cost
 - viii. Marketing and delivery strategy;
 - ix. Distribution Licensee costs and budget;
 - x. Implementation schedule;
 - xi. Implementation mechanism e.g. Energy Service Companies, DSM Bidding, Resource Acquisition etc.
 - xii. Monitoring and evaluation plan;
 - Xiii. Proposed performance incentives.
- 12.3 The Commission shall approve a DSM program if it is in line with the Objectives set out in Section 3 of the Regulations. The Commission may direct modifications to proposed or on-going programmes to ensure consistency with the DSM Objectives. However, the Commission shall allow Distribution Licensee adequate time to notify consumers of program modification.

Chapter IV: DSM Process (6/8)

13. Implementation of DSM programmes

13.1 Distribution Licensee shall undertake implementation of DSM programmes in line with the guidelines issued by the Commission from time to time

13.2 The implementation of the programme shall be undertaken in the manner as approved by the Commission

13.3 Distribution Licensee shall undertake implementation of quick gain DSM programmes

13.4 Distribution Licensee shall carry out implementation of activities assigned to it either by itself or through engagement of appropriate independent entity

While doing so, the Distribution Licensee shall ensure that continuity and consistency is maintained and interest of the consumers is not compromised

13.5 Distribution Licensee shall implement all DSM programmes developed by Bureau.

Notwithstanding above, if the Distribution Licensee is of the opinion that any programme developed by the Bureau is not appropriate for the consumers in its area of supply, the Distribution Licensee shall seek specific exemption from the Commission for implementation of such programme.



Chapter IV: DSM Process (7/8)

14. Mechanism for Cost Recovery

- 14.1 Distribution Licensee shall identify the net incremental costs, if any, associated with planning, design and implementation of programmes
- 14.2 Distribution Licensee may propose methodology for recovery of net incremental costs through tariff or any other mechanism
- 14.3 In order to qualify for cost recovery, each program must be
 - i. Approved prior to implementation
 - ii. Implemented in accordance with the approved program plan and
 - iii. Implemented cost effectively
- 14.4 Distribution Licensee shall provide all necessary assistance to the Commission, or third party assign by the Commission in undertaking Evaluation, Measurement and Verification of DSM programmes implemented by it.
- 14.5 The Commission may direct the Distribution Licensee to undertake DSM programmes that may not be cost effective but is highly beneficial to the society. The Commission will make available resources for such project



Chapter IV: DSM Process (8/8)

15. Monitoring and reporting of DSM Programmes

- 15.1 Distribution Licensee shall prepare plan and undertake monitoring and reporting of DSM programmes as per Guidelines on Monitoring and Reporting issued by Commission from time to time or as approved by the Commission while approving the DSM programme.

16. Evaluation Measurement and Verification of DSM Programme

- 16.1 Distribution Licensee shall prepare plan for evaluation, measurement and verification of savings from DSM programmes as per Guidelines on Evaluation, Measurement and Verification issued by the Commission from time to time
- 16.2 Third party Evaluation, Measurement and Verification of DSM programmes shall be undertaken by the Commission or third party assigned by the Commission

While engaging the agency, the Commission shall ensure that the Agency is not undertaking any other engagement which could conflict with the interests of the consumers in the State

- 16.3 Distribution Licensee shall make available necessary information/data to the Commission or third party assigned by the Commission to measure and verify the savings from DSM programmes



Chapter V: DSM Plan & Programme Completion Report

17. Six-monthly Reports on progress of DSM Plan and Quarterly Reports on expenses incurred on implementation of DSM Plan shall be submitted by the Distribution Licensee
18. The Distribution Licensee will prepare and submit a detailed Program Completion Report and submit the same to the Commission within one month of completion of such programme.
19. The Report shall cover the programme expenses, achievements, outcomes and outputs, constraints and difficulties faced, conclusions, recommendations, lessons learned and way forward.



Chapter VI: Incentives

20. The Commission may provide incentives to Distribution Utilities for achieving or exceeding DSM Objectives as identified in Section 3 of the Regulations.

Chapter VII: Miscellaneous

21. The Commission may, at any time add, vary, alter, modify or amend any provisions of these regulations.
22. If any difficulty arises in giving effect to the provisions of these Regulations, the Commission may, by general or specific order, make such provisions not inconsistent with the provisions of the Act, as may appear to be necessary for removing the difficulty
23. The Commission may, from time to time, issue orders and practice directions in regard to the implementation of the regulations and procedures to be followed
24. All disputes arising under these regulations shall be decided by the Commission based on an application made by the person aggrieved.



Disclaimer

- The regulations aim to provide a guiding document to the States while preparing DSM Regulations
- Modifications/additions may be required to incorporate State specific conditions/attributes
- Legal opinion may be sought to ensure consistency with prevailing Acts and legal framework in the electricity sector.





ABPS Infrastructure Advisory

Practical Solutions to Real Life Problems

ABPS Infrastructure Advisory Private Limited

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Email: contact@abpsinfra.com



**A presentation to The Forum of Regulators (FOR)
21st. April, 2010**

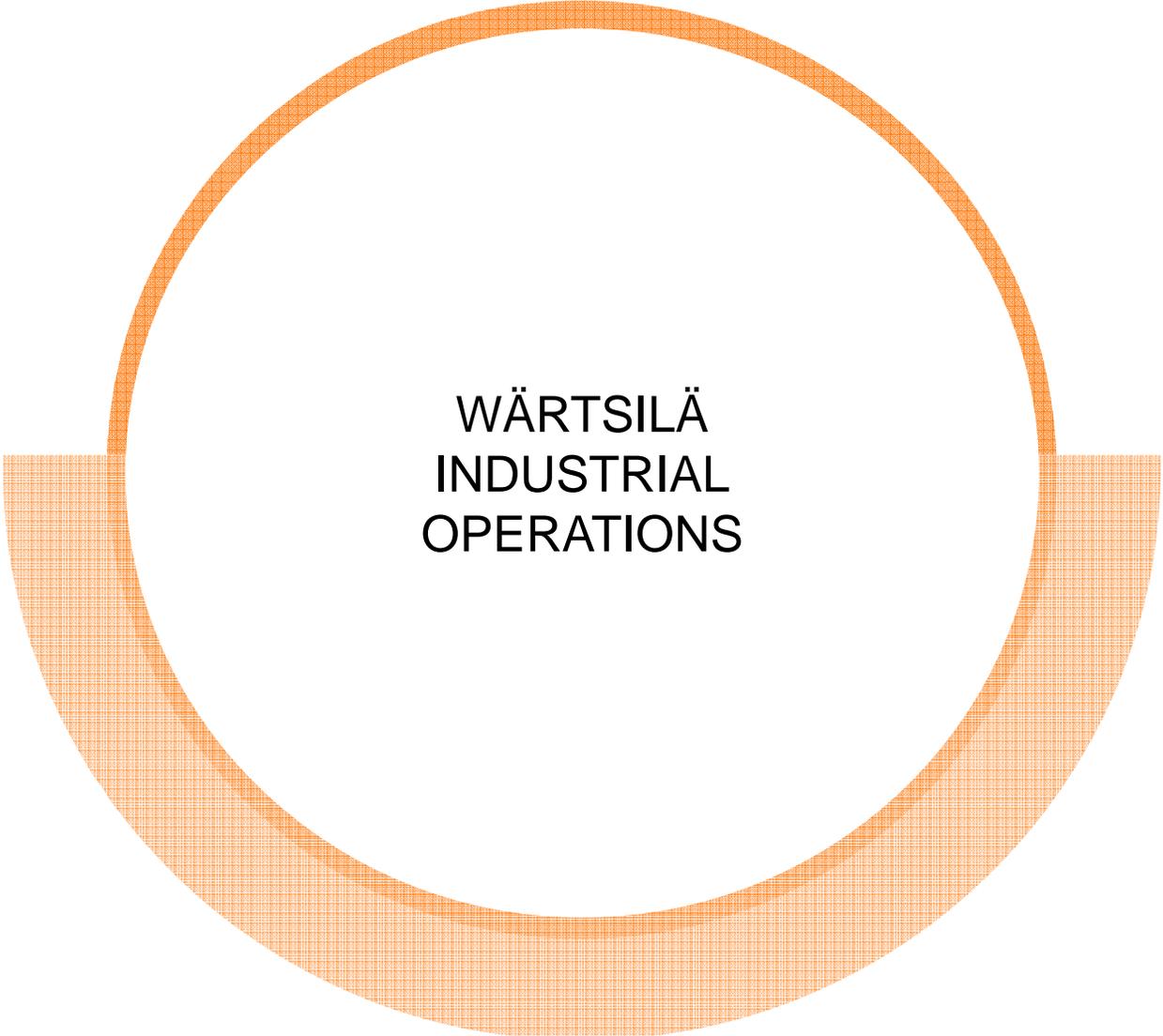
**Optimal Power Generation Mix for India
Addressing**

Sustainability & Peak Demand Management

**Rakesh Sarin
MD, Wartsila India Limited**

**Prof.. R. Balasubramanian
Centre for Energy Studies, IIT Delhi**

This is Wärtsilä



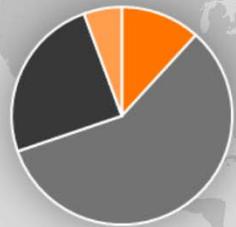
WÄRTSILÄ
INDUSTRIAL
OPERATIONS

Wärtsilä Power Plants

Wärtsilä offers products and services for modern, flexible and sustainable power generation.



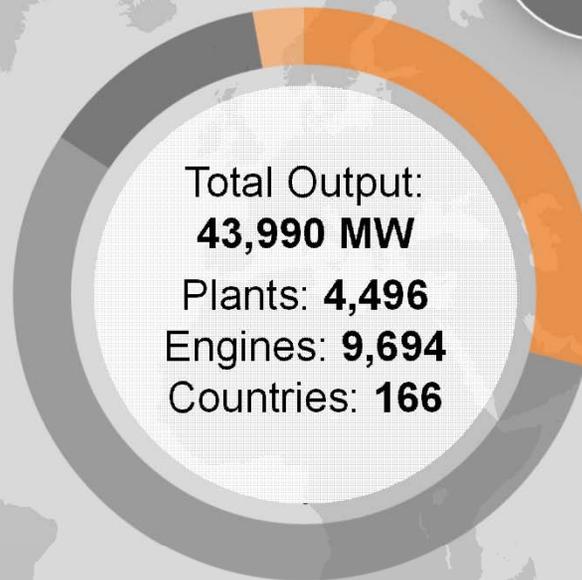
Wärtsilä Powering the World



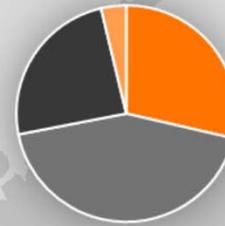
Americas

Output: 8,530 MW
Plants: 351
Engines: 1156

- Industrial self-generation
- Flexible baseload
- Grid stability & peaking
- Oil & gas

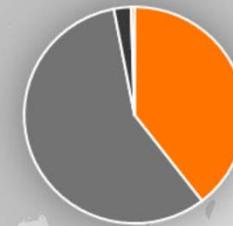


Total Output:
43,990 MW
Plants: **4,496**
Engines: **9,694**
Countries: **166**



Europe

Output: 10,403 MW
Plants: 1755
Engines: 3184



Asia

Output: 15,516 MW
Plants: 1579
Engines: 3324



Africa & Middle East

Output: 9,541 MW
Plants: 811
Engines: 2030

As on Dec'09

Our strengths - Services

Power Plant Services

Development and Financial Services

- Project development, carbon finance expertise

World class Project Management capabilities

- Global EPC
 - Wärtsilä is the only power plant contractor delivering EPC in the whole developing world
- Main enablers
 - Modular pre-fabricated power plant product. Minimised site work
 - 25 year experience constructing in developing countries
- Scope of supply flexibility
- Competitive delivery times

Support Services

Local service for lifecycle support

- Global service network close to most customers
- 24/7 service

Supporting our customers with Services agreements

- Supply agreements
- Technical management
- Maintenance agreements
- Asset management

Financial Highlights 2009

	MEUR
Order intake	3 291
Order book at the end of the period	4 491
Net sales	5 260

Highlights – Power Plants

Order intake over 2200 MW

Several markets with strong order intake

- Several 100+ MW orders from Brazil, Pakistan, The United States, Malta and Kenya

Totally over 800 MW of gas power plant orders

- Biggest gas plant orders from Brazil, The United States and Turkey
- Over 70 MW floating power plant order to Papua New Guinea

Power Plants target markets and solutions

Lifecycle services are provided by Wärtsilä Services



Flexible base-load power generation



Grid stability and peaking



Industrial self-generation



Solutions for oil and gas industry



Oil, dual-fuel and gas fired power plants



Liquid biofuel power plants



Flexible grid stability power plants



Combined heat & power plants (CHP)



Pumping and compression applications

Power Plants Market Segments

Flexible
Baseload Power
Generation

23,400 MW
1600 power plants



Grid Stability
and Peaking

4,900 MW
1020 power plants



Industrial
Self-Generation

12,100 MW
1740 power plants

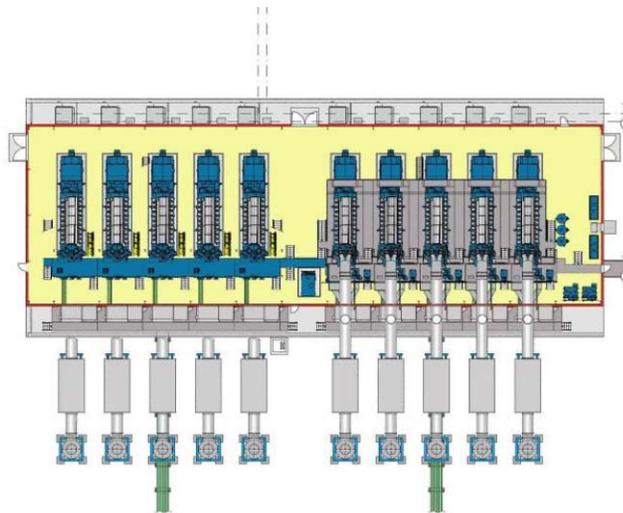


Oil and gas
industry
applications

1,200 MW
80 power plants



Plant size can exceed 300 MW



Sangachal power plant in Azerbaijan

Type: **Baseload, gas power plant**

Prime movers: **18 x Wärtsilä 18V50DF**

Total output: **307.8 MW**

Commissioned: **2008**

Completion time : 18 months

Some Gas-engine plants in India

Malanpur Group Captive power plant (24 MW). MP



Coromandel Electric Captive Power- 24 MW, TN



Arkay Group Captive gas-based 93 MW plant, TN



After 2001, Wärtsilä has offered gas-based power plants, wherever gas was available

Indian Power Scenario

India suffers from chronic power shortage

Rapidly increasing demand projections

Projections for Electricity Requirement by MoP

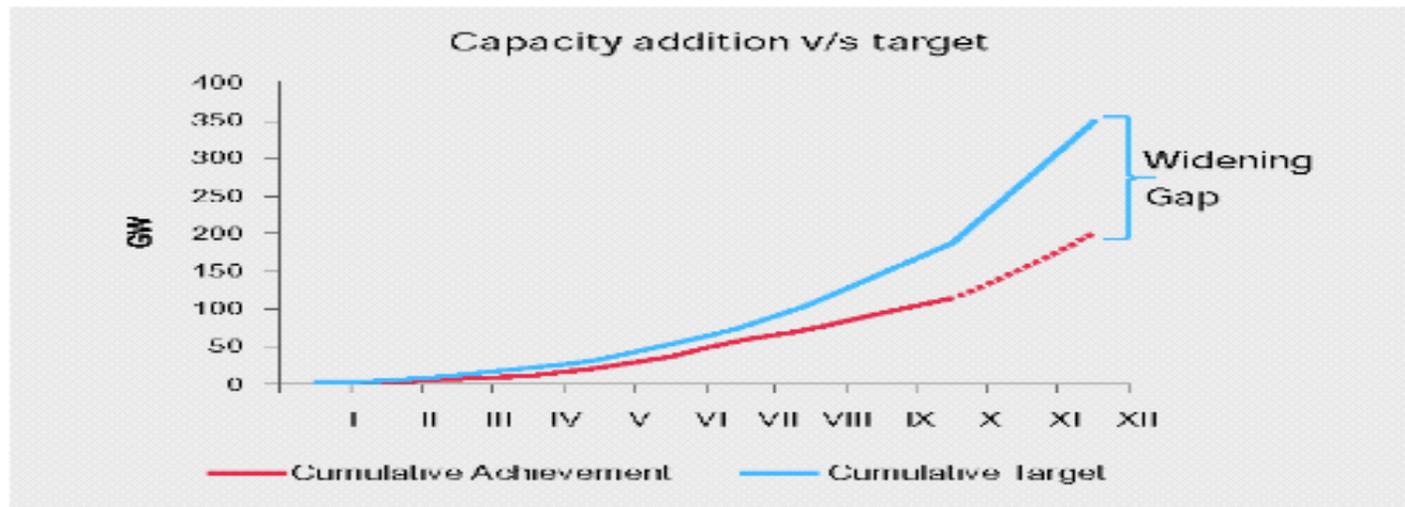
Year	Billion kWh		Installed Capacity (GW)	
	GDP 8%	GDP 9%	GDP 8%	GDP 9%
2006-07	700	700	140	140
2011-12	1,029	1,077	206	215
2016-17	1,511	1,657	303	331
2021-22	2,221	2,550	445	510
2026-27	3,263	3,923	655	785
2031-32	4,793	6,036	962	1,207

Supply unable to keep pace with Demand

Energy and Peak Shortage

Year	Energy (MU)			PEAK (MW)		
	Requirement	Availability	%Shortage	Requirement	Availability	%Shortage
2002-03	545674	497589	8.8%	81492	71574	12.2%
2003-04	559264	519398	7.1%	84574	75066	11.2%
2004-05	591373	548115	7.3%	87906	77652	11.7%
2005-06	631554	578819	8.4%	93225	81792	12.3%
2006-07	690587	624495	9.6%	100715	86818	13.8%
2007-08	739345	666007	9.9%	108886	90793	16.6%
2008-09	774324	689021	11.0%	109809	96685	12.0%
2009-10	830300	746493	10.1%	118472	102725	13.3%

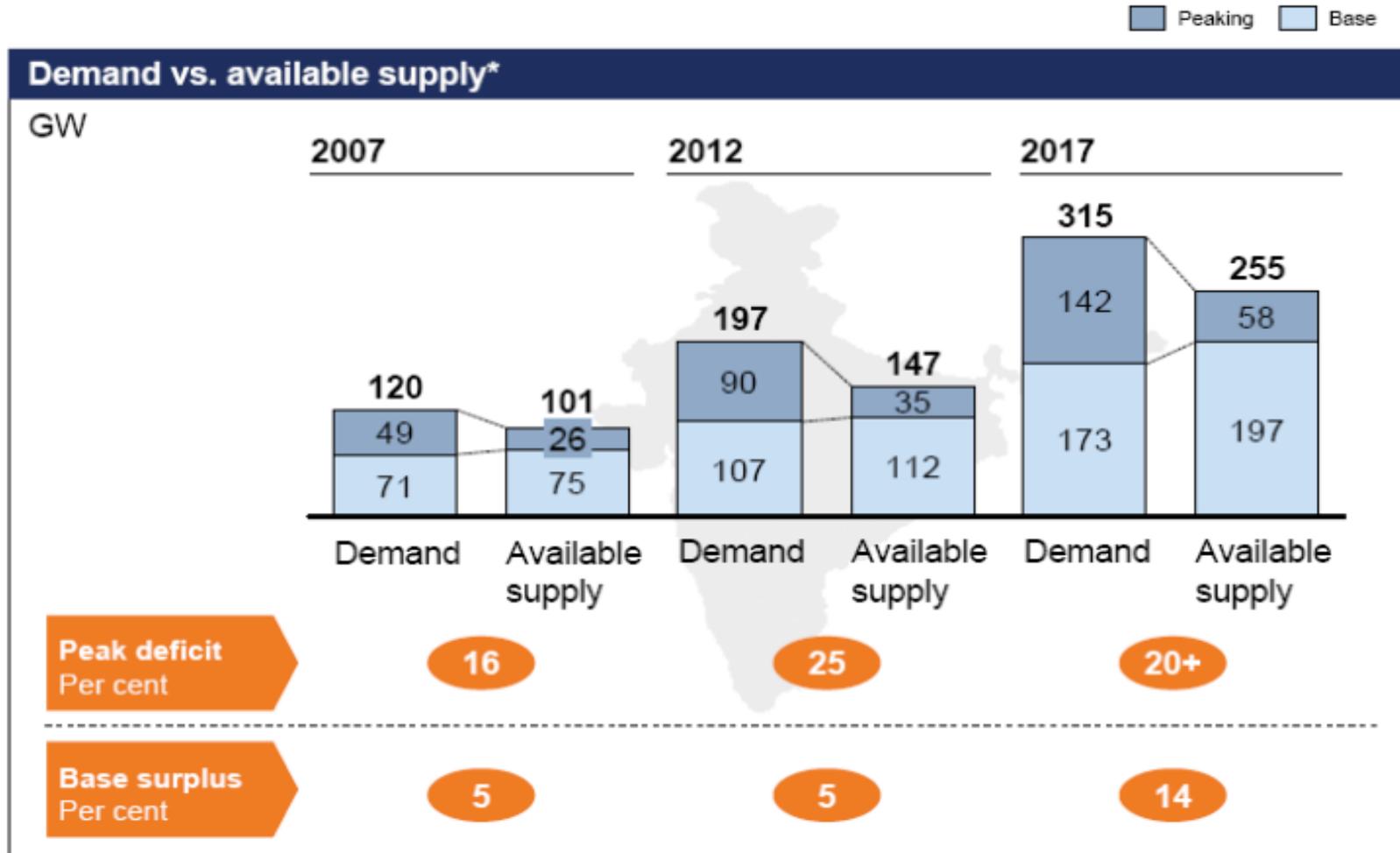
Resultant Energy gap will only widen.



Source: CEA & CII: White Paper on Strategy for XI Plan

Peak Demand is an Issue

PEAK DEFICIT OF ABOUT 70 GW LIKELY BY 2017



* Including captive

Source: Planning Commission; McKinsey analysis – Integrated Revenue Model (IRM)

Opportunity Lost – The Value of Lost Load (VOLL)

- According to the projection made by Power Grid Corporation of India, the value of Opportunity Lost in India due to non-availability of power (VOLL) ranges between Rs. 34/kWh to Rs. 112/kWh.

Taking the record energy shortfall of 85 Billion kWh in 2008-09 and lower VOLL of Rs34/kWh, the value of lost opportunity for the country translates to Rs. 289,000 crores.

In GDP terms, this means a loss of nearly **6% !!**.

The low-cost mindset

Consumer will not pay more than Rs 4/kWh. Must source power at average of less than Rs 3/kWh. Or will have to shed load



Utilities, Investors

Merit order of despatch based only on price.

Can't afford to pay higher price for electricity.

Power cuts: a way of life in India



Power consumer

- No 24 x7 service level obligations. Reliability is secondary to cost
- Hopes pinned mainly on low-cost coal-based generation
- Management by load shedding/denying power to rural areas.

Price Paradigm

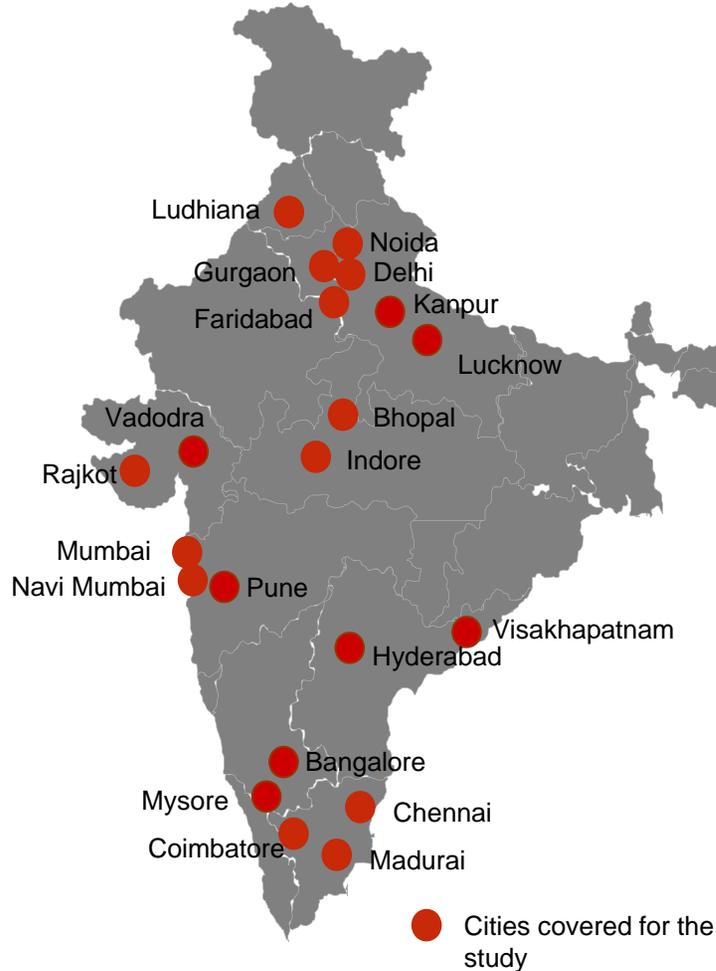


- How cheap is really 'affordable' power?
- Can cheap power be really EXPENSIVE?
- And, what could be ECONOMICAL power?

Primary Research Summary

An extensive study has been conducted in 21 cities across the country covering ~1500 respondents

Geographical Coverage – 21 Cities



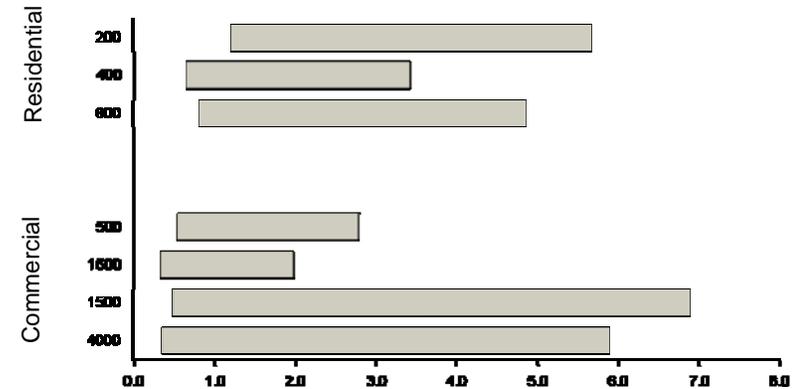
Respondent Categories	Number of Respondents
Residential Users	647
Commercial Users	748
Industrial	65
Power Backup Equipment OEMs/Dealers	43
Power Utilities	8
Total	1511

The Real cost of power...

The survey - How do consumers cope?

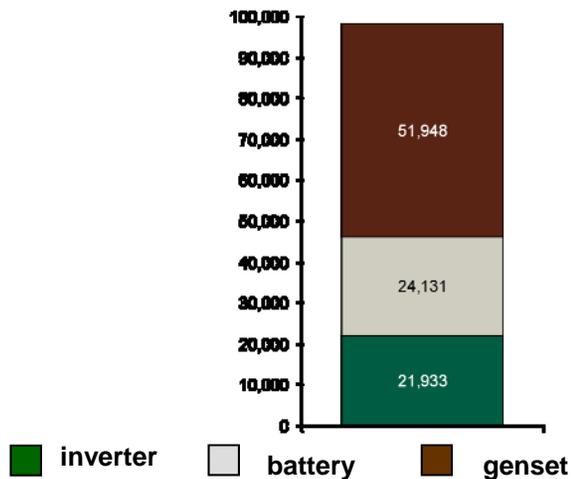
- 21 cities across India
- 1500 respondents
- residential – 200 to 600 kWh/month
- commercial – 500 to 4000 kWh/month
- no industrial

The “coping” costs for consumers



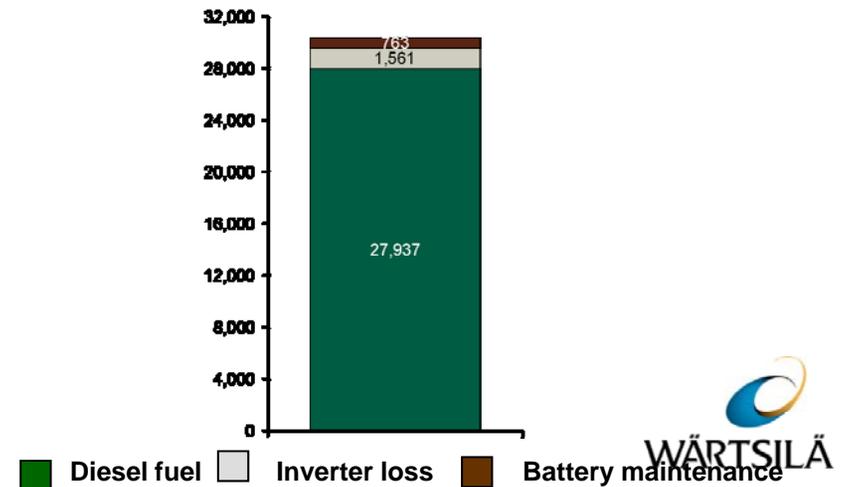
The investment

100,000 cr invested



The annual recurring cost

30,000 cr annual cost

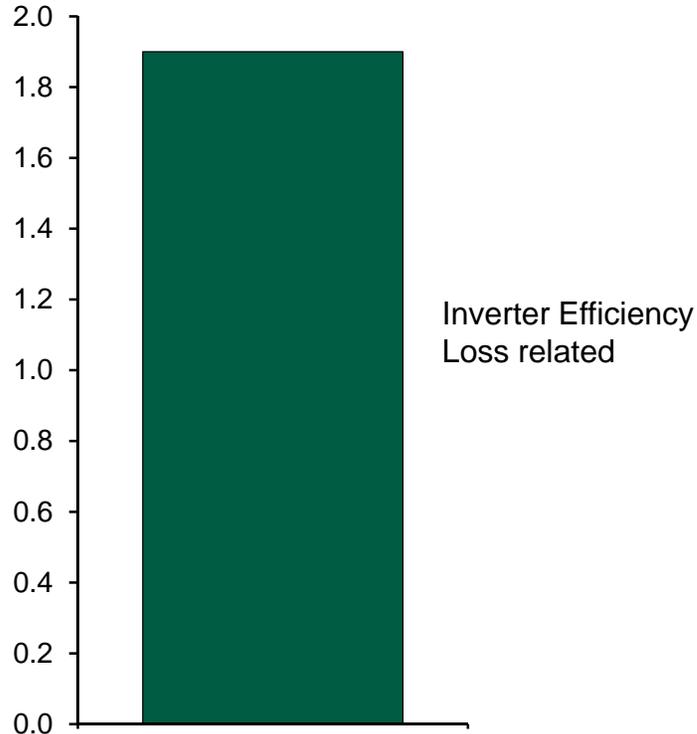


CO₂ Emissions

Further, the usage of power backup equipment is environmentally damaging and results in an additional 1.9 million tonnes of CO₂ release on a yearly basis

CO₂ Emissions because of Backup Equipment Usage

Million Tonnes of CO₂



Com binat ion	Inverter set		Prevalence	Inverter System Efficiency
	Inverter	Battery		
1	Branded	Branded	High	70-80%
2	Local	Branded	Medium	60-70%
3	Branded	Local	Low	50-60%
4	Local	Local	Low	40-50%

- The inverter system has an efficiency loss factor associated which means that not all the grid power used up in charging is actually available for usage during an outage
- This means that the usage of inverters adds to the CO₂ emissions to the extent of its efficiency loss
- This additional CO₂ emissions can be estimated to be ~ 1.9 million tonnes annually based on the installed capacity of the inverter systems in the country

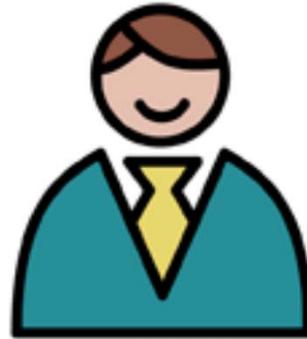
The orbital shift

Prepared to commit 24 x7 supply. Willing to look beyond coal and invest in peaking plants, if allowed to charge right price



Utilities and Investors

Discoms obliged to supply power on 24 x7 basis. Will allow them to factor in extra costs for flexible and efficient power solutions



Regulator

I must be able to take '24 x7' supplies for granted. Willing to pay more for such 'reliable' power **directly rather than spending extra by way of back ups**

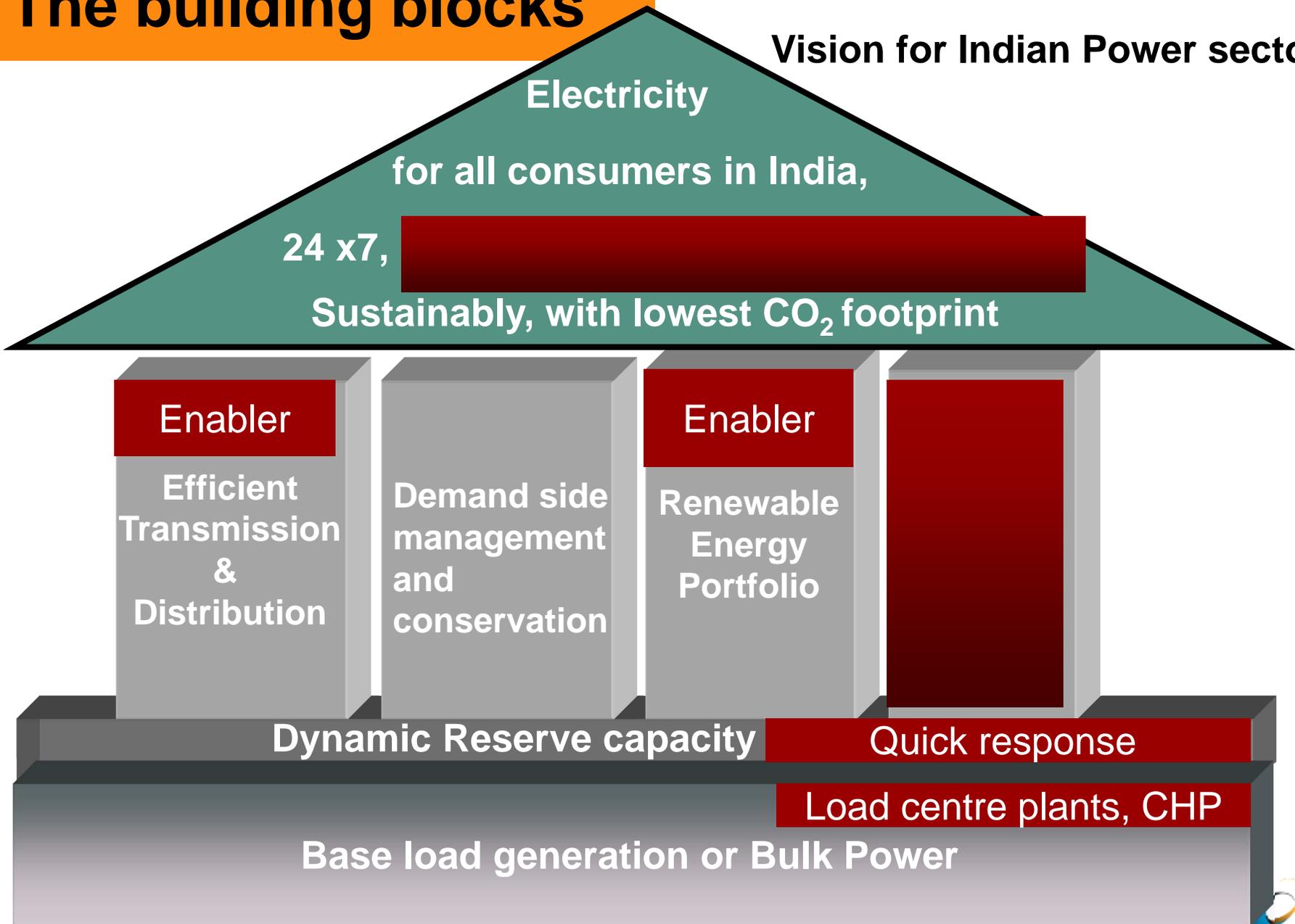


Power consumer

Reliability surcharge of the order of Rs 0.14/kWh across the Board will enable investment in flexible plants. If such reliability is to be given to selected Consumers, then the surcharge in selected areas/ consumer groups could go upto Rs. 0.25 -0.75/kWhr. Consumer will still save Rs 0.6 - 6.00/kWh, by avoiding expenses on costly back-up systems.

The building blocks

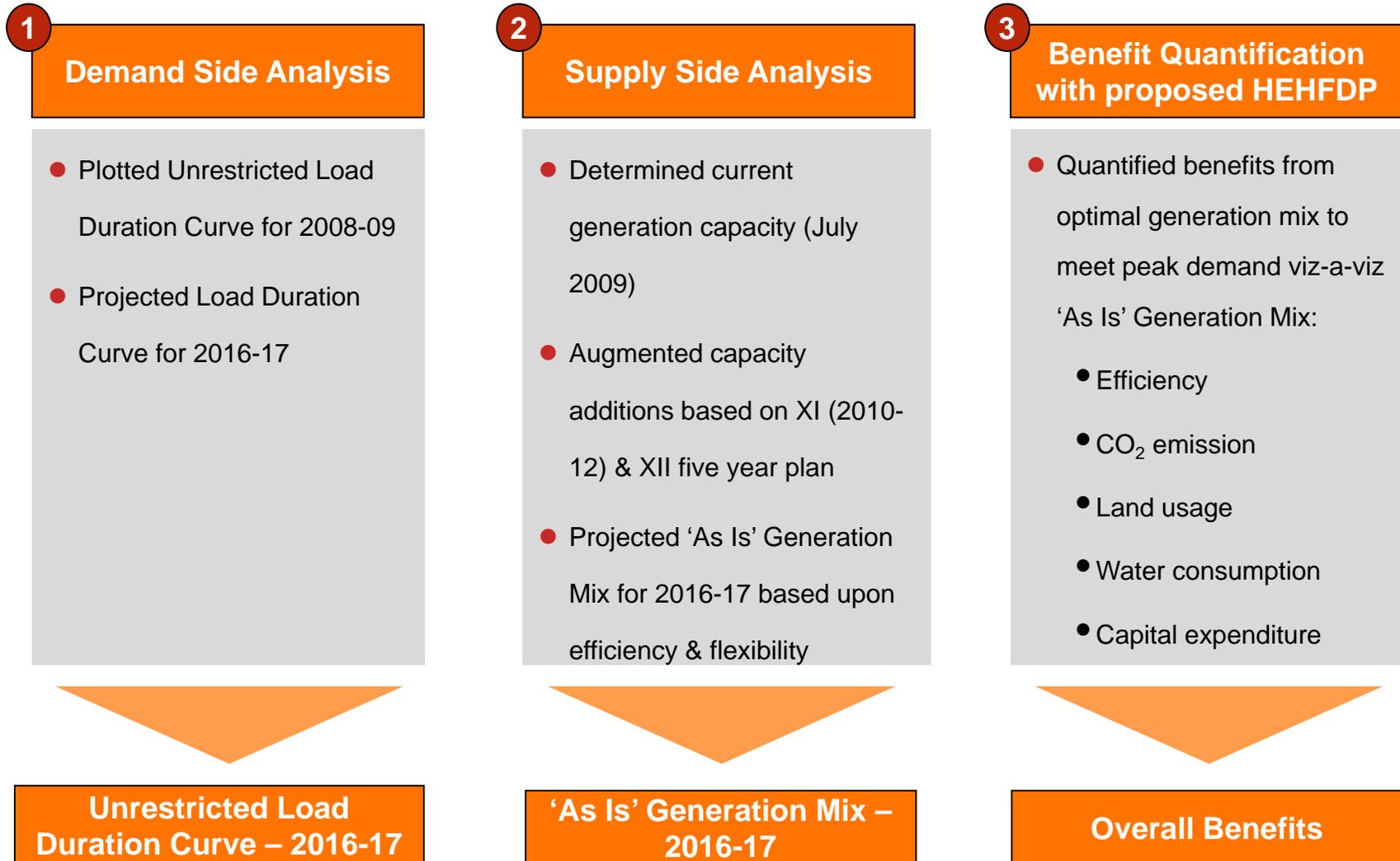
Vision for Indian Power sector



Optimal Power Generation Mix for Peak Demand Management

A Study By Wartsila

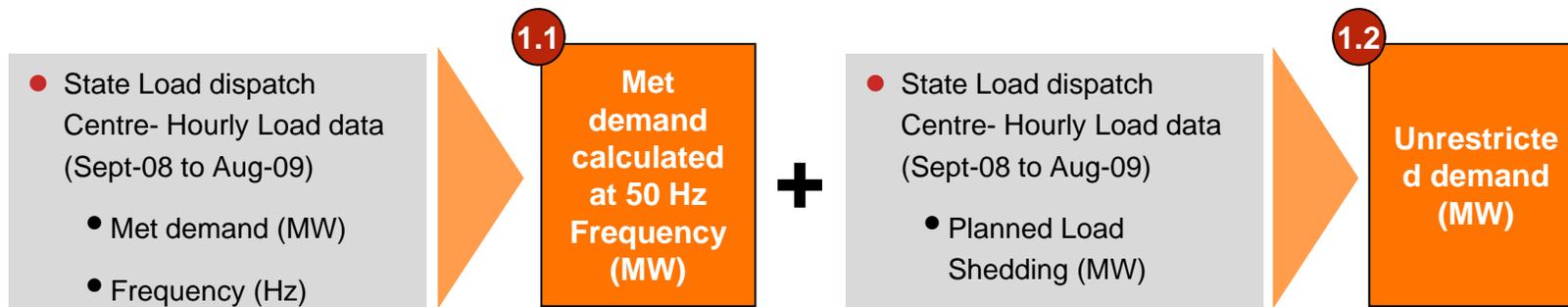
Overall Approach – Maharashtra



Note: HEHFDP - High Efficiency High Flexibility Distributed Plants

Source: UC Analysis

1 Demand Side Analysis – Unrestricted Load Duration Curve – 2008-09 (1/4)



1.3

Unrestricted Load Duration Curve – 2008-09

Area under the curve = Unrestricted demand (MU), 2008-09 is 124,172 MU calculated for the time period Sept -08 to August -09 which is 98% close to the unrestricted demand (MU) projected by CEA - LGBR '09-10. The difference can be attributed to the time period considered

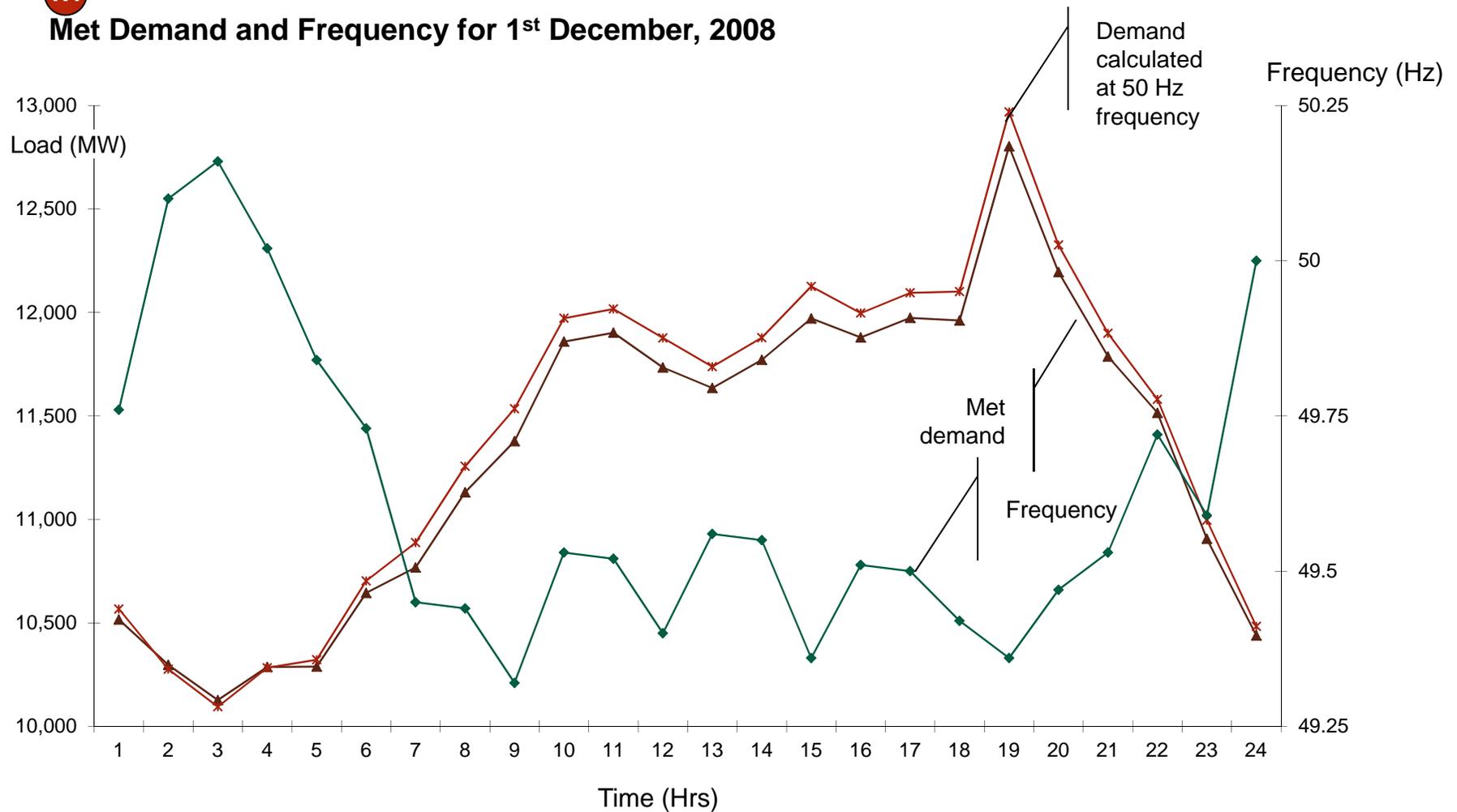
Note: CEA LGBR- CEA Load Generation Balance Report

Source: UC Analysis

1 Demand Side Analysis – Unrestricted Load Duration Curve – 2008-09 (2/4)

1.1

Met Demand and Frequency for 1st December, 2008



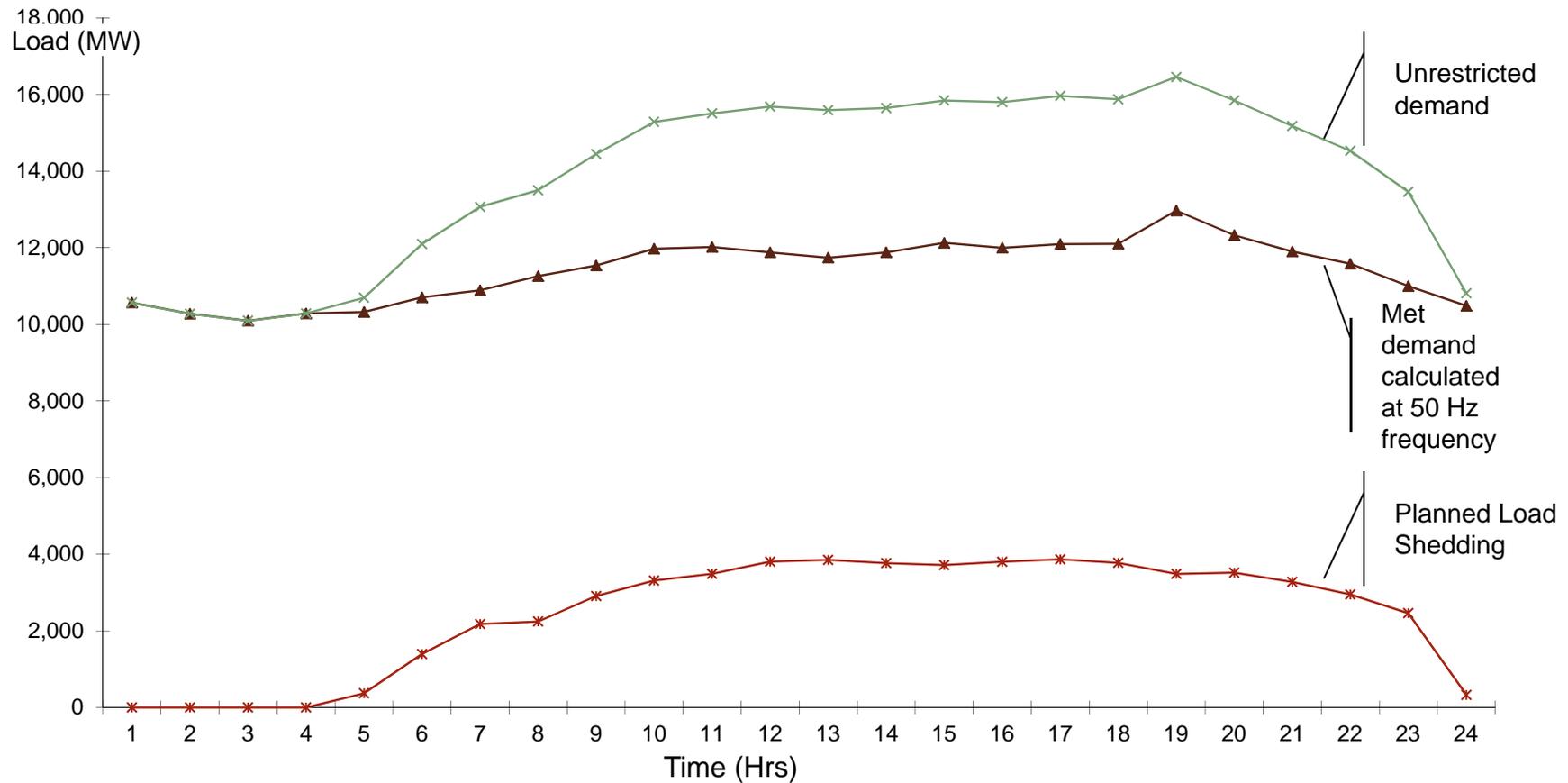
Note: The above graph has been plotted for a day. We have done the above calculations for hourly data for the time period (Sept -08 to Aug-09)

Source: Load dispatch centre hourly data- Maharashtra SLDC, UC Analysis

1 Demand Side Analysis – Unrestricted Load Duration Curve – 2008-09 (3/4)

1.2

Unrestricted Demand for 1st, December, 2008



Source: Load dispatch centre hourly data- Maharashtra SLDC, UC Analysis

1 Demand Side Analysis – Unrestricted Load Duration Curve – 2008-09 (4/4)

1.3

Unrestricted Load Duration Curve (LDC) - 2008-09

Load (MW)

18,186

18000

16000

14000

12000

10000

8000

6000

4000

2000

0

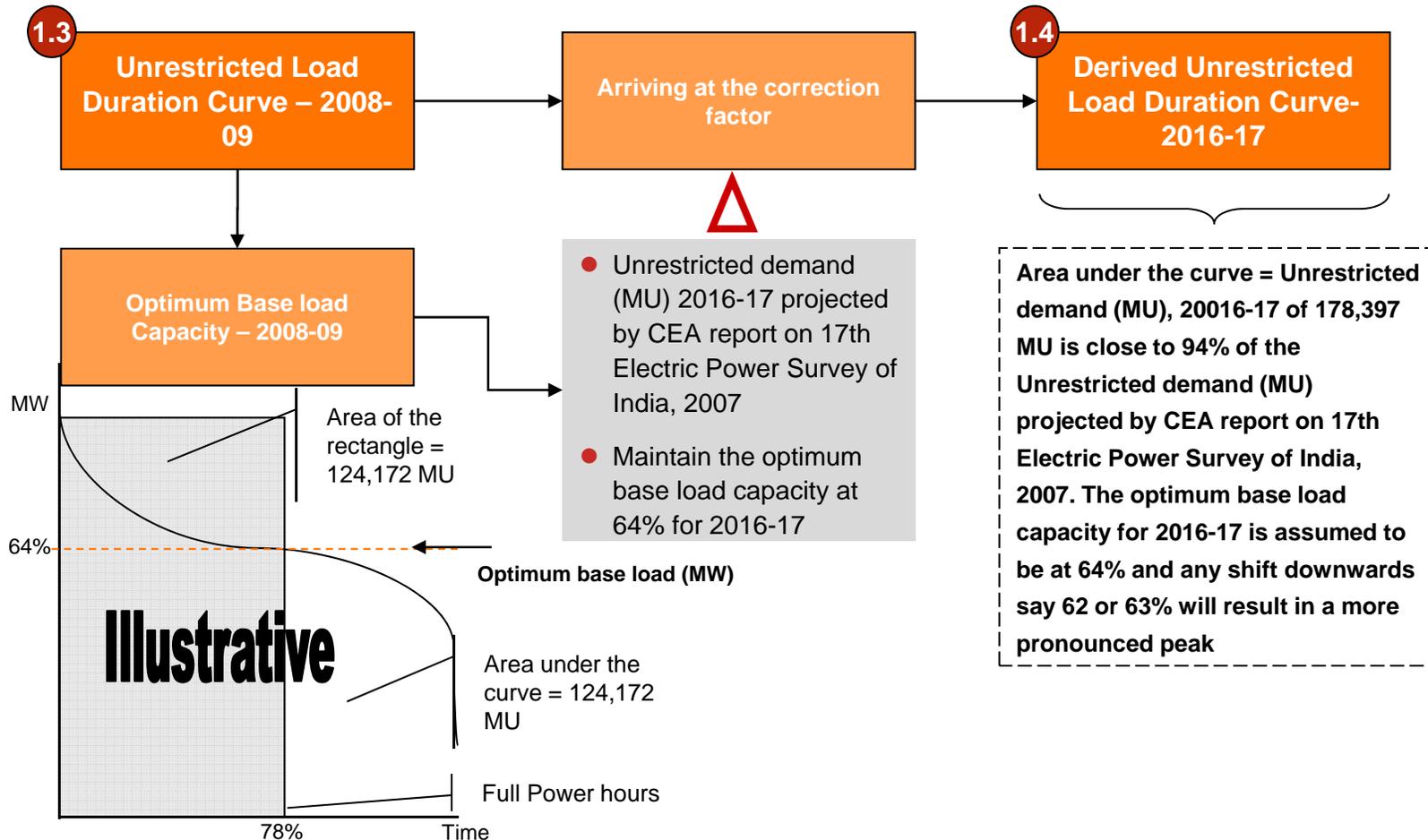
Time (Hrs)

Unrestricted demand = 124,172 MU

Unrestricted demand (MU), 2008-09 is 124,172 MU calculated for the time period Sept -08 to August -09 which is 98% close to the unrestricted demand (MU) projected by CEA - LGBR '09-10. The difference can be attributed to the time period considered.

Source: Load dispatch centre hourly data- Maharashtra SLDC, CEA - LGBR '09-10, UC Analysis

1 Demand Side Analysis – Derived Unrestricted Load Duration Curve – 2016-17 (1/3)



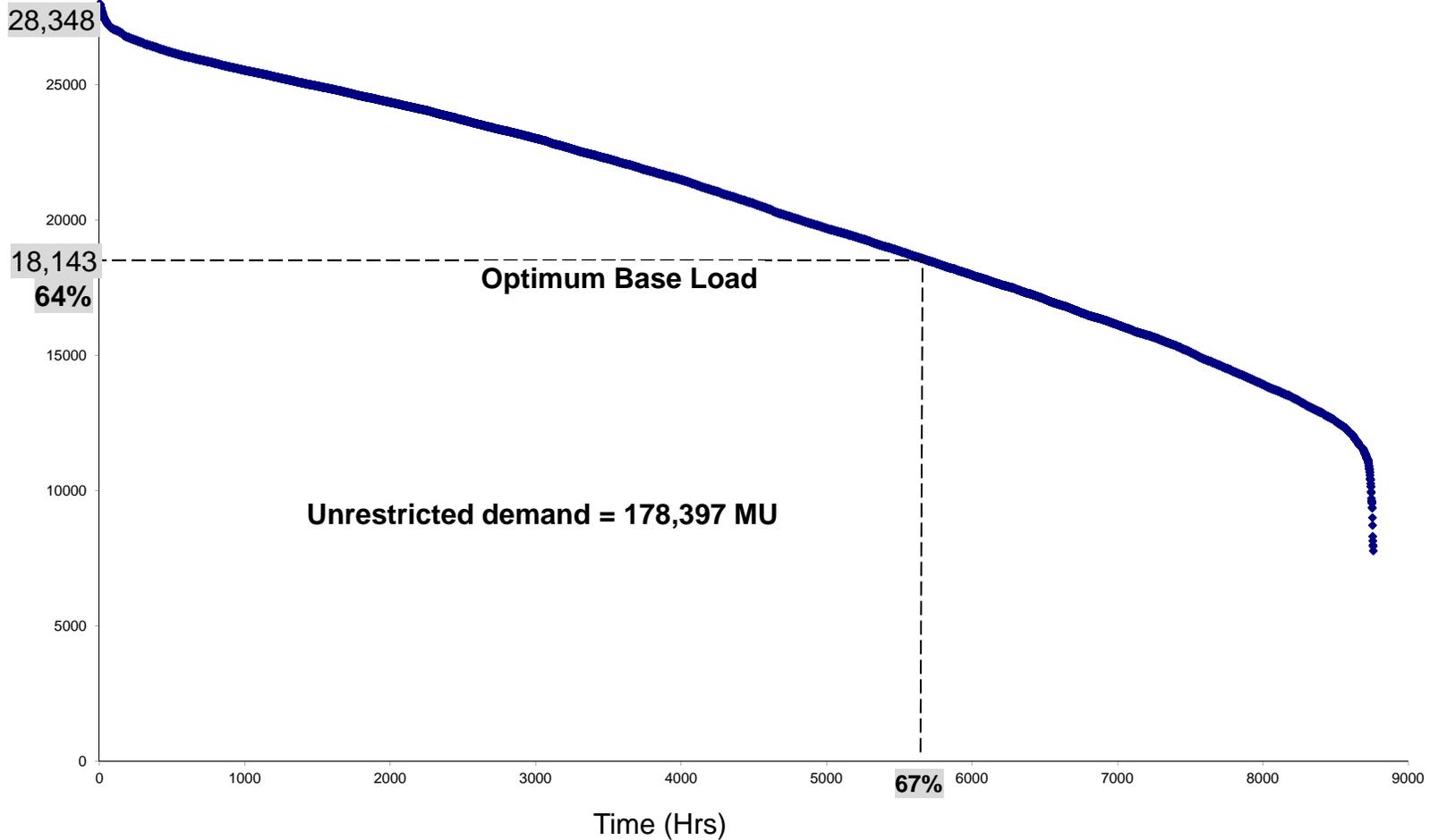
Note: Full power hours is defined as the total percentage of time for which a base load plant shall run at full load. Optimum base load is the maximum MW requirement at full power hours.

Source: UC Analysis

1 Demand Side Analysis – Derived Unrestricted Load Duration Curve – 2016-17 (3/3)

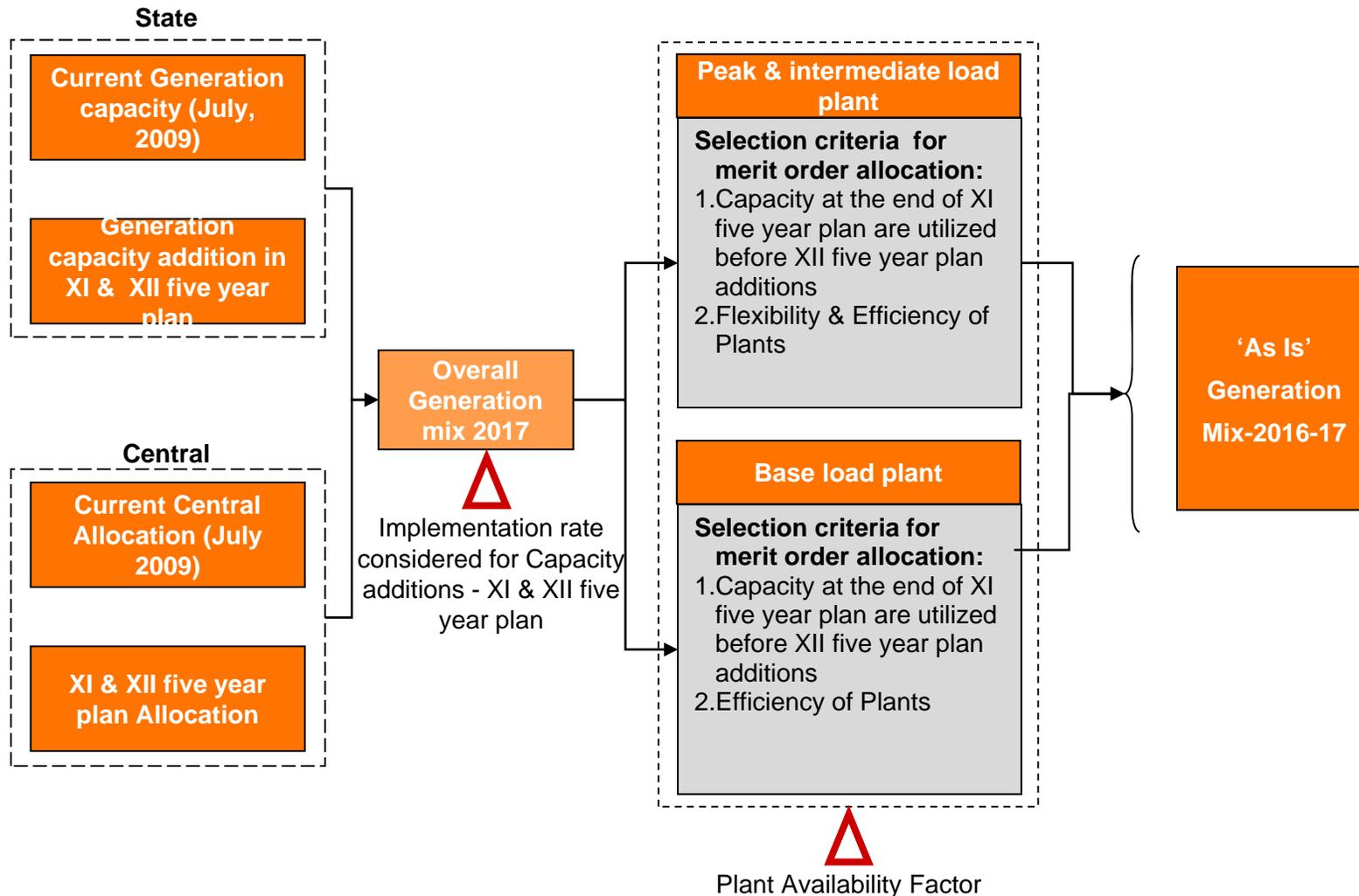
Derived Unrestricted Load Duration Curve (LDC) – 2016-17

Load (MW)



Source: CEA – 17th Electric Power Survey (EPS), UC Analysis

2 Methodology- Supply Side Analysis

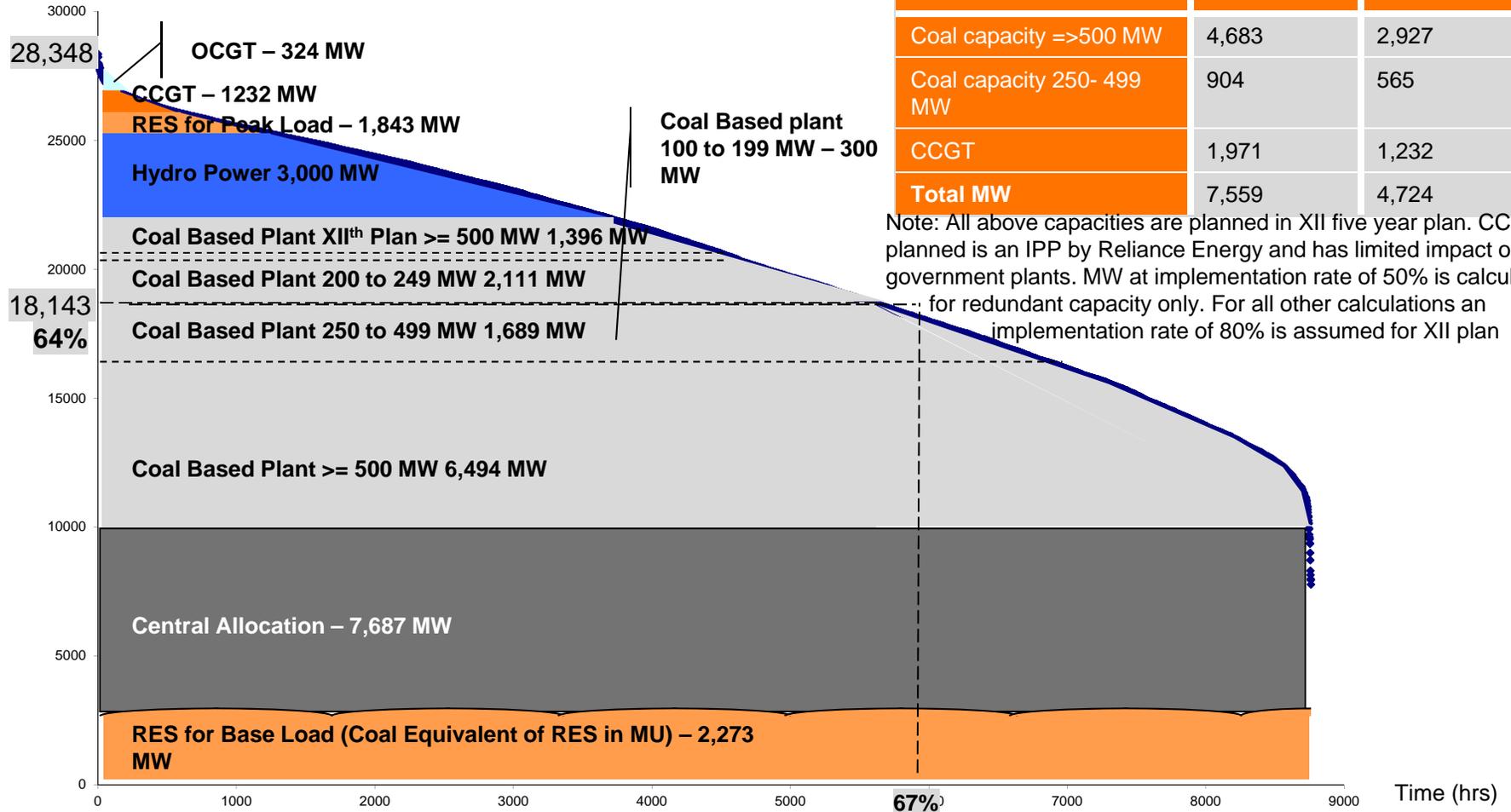


Note: Interstate/Inter-regional imports are not considered. Capacity additions from Central allocations in XI & XII five year plans have been considered only from UMPPs

Source: UC Analysis

2 'As Is' Generation Mix – 2016-17

Unrestricted Load Duration Curve (LDC)– 2016 - 17
Load (MW)



Note: All above capacities are planned in XII five year plan. CCGT planned is an IPP by Reliance Energy and has limited impact on government plants. MW at implementation rate of 50% is calculated for redundant capacity only. For all other calculations an implementation rate of 80% is assumed for XII plan

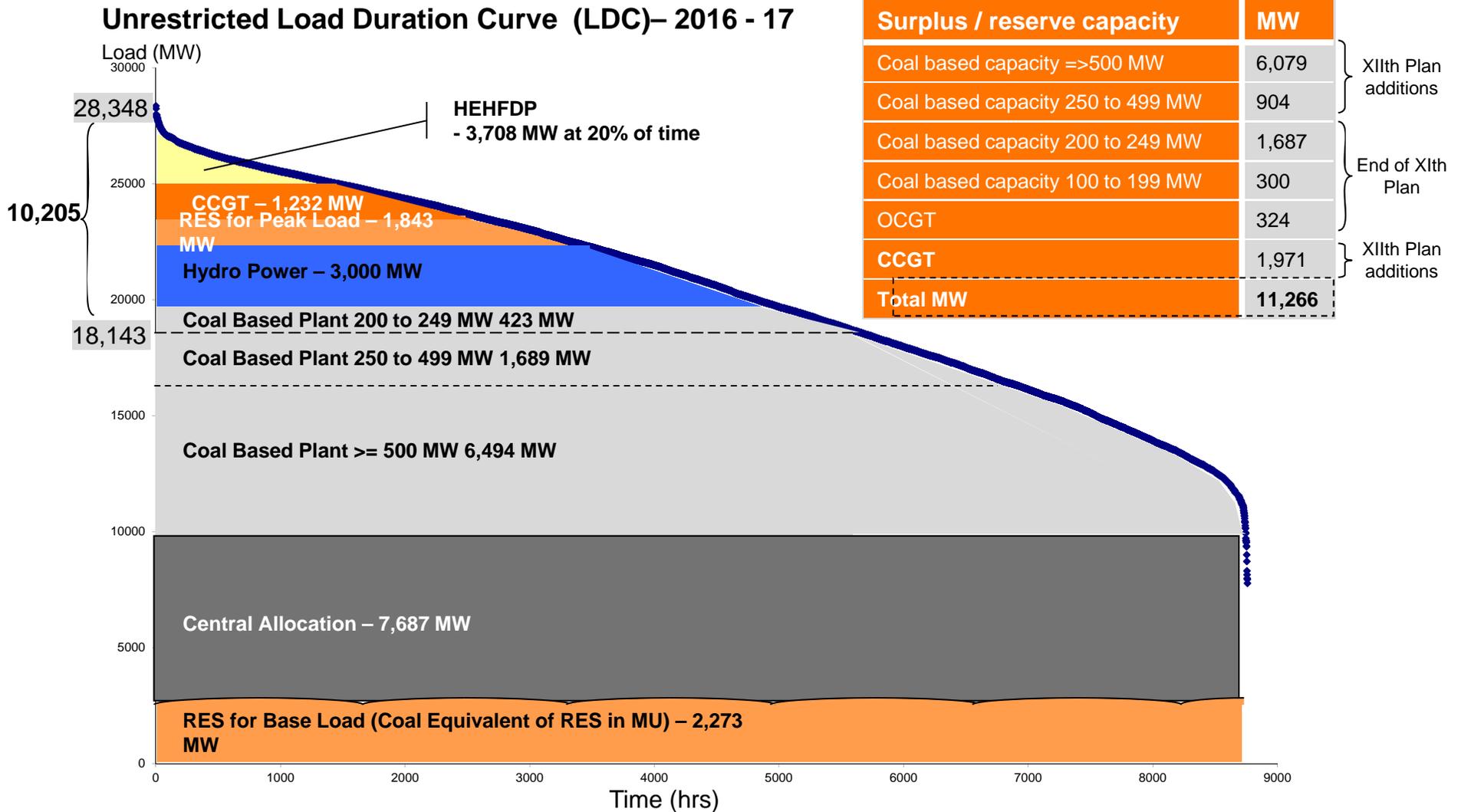
Note: Additional Spinning reserve Capacity of 1814 MW comprises of 338 MW (250 – 499 MW coal plants) + 1476 MW (200 to 249 MW coal plants). The above graph and further calculations are based on 80% implementation rate for XII plan

Source: UC Analysis

2 Key Parameters- Supply Side Analysis

Parameters	Value	Source
Percentage Implementation of XIth 5 year plan by 2017	100%	Overflow of XIth 5 year plan is, if any, will be completed by 2017
Percentage Implementation of XIIth 5 year plan by 2017	80%	Assumption
Additional Central Allocation- 2017	5,040 MW	UMPP Allocation of 6300 MW @ implementation rate of 80%
Contribution from RES as a % to Unrestricted demand (in MU)	12%	Revised CERC norms for RES
RES for base load as %age of total RES	93%	Economic Survey of Maharashtra 2008-09: 2008-09 mix of RES(MU) which includes Wind (82%) & Bagasse (11%) is considered as RES for base load
Plant Availability Factor- Central Allocation	90%	11 th Five year Plan, Planning Commission
Plant Availability Factor- Coal Based Plant : 0 – 100 MW	75%	11 th Five year Plan, Planning Commission
Plant Availability Factor- Coal Based Plant : 101 – 199 MW	75%	11 th Five year Plan, Planning Commission
Plant Availability Factor- Coal Based Plant : 200 – 249 MW	85%	11 th Five year Plan, Planning Commission
Plant Availability Factor- Coal Based Plant : 250 – 499 MW	85%	11 th Five year Plan, Planning Commission
Plant Availability Factor- Coal Based Plant : => 500 MW	85%	11 th Five year Plan, Planning Commission
Plant Availability Factor- CCGT	88%	11 th Five year Plan, Planning Commission
Plant Availability Factor- OCGT	88%	11 th Five year Plan, Planning Commission
Plant Availability Factor- Large Hydro	90%	Assumption

Recommended Solution for peak demand: 20% of the time is replaced by High Efficiency High Flexibility Distributed Plants (HEHFDP) ...



Note: Additional Spinning reserve Capacity of 1814 MW comprises of 338 MW (250 – 499 MW coal plants) + 1476 MW (200 to 249 MW coal plants)
 *- RES for base load Includes Wind mill, Cogeneration-bagasse and Solar power plants. RES for peak load includes small hydro power plants

Source: UC Analysis