

**MINUTES OF THE TWENTY SEVENTH MEETING**  
**OF**  
**FORUM OF REGULATORS (FOR)**

**Venue** : "Royal Orchid Hall"  
Hotel Babylon International, VIP Road  
Raipur (Chhattisgarh).

**Dates** : 16<sup>th</sup> December, 2011

The meeting was chaired by Dr. Pramod Deo, Chairperson, CERC/FOR.  
The list of participants is at **Annexure-I**.

Shri Rajiv Bansal, Secretary, CERC/FOR extended a warm welcome to all members of the Forum. Dr. Pramod Deo, Chairperson, CERC/FOR in his opening remarks appraised the Forum about the important developments in the power sector. He informed that Shunglu Committee has submitted its report on the "Financial Position of Distribution Utilities". The most important recommendation relates to creation of a Special Purpose Vehicle (SPV) for taking over the outstanding loans of State Government owned Discoms, subject to the condition that the States agree on reforms milestones and further conditionality that the default on the part of the States/Utilities on meeting the milestones will lead to debiting of default amount from the State Government account maintained by the RBI. Other important recommendations relate to allowance of costs incurred by

the Discoms in the tariffs, and a differential tariff based on circle wise distribution losses which in turn will put public pressure on the Discoms to improve performance.

Dr. Deo also informed the Forum about a communication sent by the Central Commission to the Ministry of Power regarding operation of the CERC Fund wherein the need for autonomy was further reiterated. Chairperson, CERC/FOR also mentioned about the letter written by the Ministry of Power to all concerned on Open Access which has generated debate amongst stakeholders.

The FOR thereafter took agenda items for consideration.

**Agenda Item No. 1: Confirmation of the Minutes of the 26<sup>th</sup> Meeting of “FOR” held during 09<sup>th</sup> - 10<sup>th</sup> October, 2011 at The Destination Resort, Kandaghat, Dist. Solan (H.P.).**

Shri Rajiv Bansal, Secretary, CERC/FOR briefed the Members about the action taken on the decisions of the last meeting. The Forum noted and endorsed the minutes of the 26<sup>th</sup> Meeting of FOR held at Kandaghat, Dist. Solan (Himachal Pradesh) during 09<sup>th</sup> - 10<sup>th</sup> October, 2011 as circulated. The Forum also noted the Action Taken Report as contained in Appendix-II of the Agenda Note. After discussion, the minutes were confirmed.

**Agenda Item No. 2 : Evolving Measures for the Effective Implementation of Prepaid Metering in the country  
- Consideration of the Draft Report.**

A presentation was made by the representative of M/s. Deloitte Touche Tohmatsu India Pvt. Ltd. A copy of the presentation is **enclosed** at **Annexure – II**. The draft report was discussed in detail and the following was decided :-

- ❖ The recommendations were endorsed in principle with the suggestion that FOR Secretariat should separately seek legal opinion from Attorney General of India or Solicitor General of India on the legality of the Prepaid Metering in the light of Section 56 of the Act.
- ❖ It was agreed that the recommendation regarding Target Groups of Consumers (viz., Government/PSU establishments, temporary connections, consumer's premises on rent etc.) for introduction of prepaid meter, should be tried by all States, to start with.

**Agenda Item No. 3 :                      National Solar Mission**  
**-                      Status of Implementation.**

A presentation was made by Shri Tarun Kapoor, Joint Secretary, MNRE and Dr. Ashvini Kumar, Director, MNRE. A copy of the presentation is **enclosed** at **Annexure – III**. The Forum discussed in detail the developments/progress on National Solar Mission (NSM) and the various initiatives taken towards promotion of solar energy in India.

After discussion, the following emerged :-

- ❖ Initially, there could be issues on compliance of Solar RPO because of non-availability of solar energy commensurate with the energy requirement equivalent to RPO.

- ❖ There is a need to evolve procedures for ensuring RPO compliance by the CPPs/Open Access consumers.
- ❖ The need for separate tariff for Hybrid Solar Plant (especially, Solar Thermal with Storage) was reiterated. It was clarified that CERC's RE Tariff Regulations provide for project specific tariff for Hybrid Solar Plant.
- ❖ On grid integration of Off Grid generation, FOR has already made recommendations for import-export meter. For this purpose, CEA needs to make in its Regulations on Technical Standard, provisions for technical standards of connectivity for such Off Grid generation. CEA Regulations on Metering should also explicitly factor in above requirement of import-export meters. FOR Secretariat was directed to pursue the matter with CEA.

**Agenda Item No. 4 :                      Judgment of APTEL (in the matter of O.P. No.1 of 2011) on Tariff Revision.**

A presentation was made by Shri Sushanta K. Chatterjee, Deputy Chief (Regulatory Affairs), CERC. A copy of the presentation is **enclosed** at **Annexure –IV**. After discussion, the following emerged :-

- ❖ The format for compilation of data as proposed was endorsed in principle with the suggestion that instead of requiring the data for the last five years, FOR Secretariat should ask for information for three years - information on Tariff Orders for following year, Annual Performance Review (APR) for the current year and True Up Order for the previous year or of the year for which True Up has been done.

- ❖ While appreciating the need for compliance of the provisions of the Act and the Policy in terms of issuance of Tariff Orders and also of periodical reporting of the same, the Members articulated the need for adequate manpower and capacity building of the staff as well as of the external resources called upon by the Regulators.
- ❖ There is acute shortage of regular staff in most Commissions because of the constraints of pay structure and other facilities. At the same time, there is a dearth of adequate number of consultants/consulting firm to meet the requirements of all Regulatory Commissions in the country.
- ❖ Need for creating a Central Pool of external resources/consultants was reiterated. Suggestions were also made for creation of a national level institute of regulatory experts wherefrom the Regulatory Commissions can draw human resource to meet their specific job requirements.
- ❖ It was informed that Forum of Indian Regulators (FOIR) has commissioned a study for suggesting staffing pattern, compensation packages, and capacity building requirements of Regulatory Authorities in the infrastructure sector. It was suggested that the Consultant be also advised to examine the above needs and make suitable recommendations in this regard for FOR to consider separately.

**Agenda Item No. 5 :                      Interpretation of Section 51 of the Act – Supreme Court Judgment dated 08.02.2011 in the context of Brihan Mumbai Electric Supply & Transport Undertaking (BEST).**

A presentation was made by Shri Sushanta K. Chatterjee, Deputy Chief (Regulatory Affairs), CERC. A copy of the presentation is **enclosed** at **Annexure – V**. The matter was discussed and the following emerged :-

- ❖ FOR should write to the Ministry of Power for amendment to the Act to set at rest the ambiguity around and special dispensation carved out for local authorities in Section 51 as well as Section 42.
- ❖ Given the emerging market dynamics, the rationale behind special dispensation for local authorities under Section 51 and Section 42 has lost relevance.
- ❖ Ministry of Power should be requested to bring about an amendment by omitting the last proviso to Section 51 and also by omitting the expression “(not being a local authority engaged in the business of distribution of electricity before the appointed date)” in sub-section (3) of Section 42.

**Agenda Item No. 6 :                      Open Access – Interpretation of Section 42 of the Electricity Act, 2003 – Letter dated 30<sup>th</sup> November, 2011 from Ministry of Power.**

A presentation was made by Shri Sushanta K. Chatterjee, Deputy Chief (Regulatory Affairs), CERC highlighting the sequence of interpretations on Open Access and implications from legal, commercial, and operational angles. Pros and cons of various scenarios and implications were discussed in detail. A copy of the presentation is **enclosed** at **Annexure – VI**.

#### **Other Issues:**

Secretary, CERC/FOR informed the Forum about the proposal for training of Regulatory Staff at IIT, Kanpur along with an international component to visit Thailand during March, 2012. The proposal was agreed in principle.

Secretary, CERC/FOR also mentioned about a proposal received from the World Bank seeking technical support of FOR on various studies being conducted by them. The Forum endorsed the proposal of FOR extending technical support to the studies of the World Bank.

The Forum appreciated the efforts of CSERC for the arrangements made for the meeting.

A vote of thanks was extended by Shri Rajiv Bansal, Secretary, CERC/FOR. He conveyed his sincere thanks to all the dignitaries present in the meeting. He also thanked the staff of “FOR” Secretariat for their arduous efforts at organizing the meeting.

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

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**LIST OF PARTICIPANTS ATTENDED THE TWENTY SEVENTH MEETING**

**OF**

**FORUM OF REGULATORS ( FOR )**

**HELD ON 16<sup>TH</sup> DECEMBER, 2011**

**AT “ROYAL ORCHID HALL”, HOTEL BABYLON INTERNATIONAL,  
VIP ROAD, RAIPUR (CHHATTISGARH)**

S. No.	NAME	ERC
01.	Dr. Pramod Deo Chairperson	CERC – in Chair.
02.	Shri A. Raghotham Rao Chairperson	APERC
03.	Shri Digvijai Nath Chairperson	APSERC
04.	Shri Umesh Narayan Panjiar Chairperson	BERC
05.	Shri Manoj Dey Chairperson	CSERC
06.	Dr. P.K. Mishra Chairperson	GERC
07.	Shri S. Maria Desalphine Chairperson	J&KSERC
08.	Dr. V.K. Garg Chairperson	JERC for Goa & All UTs
09.	Shri C. Hmingthanzuala Chairperson	JERC for Manipur & Mizoram
10.	Shri Mukhtiar Singh Chairperson	JSERC
11.	Shri V.P. Raja Chairperson	MERC
12.	Shri D.C. Samant Chairperson	RERC
13.	Shri Manoranjan Karmarkar Chairperson	TERC



14.	Shri Rajesh Awasthi Chairperson	UPERC
15.	Shri Jag Mohan Lal Chairperson	UERC
16.	Shri Prasad Ranjan Ray Chairperson	WBERC
17.	Shri Shyam Wadhera Member	DERC
18.	Shri Rohtash Dahiya Member	HERC
19.	Shri Vishwanath Hiremath Member	KERC
20.	Shri P. Parameswaran Member	KSERC
21.	Shri C.S. Sharma Member	MPERC
22.	Shri Bijoy Kumar Misra Member	OERC
23.	Shri Gurinder Jit Singh Member	PSERC
24.	Shri Rajiv Bansal Secretary	CERC/FOR
25.	Shri Sushanta K. Chatterjee Deputy Chief (RA)	CERC
26.	Ms. Neerja Verma Assistant Secretary	FOR

## Evolving measures for effective implementation of pre-paid metering in the Country

### Forum of Regulators

December 2011



# Content

1. Background
2. Legal, policy & regulatory framework
3. State practice on Pre-paid Metering
4. International Experience in PPM
5. Cost benefit analysis
6. Recommendations

# Background

# Background

- Metering is an important matter and has reference in the Electricity Act 2003, the NTP/ Tariff Policy and Prepaid metering is one of the mechanism for energy saving & DSM;
- Few utilities in India have shown interest in implementing prepaid metering for various consumer segments;
- Large scale implementation of Prepaid metering require identification of key issues (policy, legal, regulatory framework & operational) which are impediments in its implementation and its way-out;

## Objectives of Study

- To evolve measures for the effective implementation of prepaid metering in the country under the prevailing provisions of the Electricity Act 2003.

# What is Pre-paid Meter ?

An alternative metering and billing arrangement that require customers to pay for electricity before it can be consumed.

## Features of Pre-paid meter

- **Recharge** - Get recharge through coupons generated by s/w provided by meter supplier;
- **Friendly credit period** - Includes non-working hours of utility, public holidays and week ends during which supply continues even after zero credit;
- **In house display unit** - Display unit inside the consumer premises to have a check on consumption, credit balance (also in terms of days left in a consumer's account based on current rate of consumption), instantaneous & max. load etc.
- **Credit alarm warning** - Alarm facility sensitizing the consumer about low credit;
- **Auto disconnection** - the supply is automatically discontinued in case the consumer exhaust his credit limit or the load exceeds the specified limit;
- **Tariff revision** – Revised tariff may be applied through updating the token generating software in prospective manner;
- **Meter Cost** - Pre-paid meters are available within price band of INR 2,500 - INR 6,000 based on specifications and size of order;
- **MRI download** - Few Pre-paid meters have MRI port which can be used for data downloading;

# Impact of Pre-paid Meter

## Consumers

- Flexibility in frequency and amount of each recharge to be decided by consumers;
- Increased ability to monitor and adjust the consumption - a DSM approach;
- Freedom from periodic billing/ payment cycle for electricity connection;
- Consumers are not required to pay any security deposit;
- Elimination of late payment, defaults and disconnections etc.
- Limited recharging options for consumers;
- Consumers to keep meter in credit mode for continuity of supply;

## Distribution licensees

- Simplification of MBC activities and reduced associated costs (meter readings, billing, bill dispatch etc.);
- A way to reduce bad debt;
- Ensure 100% collection efficiency;
- Effective arrear recovery tool;
- Reduced working capital requirement;
- High cost of pre-paid meters;
- Limited vendor base and dependence for recharge;
- Licensee need to comply with the regulatory provisions w.r.t. metering and billing;

# Legal, policy & regulatory framework



# Existing legal, policy & regulatory framework

## Power to require security: section 47 (5) of the Electricity Act 2003

*“47-(5) A distribution licensee shall not be entitled to require security in pursuance of clause (a) of sub-section (1) **if the person requiring the supply is prepared to take the supply through a pre-payment meter**”.*

## National Electricity Policy

*“5.4.9 The Act requires all consumers to be metered within two years. The SERCs may obtain from the Distribution Licensees their metering plans, approve these, and monitor the same. **The SERCs should encourage use of pre-paid meters.** In the first instance, TOD meters for large consumers with a minimum load of one MVA are also to be encouraged. The SERCs should also put in place independent third-party meter testing arrangements.”*

## National Tariff Policy

*“If the State Government wants to reimburse even part of this cost of electricity to poor category of consumers the amount can be paid in cash or any other suitable way. **Use of prepaid meters can also facilitate this transfer of subsidy to such consumers.**”*

# Existing legal, policy & regulatory framework

The primary bone of contention being the provision regarding disconnection notice period as per Section 56 of the Electricity Act 2003;

## Disconnection of supply in default of payment : The Section 56 (1) of the Electricity Act 2003 states that:

“Where any person neglects to pay any charge for electricity or any sum other than a charge for electricity due from him to a licensee or the generating company in respect of supply, transmission or distribution or wheeling of electricity to him, the licensee or the generating company may, ***after giving not less than fifteen clear days notice in writing***, to such person and without prejudice to his rights to recover such charge or other sum by suit, ***cut off the supply of electricity*** and for that purpose cut or disconnect .....

## The basic question which arises are:

- Does implementation of pre-paid metering by a utility violate the Section 56(1)(a)(b) of the Electricity Act, 2003?
- Is there any provision in the Electricity Act, 2003 which prevents the utility/licensee/ regulator to enforce supply mandatorily through pre-paid meters on the consumers?

# Legal opinion on Section 56 w.r.t. Pre-paid Meter

## Applicability of the section 56 of the Electricity Act, 2003 to the Pre-paid Meter

- The concept of prepaid electricity meters gives an opinion to the consumer to pay for and buy units of power by making advance payment. When the said units get exhausted, the consumer can buy further units/ recharge by inserting the coupons in the prepaid meter. Inherent in the above is that the connection is given for specified number of units for which the advance payment is made. The contract between the parties is itself for supply of limited units and the contract comes to an end automatically once the units purchased are exhausted. ***The contract of supply of electricity in such cases expires by efflux of time related to consumption of the specified units.***
- The above provision proceeds on the basis that there would be a sum or charge of money due from a person to the licensee/generating company. However, ***in the case of prepaid meter, the consumer has already paid in advance for the electricity he will be consuming thereafter. Therefore, there is “no neglecting to pay any charge for electricity due from a consumer to licensee”.*** In such case there is no contract to supply and accordingly neither an obligation on the licensee to supply electricity nor on the consumer to pay for future supply. Every purchase of electricity by advance payment is an independent contract. If no payment is made for purchase of units, there is no connection to supply of electricity and therefore is no occasion for any disconnection.
- In the above premise, section 56 will have no application in the case of prepaid meters. The contract with the consumer in the case of pre-paid meter for supply of electricity ends by efflux of use of the units already paid for by the consumer.

# Legal opinion on Section 56 w.r.t. Pre-paid Meter

## Applicability of the section 56 of the Electricity Act, 2003 to the Pre-paid Meter

- Further, the fact that the prepaid meters have been given in selected areas and classes of consumers to begin with is not violative of the Electricity Act, 2003. Section 62(3) of the Act allows the Commission to differentiate between the consumers “according to the consumer’s load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which the supply is required or the geographical position of any area, the nature of supply and the purpose for which the supply is required.” Therefore, if the offer of the prepaid meters has been made to the consumer categories based on any of the above, the same will be compliant with the provisions of the Electricity Act, 2003.

## The key takeaways from the legal opinion are:

- There is no contradiction with Section 56(1)(a)(b) of the Electricity Act, 2003 in case of auto-disconnection of supply by a prepaid meter on the event of exhaustion of credit available in the meter; and
- The respective SERC’s can recommend introduction of prepaid metering to any consumer category/ group/ class in accordance with Section 62(3) of the Act.
- Sub-section 47(5) of the Electricity Act 2003 needs further deliberation on the right of taking supply through a pre-payment meter with the consumer and not with the distribution licensee.

# State practice on Pre-paid Metering

# Utility practice on pre-paid metering

Distribution Licensee	Key Feature
<p>Madhya Gujarat Vij Company Ltd, Gujarat</p>	<ul style="list-style-type: none"> <li>• Introduced in Umreth town under DRUM project in 2007;</li> <li>• Consumer category - Rural BPL (950) &amp; Domestic (150);</li> <li>• No guidelines/ directive issued by GERC on PPM;</li> <li>• Ensure more than one month collection from BPL consumers;</li> <li>• Well received by the consumes, demand for PPM is forth coming;</li> <li>• To build confidence, PPM installed at MGVCL staff premises;</li> <li>• Installment were allowed for arrear recovery;</li> <li>• Success story was broadcasted on TV channels such as NDTV etc.;</li> </ul>
<p>Maharashtra State Electricity Distribution Co. Ltd.</p>	<ul style="list-style-type: none"> <li>• MSEDCL approached MERC for implementation of PPM;</li> <li>• One of the objectives being providing facility to consumers for their second home;</li> <li>• PPM installed in Lonavala &amp; Satara for LT domestic (approx. 200);</li> <li>• Past arrears had to be settled before installation of prepaid meters;</li> <li>• Online recharge option also available for consumers;</li> <li>• 5% discount on every purchase of electricity credit;</li> <li>• Cost of prepaid meter to be passed on in ARR;</li> <li>• Approval of discount on sale of electricity but not on ED and TOSE;</li> <li>• Licensee directed to continue meter reading; bill printing/ distribution done away with;</li> </ul>

# Utility practice on pre-paid metering

Distribution Licensee	Key Feature
NDPL / BSES, New Delhi	<ul style="list-style-type: none"> <li>• Discom initiative followed by Govt. of NCT of Delhi O.M. on Jun'07;</li> <li>• Consumer category (NDPL) - Govt. office, Load &lt; 45 kW (3200); 1- <math>\phi</math> domestic consumers (Pilot project at Rohini - 800);</li> <li>• Consumer category (BSES)- Govt. office, Load &lt; 45 kW (8200);</li> <li>• Aimed at reducing the arrears and not at DSM measures;</li> <li>• 2% tariff rebate approved by DERC;</li> <li>• NDPL initially used 25% arrear logic, later enhanced to 50% logic;</li> <li>• Pre-paid connection provided with existing K-Number;</li> <li>• No change in terms of agreement for new connection with PPM facility;</li> </ul>
West Bengal State Electricity Distribution Company Ltd	<ul style="list-style-type: none"> <li>• Pre-paid concept was a Govt. driven approach initiated in 2007;</li> <li>• Consumer category - Domestic category (approx. 2,500);</li> <li>• Simplified (single part) tariff structure for PPM consumers by WBERC;</li> <li>• WBERC (Terms and Conditions of Tariff) Regulations, 2011 - PPM has been made mandatory for selected category;</li> <li>• Consumer shown interest for PPM as flat tariff is charged by utility;</li> <li>• Initially tariff discount were allowed by WBERC for PPM consumer;</li> <li>• Utility looking for recharge option for recharging of coupon;</li> </ul>

# Issues faced by distribution utilities

## Tariff related issues

- Two part tariff implementation in prepaid metering leading to accounting and Duty incidence issues;
- Implementation of Tariff revision from applicable date;
- Recovery of fuel surcharge/ fuel cost adjustment, taxes and duties based on the consumption;
- Lack of clear policy/ regulatory guidelines on Pre-paid Meter;

## Operational issues

- Frequency of meter reading and periodicity of supplementary bill;
- Limited recharge options and its accessibility for credit recharge;
- Cost of vending infrastructure vis-à-vis cost of each recharge for consumers;
- High Cost of pre-paid Meters;
- Limited number of Pre-paid meter supplier;
- Dependence on vendor for token generation;
- PPM may not be relevant for all consumer categories;
- Inadequate campaigning and training to utility staff;
- Interoperability of different s/w for generating recharge coupons for different manufacturer;



# International Experience in Pre-paid Metering

# International experience in PPM

Key Issues in PPM Implementation	UK, Southern Electric Regulator: Office of Gas and Electricity Markets (OFGEM)	ESCOM, South Africa Regulator: National Energy Regulator of South Africa (NERSA)
Effect of FAC/ Retrospective Change in Tariff	<ul style="list-style-type: none"> <li>• Price changes are not frequent;</li> <li>• Consumer have options to avail fixed tariffs for long periods (3 years);</li> <li>• No retrospective change in the electricity prices;</li> <li>• Tariff changes incorporated through recharge coupon;</li> </ul>	<ul style="list-style-type: none"> <li>• Tariff approved for Eskom for three (3) year MYT period;</li> <li>• Cost adjustment done through true-up in for past period;</li> <li>• Balance recovered in subsequent year through revised tariff;</li> </ul>
Credit availability with PPM consumer	<ul style="list-style-type: none"> <li>• Limit of £100 for a consumer;</li> </ul>	<ul style="list-style-type: none"> <li>• No limits on credit purchase;</li> <li>• IBT, equivalent to the telescopic tariff in India, introduced to curb recharge in high denomination;</li> </ul>
Tariff Structure	<ul style="list-style-type: none"> <li>• Separate tariff (Single Part) for PPM notified;</li> <li>• Tariff consists of per unit charge plus arrear if any with the PPM consumers;</li> </ul>	<ul style="list-style-type: none"> <li>• Initially single part/ Two-part option available to licensees;</li> <li>• In FY11 IBT introduced, a protection tool for low income customers;</li> </ul>

# International experience in PPM

Key Issues in PPM Implementation	UK, Southern Electric Regulator: Office of Gas and Electricity Markets (OFGEM)	ESCOM, South Africa Regulator: National Energy Regulator of South Africa (NERSA)
Issuance of bills	<ul style="list-style-type: none"> <li>• Annual statement of billing issued to each PPM consumer for info. and record;</li> </ul>	<ul style="list-style-type: none"> <li>• For PPM consumers no bills are issued;</li> </ul>
Vending	<ul style="list-style-type: none"> <li>• Over 22,000 Pay Point outlets across the UK located in local newsagents, convenience stores and forecourts, carefully selected for their long opening hours and friendly service;</li> <li>• Credit purchase option available at all post offices;</li> </ul>	<ul style="list-style-type: none"> <li>• Eskom has wide network of vending infrastructure through several service providers operating in South Africa;</li> <li>• Utility offers vending options through vending outlets, ATMs, retailers, internet vending options, mobile vending, scratch-card (similar to scratch card for mobile phone recharges in India) and other third party vendors;</li> </ul>
Billing for burnt meter cases	<ul style="list-style-type: none"> <li>• Assessment based on records obtained when the key was last charged;</li> </ul>	<ul style="list-style-type: none"> <li>• In absence of meter reading, assessment done on basis of recharge pattern;</li> </ul>

# International experience in PPM

Key Issues in PPM Implementation	UK, Southern Electric	ESCOM, South Africa
	Regulator: Office of Gas and Electricity Markets (OFGEM)	Regulator: National Energy Regulator of South Africa (NERSA)
Duty/ Cess on electricity	<ul style="list-style-type: none"> <li>• Uniform VAT @ 5% applicable on all electricity bills;</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental levy charge recovered from all customers and passed on by utility to government;</li> </ul>
Meter Reading	<ul style="list-style-type: none"> <li>• Magnetic/ Card based PPM ensures two way communication;</li> <li>• Meter reading for all consumers done on a six monthly basis;</li> <li>• Ofgem places obligation on licensee to inspect meters once every two years;</li> </ul>	<ul style="list-style-type: none"> <li>• No fixed schedule for meter reading with regards to prepayment meters;</li> <li>• Provision of accounting of unit in vending s/w;</li> </ul>
Responsibility for prepayment metering	<ul style="list-style-type: none"> <li>• Utility responsible for prepayment metering;</li> </ul>	<ul style="list-style-type: none"> <li>• Utility provides single PPM for each premises;</li> <li>• Additional PPM, if required shall be purchased by consumer at his own cost;</li> <li>• Eskom offering flexibility to consumers to promote PPM;</li> </ul>

# Cost Benefit Analysis of PPM

# Cost Benefit Analysis

## Assumptions for cost-benefit analysis:

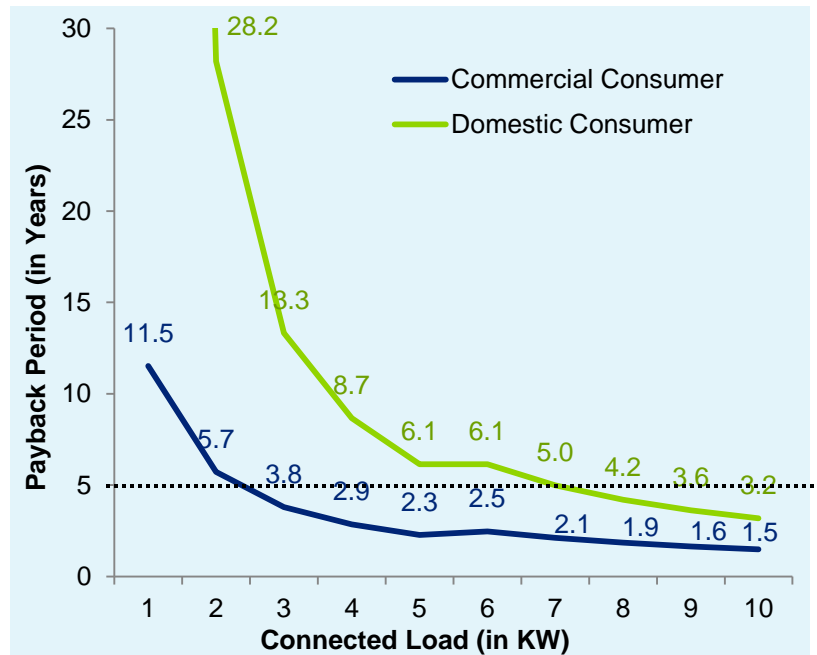
- Higher cost of Pre-payment meters compared to standard credit meters;
- Prepayment meters have the potential to allow discom to avoid meter reading costs completely; However, it has been assumed that reading prepayment meters and bills dispatch to the consumers will continue to be necessary to meet the requirements of the regulatory provisions;
- There is no difference in meter maintenance requirements;
- Prepayment meters are 'credited' by using the vending system of the meter manufacturer, which costs around Rs. 16 per recharge per consumer.
- 50% LF for 12 Hrs for Coml. and 40% LF for 8 Hrs for Domestic assumed for analysis @ Delhi tariffs

## Potential financial benefits to the discom from conversion of a postpaid to prepaid connection:

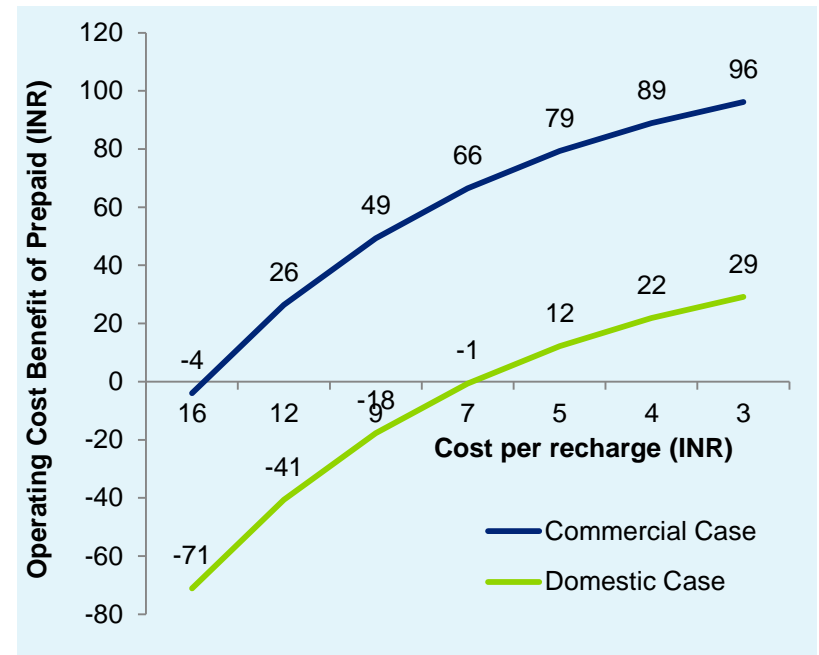
- Benefits due to elimination of outstanding dues beyond the due date;
- Opportunity Cost Benefit Due to elimination of consumption to due date cycle;
- Interest earned on advance payment by consumers;

# Cost Benefit Analysis

- Utilities may identify target PPM consumers based on their connected load/ average annual consumption;
- Reduction in the vending cost per recharge will eventually lead to operating cost benefit while transition from conventional to PPM;



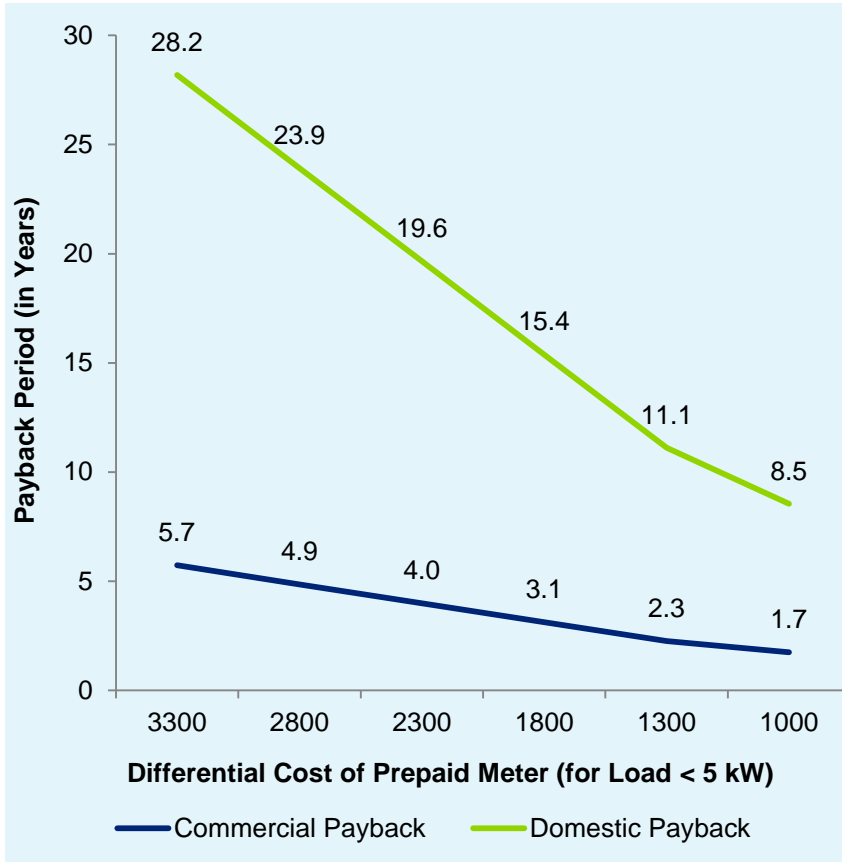
Sensitivity of Connected Load/ Annual Consumption to Payback Period of PPM



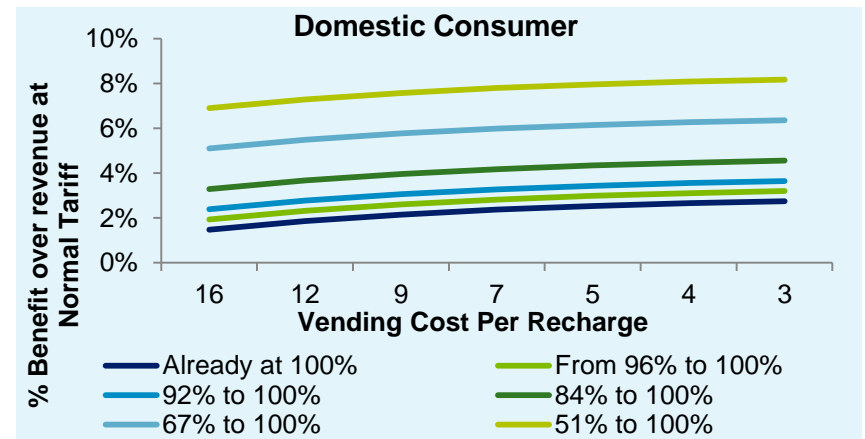
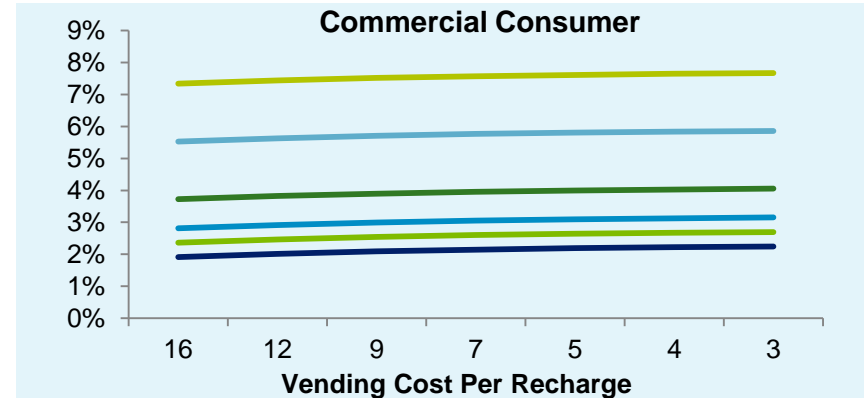
Sensitivity of Vending Cost to Operating Cost Benefit of PPM

# Cost Benefit Analysis

- For lower/ subsidized tariffs consumers, the viability of PPM system shall increase with reduction in differential cost of PPM;



Sensitivity of Differential Cost of PPM on Payback Period

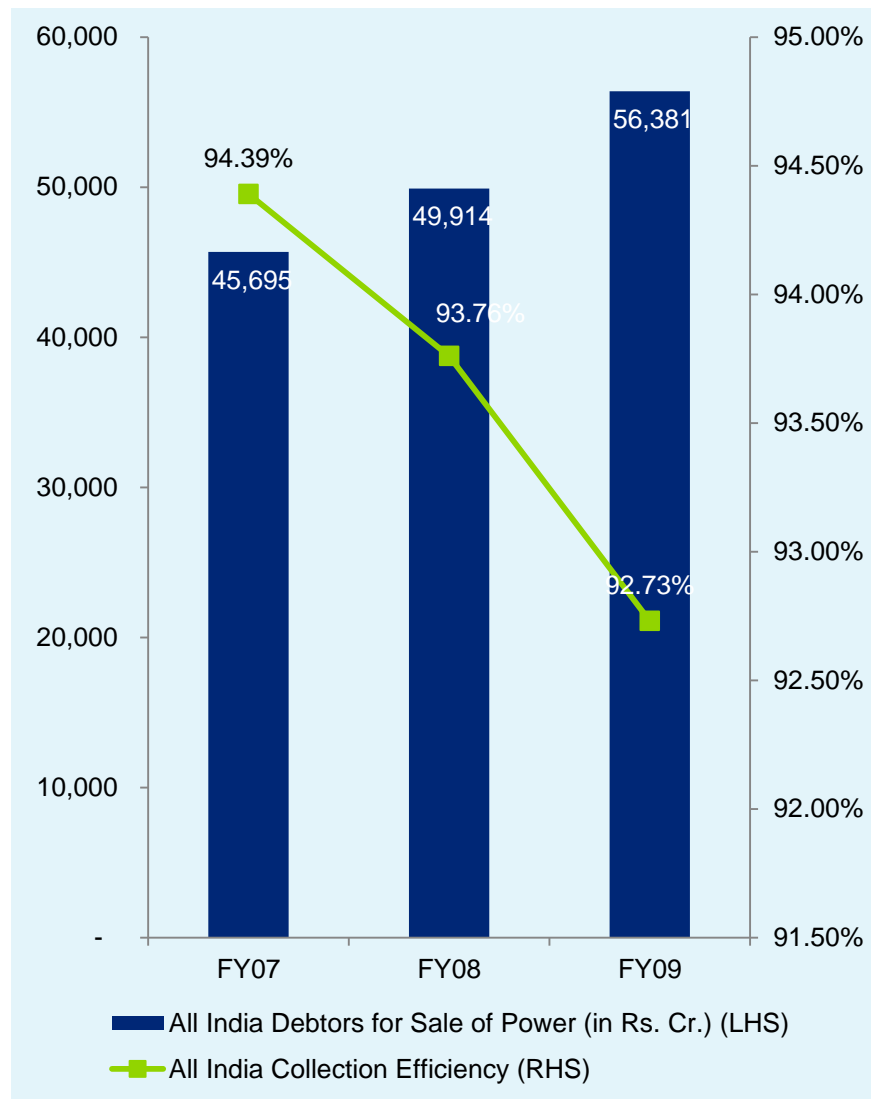


Sensitivity of PPM Benefits over Revenue at Normal Tariff



# Views and Recommendations

# Efficacy of Prepaid as a Concept



## Benefits from Prepaid

- Prepaid offers significant benefits over the conventional billing mechanism, in terms of:
  - Benefits due to advance payment;
  - Reduction of working capital requirement;
  - Maintaining 100% collection efficiency;
  - Tool for arrear recovery;
  - Various consumer friendly features

## Implementation

- Prepaid option shall become a matter of functionality on implementation of SMART METERING/ ADVANCED METERING INFRASTRUCTURE.
- The implementation issues encountered by the Utilities in India so far are primarily due to the Standalone nature of the existing prepayment meters and the same would get automatically resolved under Smart Metering/ AMI.
- However, considering the present status of collection efficiency and the cash position of utilities, recommendations are being made for effectively using prepaid metering for the benefit of the Indian power sector during the interim period.

# Recommendations on PPM (for Stand-alone meters)

## Target Consumer Group

- SERCs may explore target consumers for implementation of PPM as under:
  - Government/ PSU's establishments;
  - Urban Commercial connections, starting from consumers with highest connected load;
  - Urban Domestic consumers having connected load of more than 5 kW, starting from consumers with highest connected load, giving priority to Govt. quarters, multi-story apartment & residential societies;
  - All temporary connections;
  - Consumers premises where the owner has rented the house;
  - Any consumer located in an urban area, who opts to shift to prepaid metering;
- PPM may not be effective for implementation on BPL and other small consumers with low annual average consumption;
  - Utilities/ SERCs may undertake cost benefit to arrive at target consumer category;

# Recommendations on PPM (for Stand-alone meters)

## On Tariff/ Regulation

- Single part telescopic tariff with minimum monthly units (in lieu of fixed charges);
- Telescopic tariff in the monthly vending to ensure there is no accumulating/ hoarding of credit balance to avoid tariff increases; Shift from Money vending to Units vending in the PPM as in South Africa.
- No retrospective charging for PPM Consumers, any FSA/ increase may be made applicable from subsequent recharges only.
- SERCs may allow a suitable incentive for promotion of PPM; initially 4% – 5% may be considered which can be reduced to 2% - 3% once collection efficiency benefit is stabilized.
- Appropriate regulation/ guidelines may be notified by SERCs for undertaking activities such as meter readings, bill distribution, recovery of FAC/ duty etc. for PPM;

## On operational issues

- The CEA should come out with specific regulation/ guidelines on pre-paid metering and development of common platform for vending infrastructure;
- More recharge options need to be made available, such as at ATMs, through Website, Mobile banking, various retail outlets etc.
- Designing and imparting appropriate trainings through structured programs for utilities;
- Vendors should gear-up for meeting the demand expected at competitive cost;



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# Cost Benefit Analysis: Assumptions

- Prepayment meters have a higher cost than standard credit meters, with the difference between the cost of a prepayment meter and a standard credit meter in the range of Rs. 3300 per meter, considering an average cost of Rs. 1200 for a standard meter and Rs. 4500 for a prepayment meter;
- Prepayment meters have the potential to allow discom to avoid meter reading costs completely, given no bills are required to be sent to customers. However, it has been assumed that reading prepayment meters and bills dispatch to the consumers will continue to be necessary to meet the requirements of the regulatory provisions (specifically, the obligation to provide consumption data to customers on request), and may also be desirable to monitor meters for evidence of illegal tampering. Accordingly, it is assumed that these activities will take place on quarterly basis for pre-payment consumers.
- There is no difference in meter maintenance requirements, so the installation of prepayment meters does not result in any change in meter maintenance costs. Prepayment meters do not result in additional meter testing, so the installation of prepayment meters does not result in a change in meter testing costs.
- Prepayment meters are 'credited' by using the vending system of the meter manufacturer, which cost around Rs. 16 per recharge per consumer.

# Review of International Experience in PPM

Name of Country	Details
South Africa	<p><b>Consumer base</b></p> <ul style="list-style-type: none"> <li>Over 4 millions (54% of Total consumers)</li> </ul> <p><b>PPM Technology</b></p> <ul style="list-style-type: none"> <li>Proprietary meters</li> <li>Standard Transfer Specification (STS) meters</li> </ul> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>Online vending systems for issuing recharge tokens</li> <li>Role of advertising and initial subsidy in popularizing prepaid electricity</li> </ul> <p><b>Issues faced</b></p> <ul style="list-style-type: none"> <li>Prepayment is not necessarily a well-received innovation in all segments of society</li> <li>Increase cost of maintenance of PPM due to tampering, vendor fraud, and meter failures</li> </ul>
Bangladesh	<p><b>Consumer base</b></p> <ul style="list-style-type: none"> <li>Pilot for 12000 single phase, 1000 three phase and 150 check meters</li> <li>If pilot is successful BPDB will go for 1 million consumers</li> </ul> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>2% discount on the standard electricity billing rate for PPM users</li> <li>Estimated pay back of 6-7 years for PPM pilot.</li> </ul> <p><b>Issues faced</b></p> <ul style="list-style-type: none"> <li>PPM used have been designed locally Which are more prone to fraud.</li> </ul>

# Review of International Experience in PPM

Name of Country	Details
United Kingdom	<p><b>Consumer Base</b></p> <ul style="list-style-type: none"> <li>▪ App. 3.8 millions (15% of Domestic consumers)</li> </ul> <p><b>PPM Technology</b></p> <ul style="list-style-type: none"> <li>▪ Magnetic Card/ Token; Smart Key; Smart Card and Key Pad</li> </ul> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>▪ The three networks providing facilities for PPM customers in the UK to buy credit are the Post Office, Paypoint and Payzone</li> <li>▪ Suppliers ensure that the payment outlets are within reasonable distance of the customer's home.</li> </ul> <p><b>Issues faced</b></p> <ul style="list-style-type: none"> <li>▪ The Post Office provides a wider network of payment outlets in rural areas but often has limited operating hours during the day.</li> </ul>
North Ireland	<p><b>Consumer Base</b></p> <ul style="list-style-type: none"> <li>▪ 2,30,000 (30% of Total consumers)</li> </ul> <p><b>PPM Technology</b></p> <ul style="list-style-type: none"> <li>▪ Key pad meters</li> </ul> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>▪ 2.5% discount on the standard price of electricity.</li> <li>▪ There are various credit top-up facilities (vending outlets, phone, internet etc.)</li> <li>▪ Friendly credit hours: 4:00 PM – 8:00 AM; weekends</li> </ul>



# Review of International Experience in PPM

Name of Country	Details
United States	<p><b>Consumer Base – utility wise</b></p> <ul style="list-style-type: none"> <li>▪ <b>Wood Country Electric Cooperative</b> – 600 (2% of consumers base)</li> <li>▪ <b>Brunswick Country EMC</b> – 6,500 (9% of Consumer base)</li> <li>▪ <b>Salt River Project</b> – 50,000 (5.5% of Consumer base)</li> </ul> <p><b>Issues faced</b></p> <ul style="list-style-type: none"> <li>▪ Opposition from regulators, politicians and consumer groups</li> <li>▪ Acceptance of self- disconnection facility by regulators</li> </ul>
Argentina	<p><b>Consumer Base</b></p> <ul style="list-style-type: none"> <li>▪ CELCA has over 5000 users in the city of Carmen de Areco, 140 KM west from Buenos Aires City</li> </ul> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>▪ The user goes to CELCA's offices or the point of sale and buys electricity</li> <li>▪ The system issues an invoice (according to local regulations) for the amount purchased as well as a credit transfer voucher on which a 16-digit code is displayed.</li> <li>▪ At home, the user punches in the code on the keypad of the meter and a confirmation of kWh credit is displayed</li> </ul>
Other Countries	<p><b>New Zealand</b></p> <ul style="list-style-type: none"> <li>▪ 60,000 consumer (3% of residential customers)</li> <li>▪ PRI Liberty prepayment smart meter has been successfully tried in pilot implementations by Genesis Energy in New Zealand</li> </ul> <p><b>Australia</b></p> <ul style="list-style-type: none"> <li>▪ PPM is introduced as a debt recovery mechanism</li> <li>▪ Australia has separate pre-payment meter tariff system called Aurora Pay As You Go (<b>APAYG</b>)</li> </ul>

# **Jawaharlal Nehru National Solar Mission**

**Present Status**

**Ministry of New and Renewable Energy**

**16 December 2011**

# Jawaharlal Nehru National Solar Mission (JNNSM)

- ❑ JNNSM was launched by the Government of India in January 2010.
- ❑ JNNSM is one of the major global initiatives in promotion of solar energy technologies.
- ❑ Mission aims to achieve grid tariff parity by 2022 through
  - Large scale utilization, rapid diffusion and deployment at a scale which leads to cost reduction
  - R&D and technology demonstration
  - Local manufacturing and support infrastructure

# JNNSM 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 & distribution grid connected plants	1,000 MW 100 MW	4,000 MW 10,000 MW	20,000 MW
Off-grid solar applications	200 MW	1,000 MW	2,000 MW
Solar collectors	7 million sq meters	15 million sq meters	20 million sq meters

# **Key Deliverables for Phase – 1**

## **Progress of JNNSM**

- ❑ 1,100 MW Grid Solar Power Projects**
- ❑ 200 MW Off-grid Solar Applications**
- ❑ 7 million Sq. m solar thermal collector area**
- ❑ R&D and HRD; Centers of Excellence**
- ❑ Domestic Manufacturing**
- ❑ Institutional arrangements for implementation of activities under the Mission**

# Strategy

- ❑ Consultative process to finalize the guidelines
- ❑ Enabling policy and regulatory frame work
- ❑ Supporting Utility scale power generation
- ❑ Expanding off-grid applications
- ❑ Accelerating Research and Development
- ❑ Enhancing Domestic manufacturing base
- ❑ Strengthening support infrastructure

## Strategy (2)

- ❑ Bundling solar with unallocated thermal power through NVVN
- ❑ Competitive Bidding to select utility scale power projects
- ❑ Solar specific RPO - 0.25% in Phase 1 to increase to 3% by 2022
- ❑ Refinancing at lower interest rates (5%) for off-grid applications, involvement of NABARD
- ❑ Capital Subsidies (30% to 90%)
- ❑ Grant support for R&D and technology demonstration

# Policy and Regulatory Framework

- ☐ Policy and Tariff Policy for RPOS for solar power
- ☐ REC Mechanism
- ☐ Announcement of solar policy by some States
- ☐ State-wise RPO Orders by Regulators
- ☐ Provisions in Municipal laws for mandatory use of solar water heaters
- ☐ Exemption from environmental clearance for solar power projects



# Targets & Achievements

Application Segment	Target for Phase I (2010-13)	Status March, 2011	Target March, 2012
Grid solar power incl. roof top & distribution grid connected plants	1,000 MW	704 MW allotted	350 MW capacity to be selected by 31 <sup>st</sup> Dec. 2011
	100 MW	98 MW allotted	
Off-grid solar applications	200 MW	40.6 MW sanctioned	Total 100 MW to be sanctioned by March, 2012
Solar collectors	7 million sq meters	4.5 million sq meters	5.7 million sq meters by March, 2012

## Grid Solar Power - Large Plants

- ❑ **1,000 MW Capacity solar power (connected to 33 KV or higher grid) through bundling**
  - 500 MW each for solar thermal and PV projects
- ❑ **Batch I – 150 MW SPV and 500 MW ST**
  - PV projects to be completed in 12 months & solar thermal in 28 months after signing PPA
  - Permitted plant capacity for a new project: 5 MW for PV and 20 MW to 100 MW for solar thermal
- ❑ **Batch II 350 MW SPV**
  - To be completed in 13 months after PPA
  - Permitted plant capacity upto 20 MW/Project and upto 50 MW for one group or developer

## Grid Solar Power-Migration Scheme

- ❑ 16 projects of 84 MW capacity projects (54 MW PV & 30 MW Thermal) were allocated; PPAs signed in October, 2010
- ❑ PV Projects were to be commissioned by October, 2011
  - 9 PV projects of 39 MW capacity synchronized to grid in October, 2011
  - 3 projects of 11 MW capacity and 1 project of balance 2 MW capacity had time available till 15/12/11 for commissioning.
  - Bank Guarantee encashed for delay in not meeting the time limit of 15<sup>th</sup> October, 2011
- ❑ 3 Solar Thermal Projects to be commissioned by March, 2013
  - 2.5 MW capacity of a 10 MW capacity solar thermal project synchronized to the grid in May, 2011

**10 MW capacity  
project at  
Bikaner by  
ACME**



# 5 MWp Power Plant at Khimsar, Rajasthan





## Grid Solar Power-New projects

- ❑ **Solar Thermal : 7 projects for 470 MW selected in December, 2010. Average Tariff Rs. 11.48**
  - CSP Projects scheduled to be synchronized in early 2013
- ❑ **Solar PV : 30 projects for 150 MW selected in December, 2010. Average Tariff Rs. 12.16**
  - One PV project was rejected by NVVN as information on net worth was found to be incorrect.
  - Another PV project rejected for not having possession of land at the time of reporting financial closure
  - 28 PV projects continue, scheduled to be synchronized by mid January, 2012

# Grid Solar Power (Batch-II)

- ❑ Guidelines announced in August, 2011 for 350 MW PV capacity
- ❑ 143 companies issued Request for Proposal to offer discounts on CERC tariff (Rs. 15.39 per kWh) for 204 projects of 2400 MW capacity by 2<sup>nd</sup> December, 2011.
- ❑ The minimum and maximum tariff short listed are Rs 7.49 and Rs. 9.44 per unit. The weighted average tariff Rs. 8.77 per unit.
  - Total 350 MW capacity in 28 projects
- ❑ Likely to be commissioned by end of 2012 or first quarter of 2013

# Grid Solar Power-Small Plants

- ❑ 100 MW capacity solar power projects (100 kW to 2 MW) connected to 11 KV grid being supported through Generation Based Incentive (GBI) to utilities on reimbursement basis
- ❑ GBI rate Rs. 12.41 per unit which is the difference of CERC tariff of Rs. 17.91 per unit and notional cost of Rs. 5.5 per unit
- ❑ 78 projects for 98 MW capacity from 12 States were issued letters of eligibility by IREDA in Sept - Dec 2010
  - 11 Plants (12 MW capacity) commissioned so far
- ❑ Remaining plants are likely to be commissioned in next few months, penalty of Rs. 10 lakhs/MW charged due to delay in commissioning





( 1 MW capacity PV Plant at Hissar in Haryana

# Solar RPO

- Amendment to National Tariff Policy has mandated solar specific renewable purchase obligation of 0.25% by March, 2013, gradually increasing to 3% by 2022.
- At the National level total electricity generation in 2010-11 was ~ 811.1 billion units
  - 0.25% solar RPO means 2.03 million units : 1120 MW solar power generation capacity
- Most of the States have announced solar specific RPOs
- Many States (Gujarat – 968.5 MW, Maharashtra – 125 MW + 80 MW, Karnataka-80 MW, Rajasthan-100 MW) have announced specific plans.

# State wise Solar RPOs – Status

State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
AP	0.25%	0.25%	0.25%	0.25%	0.25%	0.25%
Assam*	0.05%	0.10%	0.15%	0.20%	0.25%	
Bihar	0.25%	0.50%	0.75%	1.00%	1.25%	
Chhattisgarh	0.25%	0.25%	0.5%			
Delhi*		0.1%	0.15%	0.2%	0.25%	0.3%
Gujarat	0.25%	0.50%	1.00%			
Haryana	0.25%	0.5%	0.75%	1%	1.25%	
Himachal Pradesh*	0.10%	0.10%	0.10%			
J & K*	0.02%	0.10%	0.25%			
Jharkhand	0.25%	0.50%	1%			
Karnataka	0.25%					
Kerala	0.25%	10% increase every year on RPO of 3%				
MP	0	0.4%	0.6%	0.8%	1.0%	
Maharashtra	0.25%	0.25%	0.25%	0.50%	0.50%	0.50%
Manipur	0.25%	0.25%	0.25%			

# State wise Solar RPOs – Status

[illegible]

# State wise Solar Power requirement

	Solar RPO	Installed Capacity (MW)	Solar Power Required (MW)										
State	2011-12	as on 31.05.2011	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Andhra Pradesh	0.25%	14268	143	294	454	622	799	984	1179	1381	1592	1812	2226
Arunachal Pradesh	0.25%	135	1	3	4	6	8	9	11	13	15	17	21
Assam	0.25%	951	10	20	30	41	53	66	79	92	106	121	148
Bihar	0.25%	1854	19	38	59	81	104	128	153	179	207	235	289
Chhattisgarh	0.25%	4632	46	95	147	202	259	320	383	448	517	588	723
Delhi	0.25%	5800	58	119	184	253	325	400	479	561	647	737	905
Goa & UT	0.25%	822	8	17	26	36	46	57	68	80	92	104	128
Gujarat	0.25%	13722	137	283	436	598	768	947	1133	1328	1531	1743	2141
Haryana	0.25%	5880	59	121	187	256	329	406	486	569	656	747	917
Himachal Pradesh	0.25%	2201	22	45	70	96	123	152	182	213	246	280	343
Jammu & Kashmir	0.25%	2167	22	45	69	94	121	150	179	210	242	275	338
Jharkhand	0.25%	1979	20	41	63	86	111	137	163	192	221	251	309
Karnataka	0.25%	9530	95	196	303	416	534	658	787	923	1064	1210	1487
Kerala	0.25%	3573	36	74	114	156	200	247	295	346	399	454	557
Madhya Pradesh	0.25%	8114	81	167	258	354	454	560	670	785	906	1030	1266
Maharashtra	0.25%	20271	203	418	645	884	1135	1399	1674	1962	2262	2574	3162
Manipur	0.25%	152	2	3	5	7	9	10	13	15	17	19	24
Meghalaya	0.25%	258	3	5	8	11	14	18	21	25	29	33	40
Mizoram	0.25%	102	1	2	3	4	6	7	8	10	11	13	16
Nagaland	0.25%	75	1	2	2	3	4	5	6	7	8	10	12
Orissa	0.25%	5299	53	109	169	231	297	366	438	513	591	673	827
Punjab	0.25%	6690	67	138	213	292	375	462	553	648	747	850	1044
Rajasthan	0.25%	7508	75	155	239	327	420	518	620	727	838	954	1171
Sikkim	0.25%	154	2	3	5	7	9	11	13	15	17	20	24
Tamil Nadu	0.25%	9803	98	202	312	427	549	676	810	949	1094	1245	1529
Tripura	0.25%	249	2	5	8	11	14	17	21	24	28	32	39
Uttar Pradesh	0.25%	9848	98	203	313	429	551	680	813	953	1099	1251	1536
Uttarakhand	0.25%	2309	23	48	73	101	129	159	191	224	258	293	360
West Bengal	0.25%	8155	82	168	259	356	457	563	674	789	910	1036	1272
<b>Total</b>		<b>146501</b>	<b>1465</b>	<b>3018</b>	<b>4659</b>	<b>6387</b>	<b>8204</b>	<b>10109</b>	<b>12101</b>	<b>14181</b>	<b>16350</b>	<b>18606</b>	<b>22854</b>

# Solar REC

- In August 2011, CERC has announced new Solar REC floor rate effective April 2012 as Rs. 9300 per MWh (One REC), valid up to control period 2016-17
- Forbearance price is Rs. 13400 per MWh
- Some project developers are planning to set up solar power plants to take advantage of solar REC mechanism
  - 8.5 MW capacity PV project registered in Maharashtra



## REC trading Status

Month, Year	Opening Balance	REC Issued	REC Redeemed	Closing Balance
March, 2011	0	532	424	108
April, 2011	108	4503	260	4351
May, 2011	4351	28270	18502	14119
June, 2011	14119	27090	16385	24824
July, 2011	24824	30224	18568	36480
August, 2011	36480	31813	25096	43197
September, 2011	43197	74612	46362	71447
October, 2011	71447	126544	95504	102487
November, 2011	102487	135697	105527	132657

# Solar Power Installations

- **Total capacity installed = 186.5 MW**
  - 102 MW projects under States policy
  - 84.5 MW projects under JNNSM
- **About 250 MW capacity likely to be commissioned by March, 2012 under the Mission.**
- **Total grid solar power capacity in the country likely to be around 400 MW by March, 2012**
  - 3 MW Capacity was installed by January, 2009



# Off-Grid Solar Applications

- ❑ 200 MW capacity in the first phase
- ❑ Demand driven expansion
  - ❖ 30% subsidy & loan @ 5% for PV
  - ❖ 30% subsidy OR loan @ 5% for solar thermal
  - ❖ 60% - 90% subsidy for Government projects in special category States and in other remote and difficult areas

# Off-Grid Solar Applications

- ❑ Additional channels for supply and maintenance (RESCO, Financial Integrators, System Integrators, Programme Administrators) through accreditation by rating agencies
- ❑ NABARD, bankers and RRBs
- ❑ Focus is on
  - solar lights, charging stations, specially in rural areas
  - Rural power supply – Mini Grids
  - Solar power to replace diesel / Kerosene
  - Solar water heaters
  - Process Heat

# Off-Grid Solar Applications

- ❑ 40.6 MW capacity PV off-grid projects sanctioned in 2010-12, additional 60 MW to be sanctioned in 2011-12
- ❑ Refinancing to offer loans at 5% annual interest rate
  - NABARD is coordinating with Regional Rural Banks (RRBs)
  - 15 RRBs are extending loan & subsidy
- ❑ 4.5 million square metre solar thermal collector area installed by March, 2011, additional 1.2 million sq. m. by 2011-12

# Types of PV Projects supported

- ❑ Stand-alone PV power plants in Panchayat Buildings., Tribal Hostels, Police Thanas, Paramilitary Forces, Primary Health Centers, Forest Range Offices, Bank Branches, educational institutions etc.
- ❑ Street lights in Ambedkar villages, SC/ ST and Minority dominated villages
- ❑ Home lights in Special Category States, Border districts
- ❑ Solar Lanterns for border villages
- ❑ Central Charging Stations for Solar Lanterns
- ❑ PV pumps for horticulture
- ❑ Rooftop systems for diesel replacement

# R&D Strategy

- **Research at Academic/Research Institutions on materials & devices with long term perspective**
- **Applied Research on existing processes and developing new technologies**
- **Technology Validation aimed at field evaluation of materials, components and systems**
- **Development of Centers of Excellence in thematic areas of research in the area of Solar Energy.**
- **Support for Incubation and Innovation**
- **International collaborations with institutional/industrial**

# R&D Activities

- 36 R&D projects under implementation
- Centers of Excellence in research and education - *5 Centres sanctioned*
- Technology Validation - *1 MW solar thermal power with storage; field trials of thermal systems for industrial process heat*
- Testing & Training - *6 test labs for PV & 6 for solar thermal systems*
- International collaborations - *Joint projects with USA, Japan, Germany, Spain*
- 51 new centres set up for Solar Radiation Data collection

# National Solar Thermal Power Testing, Simulation and Research Facility

- **1MWe Solar Thermal Power Plant**
  - Research and Demonstration plant
  - Combination of different collector fields  
(Direct and Indirect Steam Generation)

## Parabolic Trough Field

-8700 sq. m  
-3.3 MWth (Design)



## Linear Fresnel Field

- 7200 sq. m  
- 2.2 MWth (Design)



**Turbine operating conditions:**  
saturated steam at 350 deg. C and 40 bar



# 1 MW with 16 hour thermal storage Project at Mount Abu By WRST with co-funding from German Ministry and Indian industry.





# Ground Measurements of Solar Radiation

Andhra Pradesh	6
Gujarat	11
Haryana	1
Madhya Pradesh	3
Karnataka	5
Rajasthan	12
Chhattisgarh	1
Ladakh	1
Maharashtra	3
Pudducherry	1
Tamil Nadu	6

- C-WET is implementing the project for setting up 51 ground monitoring stations
- Centralized data collection, analysis and calibration of measuring sensors



# Solar Energy Centre

- **Solar Energy Centre (SEC) near New Delhi under the Ministry is the lead Centre for testing and training in solar energy in the country**
- **SEC has NABL accredited testing facilities for PV module qualification as per Indian and International standards**
- **SEC is imparting training in solar energy at various levels**
- **SEC is regularly conducting international training programmes in solar energy with MEA**
- **Demonstration of several solar PV and thermal applications including setting up of 1 MW capacity solar thermal simulation and validation facility at SEC is under progress**



**Solar PV outdoor test  
bed at SEC**



# Capacity Building

- Course contents for technicians, graduate, post graduate finalized. Many IITs/NITs/Other Engineering Colleges and Universities plan to start courses from next academic session
- MoU signed with IGNOU for technician training from next session
- Regular teaching at ITI level from current academic session
- Solar Fellowships and Solar Chairs
- IIT, Bombay has started programme to train 1,000 college/ university teachers in PV technology
- Training programmes through banks, manufacturers, NGOs
- 10000 technician training in off-grid

# Manufacturing and Domestic Content

- More than 65 companies, with installed capacity of over 1.5 GW make PV modules.
- 15 companies manufacture solar cells (> 700 MW installed capacity)
- Manufacturing of various raw materials, components, devices and systems is coming up/expanding in the country (Poly silicon, wafers, glass, EVA, back sheet, grid inverters etc.)
- Use of domestic crystalline silicon cells & modules mandatory for the grid projects to be selected in 2011-12 is mandatory, import of thin film modules allowed.
- No customs & Excise duty on cells and modules, but some raw materials to manufacture cells and modules attract 5% customs duty and CVD.
- 30% domestic content in the cost of solar thermal power projects has been made mandatory for the Phase 1 projects

## Other Initiatives

- Strengthening of transmission network for evacuation of solar power in Rajasthan, Gujarat and some other States
- Pilot projects on solar thermal power to address issues related to air cooling, hybridization, large thermal storage, new technologies etc.
- Proposal to set up National Institute for Solar Energy (NISE) which will include Solar Energy Centre.
- Consultation process for launching Phase-II to be started now to maintain continuity in implementation of grid solar power projects<sub>7</sub>



# Institutional Arrangements

- ❑ Solar Energy Corporation of India (SECI) set up as a Company Not for Profit under Section 25 of Company Act for implementation of activities under the Mission
  - ❑ Dr. Anil Kakodkar appointed Chairman
  - ❑ CEO and 4 full time Directors to be appointed
- ❑ Mission Steering Group, chaired by Minister set up
- ❑ Solar Energy Research Advisory Council, Chaired by Dr. Anil Kakodkar set up – 1<sup>st</sup> meeting was held
- ❑ Shri Anand Mahindra to be Chairman of Solar Energy Industry Advisory Council

## Issues for Discussion

- ☐ RPO orders are required to be issued by each State with solar specific provision.
- ☐ Mechanism to enforce compliance to RPO requirements including penalty for non- compliance
- ☐ RPO Requirement on quarterly basis
- ☐ Right to avail RECs to Discoms/  
Purchasers for the solar power  
purchased in excess of their RPO
- ☐ Tariff for solar hybrid grid power plants



# Issues for Discussion

- ☐ Long term visibility in the rate of RECs for better prospects of financing
- ☐ Transmission wheeling charges for solar power to be waived off.
- ☐ RECs for off-grid
- ☐ Promotion of Roof-Top solar and Net-metering
- ☐ Developing of transmission network
- ☐ Priority in payment by Discoms
- ☐ Calculation of RPO requirement

**Thank You !**



FORUM OF REGULATORS

# Appellate Tribunal of Electricity order dated 11.11.2011

*S K Chatterjee, DC (RA),CERC*

# In this presentation



- Directions of the Appellate Tribunal of Electricity order dated 11.11.2011
- Format for report of SERCs regarding APTEL order dated 11.11.2011

## Directions of the Appellate Tribunal of Electricity order dated 11.11.2011



FORUM OF REGULATORS

- i. Every State Commission has to ensure that Annual Performance Review (APR), true-up of past expenses and Annual Revenue Requirement (ARR) and tariff determination is conducted year to year basis as per the time schedule specified in the Regulations.
- ii. The tariff for the financial year to be decided before 1<sup>st</sup> April of the tariff year. Such tariff could be applicable only till the end of the financial year so that the licensees remain vigilant to follow the time schedule for filing of the application for determination of ARR/tariff.

## Directions of the Appellate Tribunal of Electricity order dated 11.11.2011



FORUM OF REGULATORS

- iii. In the event of one month delay (beyond the scheduled date of submission of the petition) in filing of the ARR, truing-up and APR, the SERCs must initiate suo-moto proceedings for tariff determination in accordance with Section 64 of the Act.
- iv. SERCs should not leave any revenue gaps while determining ARR/tariff and should not create Regulatory Assets except when it is justifiable.
- v. Recovery of the Regulatory Asset should be time bound and within a period not exceeding three years at the most and preferably within Control Period.

## Directions of the Appellate Tribunal of Electricity order dated 11.11.2011



FORUM OF REGULATORS

vi. Carrying cost of the Regulatory Asset should be allowed to the utilities in the ARR of the year in which the Regulatory Assets are created to avoid problem of cash flow to the distribution licensee.

vii. Truing up should be carried out regularly and preferably every year. For example, truing up for the financial year 2009-10 should be carried out along with the ARR and tariff determination for the financial year 2011-12.

## Directions of the Appellate Tribunal of Electricity order dated 11.11.2011



FORUM OF REGULATORS

viii. Every State Commission must have in place a formula/mechanism for Fuel and Power Purchase cost adjustment and it should preferably be carried out on monthly basis on the lines of the CERC's Regulations for the generating companies but in no case exceeding a quarter. Any State Commission which does not have such formula/mechanism should specify the same within 6 months of the date of this order.

ix. All the State Commissions to follow above directions scrupulously, and send the periodical reports by 1<sup>st</sup> June of the relevant financial year about the compliance of these directions to the Secretary, Forum of Regulators, who in turn will send the status report to this Tribunal and also place it on its website.



# Format for report of SERCs regarding APTEL order dated 11.11.2011



FORUM OF REGULATORS

Sr. No.	Particulars	2009-10	2010-11	2011-12	2012-13
I. Timeliness of Tariff Determination Process					
A. Tariff Filing					
1	Whether timeline for filing petitions for Annual Performance Review (APR), true up of past expenses, Average Revenue Requirement (ARR) and Tariff Order specified in Tariff Regulations (Yes/No and also please mention the timelines)? i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order
2	If yes, whether Annual Performance Review (APR), true up of past expenses, Average Revenue Requirement (ARR) and Tariff Order are being filed as per the requirements of regulation (please also provide the date of filing)? i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order	i. APR ii. True Up iii. ARR iv. Tariff Order

# Format for report of SERCs ....(contd.)



FORUM OF REGULATORS

Sr. No.	Particulars	2009-10	2010-11	2011-12	2012-13
3	<p>If delay in filing of Annual Performance Review (APR), true up of past expenses, Average Revenue Requirement (ARR) and Tariff Order is beyond one month, whether the Regulatory Commission has taken any suo-motu action for determination of tariff? If not, please provide the reasons thereof</p> <p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>
<b>B. Tariff Order</b>					
4	<p>Whether Annual Performance Review (APR), true up of past expenses, Average Revenue Requirement (ARR) and Tariff Orders are being issued regularly within the time specified in accordance with the Act (please indicate the date of tariff petition and date of tariff order)?</p> <p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>	<p>i. APR ii. True Up iii. ARR iv. Tariff Order</p>
5	Whether the applicability of Tariff is till the end of the financial year (Yes/No)?				

# Format for report of SERCs ....(contd.)



FORUM OF REGULATORS

Sr. No.	Particulars	2009-10	2010-11	2011-12	2012-13
II. Adequacy of Tariff					
1	Annual Revenue Requirement (in Rs. Cr.)				
2	Saleable Energy (in MUs)*				
3	Average Cost of Supply (Rs./kWh)				
4	Average Tariff (Rs./kWh)*				
5	Revenue gap between ARR and ACS per unit				
6	Whether Regulatory Assets have been created?				
7	If yes, whether the creation of Regulatory Assets is in line with the National Tariff Policy?				
8	Whether a roadmap (in terms of timeline not exceeding 3 years) for the recovery of such Regulatory Assets been specified?				
9	Whether carrying cost of the Regulatory Asset allowed to the utilities in the ARR of the year in which the Regulatory Assets are created?				

\*: Average Tariff and Saleable energy for the State and also separately for category-wise in Annexure

# Format for report of SERCs ....(contd.)



FORUM OF REGULATORS

Sr. No.	Particulars	2009-10	2010-11	2011-12	2012-13
II. Fuel & Power Purchase Cost Adjustment					
1	Whether Fuel Surcharge Adjustment formula/mechanism provided in regulation (Yes/No)?				
2	Frequency of adjustment of Fuel Surcharge as per the regulations (monthly/ bi-monthly/quaterly)?				
3	Fuel Surcharge Adjustment being done as per the regulations? If not, please provide the reasons thereof.				



## INTERPRETATION OF SECTION 51 OF THE ACT – SUPREME COURT JUDGMENT DATED 08.02.2011 IN THE CONTEXT OF (BEST).

- Supreme Court in its judgment dated 08<sup>th</sup> February, 2011 set aside the theory that despite the last proviso to section 51, that **BRIHAN MUMBAI ELECTRIC SUPPLY & TRANSPORT UNDERTAKING** cannot have its electricity distribution business subsidise other business undertakings (Transport Business).

## LEGAL ISSUE –

1/2



- However the remit under the 2003 Act does not permit cross-subsidization of losses suffered by the transport division of BEST by the electricity consumers through electricity tariffs.
- S. 51 permits “other business for optimum utilisation of its assets”. For example, use of Distribution wires for optic fibre network. But Distribution Network is not used for Passenger Bus Transport. Electric metro or Trams do. However, Busses do not use Distribution Network. Hence, no question of “utilisation of its assets”.

## LEGAL ISSUE –

2/2



- *EXERCISE OF JURISDICTION WILL BE IN EXCESS OF 2003 ACT* - The ERC will have to go into the veracity of Transport Losses as it cannot be taken on face value. On the other hand, ERC has no jurisdiction to regulate Transport Sector. SERC's powers and functions are confined to the provisions laid down in the 2003 Act and cannot extend to undertaking the veracity and prudence of the bus transport business of BEST so as to accept the figure of deficit / losses of bus transport business.

## OTHER EFFECTS



- Pass through of *PASSENGER BUS TRANSPORT* division deficit in the ARR would result in a tariff hike for consumers of BEST.
- **SUGGESTED ACTION:-**
- **Either** to do away with the last proviso to Section 51 of the Electricity Act, 2003 by legislative amendment (to take it up with the Ministry of Power)



## OTHER EFFECTS :



### Suggested Action

- to clarify the scope by legislative amendment. Clarification may be required on account of the following reasons –
- The activity of *PASSENGER BUS TRANSPORT* has nothing to do with the utilization of the electricity distribution assets which comprise of the system of wires and associated facilities between the delivery points on the transmission lines or the generating station connection and the point of connection to the installation of the consumers as defined in section 2(19) of the 2003 Act.
- Even if the entire section 51 on account of its last proviso is not applicable to BEST, there is no provision whatsoever in the 2003 Act which could allow BEST to demand and claim the losses and deficits of its *PASSENGER BUS TRANSPORT* business (which has nothing to do with utilization of the assets of electricity distribution basically comprising of wires) from the tariffs that could be determined u/s 62 of the 2003 Act.



## Operationalisation of Open Access in Power Sector – MoP Letter dated 30.11.11

Forum of Regulators



**S K Chatterjee, DC (RA), CERC**  
**16.12.11**



# In this Presentation

Sequence of interpretations – Open Access

MOP letter dated 30.11.2011

Issues for consideration

Legal, commercial, operational and other issues

Impact analysis- Gujarat Case studies



# **SEQUENCE OF INTERPRETATIONS**

## **– OPEN ACCESS**



## SGI's OPINION DATED 08-06-2010

### Queries:

- Whether section 86(1)(a) of the Act implies that the consumers who have been permitted open access are mandatorily required to take supply of electricity from a person other than the local distribution company?



## SGI's OPINION DATED 08-06-2010

### Opinion:

- **There is no such mandatory obligation cast by the proviso.**
- A combined reading of section 49, section 42 and section 86(1)(a) makes it amply clear that category of consumers having open access are not mandated to take supply from person other than the local distribution company.
- Section 42 being an enabling provision should not be interpreted to mean that all consumers satisfying the condition under regulations must necessarily avail open access.
- Sub-section (3) of section 42 of the Act, further makes it clear that consumers seeking open access can do so after giving notice.
- As per the provisions of section 43 the distribution licensee is under an obligation to supply electricity as and when requested to do so, implying that the option and choices remain open to the consumers.



# AGI's OPINION DATED 07-12-2010

.....1/2

Queries:

- Whether all bulk consumers (above 1 MW) shall be deemed to be open access consumers with effect from January, 2009 in terms of the proviso to Section 42 (3) ?

Opinion

- No. **All bulk consumers are not deemed to be open access consumers.** Only those who opt for open access are entitled to open access.



# AGI's OPINION DATED 07-12-2010

## .....2/2

### Queries:

- Whether the SERCs can continue to regulate the tariffs for supply of electricity to the aforesaid open access consumers after January, 2009 ?
- Whether the jurisdiction of SERC in respect of the bulk consumers is limited to fixing the wheeling charges and surcharge thereon in accordance with the provisions of Sections 49 and 86 (1)(a) ?





# AGI's OPINION DATED 07-12-2010

.....2/2

## Opinion

- The jurisdiction of the State Commissions in relation to bulk consumers who opt for open access is limited to the determination of wheeling charges and surcharge and not fixation of tariff.



## PLANNING COMMISSION's INTERPRETATION DATED 12-01-2011 ..1/3

- First proviso to section 42 (2) of the Electricity Act, 2003 has been reproduced as follows:

*"Provided that such open access may be allowed before the cross subsidies are eliminated, on payment of a surcharge in addition to the charges for wheeling as may be determined by the State Commission".*

- Said proviso has been amended with effect from 15.06.2007. The amended proviso reads as follows:

*"Provided that such open access shall be allowed on payment of a surcharge in addition to the charges for wheeling as may be determined by the State Commission."*



## PLANNING COMMISSION's INTERPRETATION DATED 12-01-2011 ..2/3

- Amended proviso has done away with the option of providing open access prior to elimination of cross subsidies.
- It has since been made mandatory for the SERC to allow open access on payment of a surcharge (in addition to wheeling charges).
- A conjoint reading of Section 42(2) along with its first and fifth provisos suggests that as a category, all consumers of more than 1 MW are to be treated as open access consumers who do not require any further permission or approval of the SERC to exercise their right of open access.



## PLANNING COMMISSION's INTERPRETATION DATED 12-01-2011 ..3/3

- The intention to deregulate the tariffs of an entire consumer category has been determinatively expressed in the proviso to section 86(1)(a) of the Act. The proviso reads as follows:

*"Provided that where open access has been permitted to a category of consumers under Section 42, the State Commission shall determine only the wheeling charges and surcharge thereon, if any, for the said category of the consumers."*



## AGI's OPINION DATED 31-03-2011

- The reference in my earlier opinion to Section 42(2) does not appear to have been appropriate to the issue of open access for consumers who require the supply of electricity of 1 MW and above.
- The better view appears to be that Section 42(2) read with the First and Fifth proviso is a self contained code with regard to consumers who requires the supply of electricity of 1 MW and above. In the premises, I reconsider my opinion dated 07.12.2010 and answer the query as follows:

Q. Whether a state regulatory commission can continue to regulate the tariff for supply of electricity to any consumer of 1 MW above.

Ans. No, for the reasons set out hereinabove.



## AGI's OPINION DATED 01-11-2011

- If open access is made obligatory whether the distribution licensee will continue to have the responsibility of universal service obligations with regard to consumers whose requirements are in excess of 1 MW.
- An analysis of the various provisions (particularly section 49 of the Act) shows that if certain consumers want to have the benefit of the option to buy power from competing sources, then it is logical that DISCOMS do not have an obligation to compulsorily supply power to such consumers.
- If such consumers want power from the DISCOM then the terms and conditions of the supply would be determined in terms of section 49 of DISCOM also.



## **MOP LETTER DATED 30.11.2011**



## Opinion from M/o Law & Justice on Open Access in Power Sector: MOP letter dtd. 30/11/2011

- All 1 MW and above consumers are deemed to be open access consumers
- The regulator has no jurisdiction over fixing the energy charges for them

MOP requested that necessary steps for immediately implementing the provisions relating to open access may be taken in light of above opinion





## **ISSUES FOR CONSIDERATION**



# Issues for consideration

## Legal

- Communication from MoP vs direction under Section 107 or 108 of the Act ?
- Universal Service Obligation – APTEL Judgement dtd 11/7/2006 : HINDALCO v/s WBERC (1/2006)
- Powers under Sec. 60 against abuse of dominant position

## Commercial

- Impact of deemed OA on Discom's revenue
- Wheeling Agreement Vs. Supply Agreement .
- Billing, Collection and Disbursement



# Issues for consideration

## Operational

- Scheduling and Energy Accounting.

## Other

- Performance Standards
- Grievance Redressal

Forum of Regulators



# **LEGAL ISSUES**

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## Legal Issues

- Communication from MOP is not a direction U/S 107 or 108 of the Act
- Issues about universal service obligation, relationship of consumer with discom, powers of Regulators to determine tariff – on grant of open access
  - were dealt by APTEL in its judgment dtd. 11/7/2006 in Appeal No. 1/2006 (Indian Aluminum Company limited, HINDALCO v/s WBERC and others)



# Legal Issues

APTEL's Judgment dtd. 11/7/2006

- Questions of law
  - Whether SERC ceases to have powers to determine the tariff once open access is permitted?
  - Whether Open Access consumers cease to be a consumer of local licensee?
  - Whether the area Discom continues to have USO for OA consumers?
  - Whether the area Discom is obliged to supply standby energy and if so under what condition?



## Legal Issues

APTEL's Judgment dtd. 11/7/2006.....

- APTEL held
  - *The Commission has proceeded on a wrong premise that it has no jurisdiction or power to determine tariff once open access is permitted and therefore any consumers seeking such open access should cease to be a consumer of area distribution license.*
  - *This view of WBERC can not be legally sustained*
  - *Such a conclusion has been arrived at on an erroneous interpretation of Sec. 86 (1)(a)/42 and Sec. 49 of the Act as well as losing sight of the object behind the same provisions.*



## Legal Issues

APTEL's Judgment dtd. 11/7/2006.....

- APTEL held .....
  - *Neither Sec. 38 (2)(d) nor Sec. 39 (2) (d) nor Sec. 42 (2) which provides for Open Access warrants or stipulates that an existing consumers who seek an open access shall cease to be a consumer of a area Discom*
  - *In law and as per statutory provisions so long as Appellant desires to continue its relationship with area distribution licensse and agreed to abide by the stipulation, there can be no direction or compulsion to sever its contractual relationship as a consumer*





# Legal Issues

APTEL's Judgment dtd. 11/7/2006.....

- APTEL held .....
  - *Sec. 49 provides for an agreement being entered into when open access is allowed to consumers for supply or purchase of electricity on such terms and conditions including tariff as may be agreed upon. We do not find any justifiable reason for the direction issued by the Commission in this respect.*
  - *So long as an open access consumers abides by the subsisting terms and conditions as are applicable to identical industries the Discom is obliged to supply and the standby energy has to be supplied subject to terms to be agreed between Discom and the OA consumers*



## Legal Issues

### APTEL's Judgment – Finality!

- Rulings relating to 'wheeling charges' went up to Supreme Court.
- Rulings regarding definition of consumer/ relationship of consumer with Discom not challenged.

**However, APTEL's judgment predates the 2007 amendment based on which AG opined in the present context**



# COMMERCIAL ISSUES

## Commercial Issues

# **IMPACT OF DEEMED 'OA' ON DISCOM'S REVENUE**



## Impact of deemed OA on Discom's revenue

- Freedom to negotiate tariff & terms with existing supplier or switch to alternate supplier
- Percentage of such consumers switch to alternate supplier
- Impact under various scenarios of sale of such surplus power to:
  - Existing consumers
  - Only to existing subsidized consumer categories
  - Other licensees and OA consumers
  - Reduction in schedule of power to that extent

## Commercial Issues



# **WHEELING AGREEMENT V/S. SUPPLY AGREEMENT**



# Wheeling Agreement v/s Supply Agreement

- Existing agreement to be replaced by Wheeling Agreement by considering following aspects :

Particulars	As per Supply /Contract Agreement	Anticipated Modification
Requirement of demand	KVA basis ( deemed consideration as 24 hrs)	Time interval basis with corresponding quantum
Commencement of Supply	Three months after intimation from Discom	Choice may be given to intending consumer
Charges of Supply	Applicable as per Standard Tariff Schedule	To be negotiated based on mutual agreement
Period of Agreement	Minimum two years from date of commencement	Lock in period of two years to be relaxed
Interruption of Supply	Consumer is liable to pay fixed charges	Consumer may be compensated for fixed charges
Exceeding Contract demand	Additional Charges -- No compensation on reduction of drawal	Charges may be defined by Commission for deviation on both sides
Power Factor	Power factor is to be maintained as 85%	The additional charges may be introduced by Commission

# Commercial Issues



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## **BILLING, COLLECTION AND DISBURSEMENT**





## Billing , Collection and Disbarment

Forum of Regulators

- SERCs may work out billing and collection procedures based on the FOR Model Regulations on
  - Terms and Conditions of Intra-State Open Access Regulations



Operational Issues



# **SCHEDULING AND ENERGY ACCOUNTING**



# Scheduling and Energy Accounting

- SERCs may work out operational model for Scheduling and Energy Accounting at two stages,
  - Distribution companies and
  - SLDC level:
- As per FOR Model regulation Scheduling requirement can be introduced for 10 MW and above OA consumers
- Intra State ABT may be introduced to enhance efficiency of dispatch function so as to enable smooth operation of large number of transaction

## Other Issues



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# **PERFORMANCE STANDARDS & GRIEVANCE REDRESSAL**



# Performance Standards & Grievance Redressal System

Forum of Regulators

- Performance standard for utility for such deemed open access consumers
  - Only Wheeling related parameters to be considered
  - Reliability Indices
    - SAIDI
    - SAIFI
- Existing grievances redressal mechanism  
Forum of Ombudsman may continue to entertain such deemed open access consumers



# **IMPACT ANALYSIS- GUJARAT CASE STUDIES**



# Potential Consumers - MGVCL

## Potential Consumers of Open Access

		<b>MGVCL</b>
<b>Total Consumers</b>	Nos	<b>2731559</b>
<b>Total Connected load</b>	MW	<b>7235</b>
<b>Total HT Consumers</b>	Nos	<b>1387</b>
<b>Total Connected load of HT Consumers</b>	MW	<b>1022</b>
<b>Consumers of 1 MW and Above</b>	Nos	<b>144</b>
<b>@ 1 MW and Above</b>	MW	<b>685</b>
<b>% of load of 1 MW and Above cons.</b>	%	<b>9.5%</b>
<b>HT Express Feeder</b>	Nos.	<b>84</b>
<b>EHT Express Feeder</b>	Nos.	<b>41</b>
<b>Total HT+EHT Express Feeder</b>	Nos	<b>125</b>
<b>% of Potential Consumer (1 MW &amp; above)</b>	%	<b>86% (595 MW)</b>

(Source : [www.gercin.org](http://www.gercin.org) , MGVCL)



## Gujarat Case Study : MGVCL 2011-12

### Forum of Regulators

#### Scenario IA

All  $\geq 1$  MW consumers source power from out side and Discom sells surplus power to its existing consumers on pro-rata basis

#### Scenario IB

All  $\geq 1$  MW consumers source power from out side and Discom sells surplus power to its subsidized consumers on pro-rata basis

#### Scenario IIA

All  $\geq 1$  MW consumers source power from out side and Discom sells surplus power outside

#### Scenario IIB

All  $\geq 1$  MW consumers source power from out side and Discom doesn't schedule such surplus power (avoids power purchase)

#### Scenario IIIA

All  $\geq 1$  MW consumers source power from local Discom & Discom sells the power at the same retail tariff to such OA consumers

#### Scenario IIIB

All  $\geq 1$  MW consumers source power from local Discom & Discom sells the power at 10% higher retail tariff

#### Scenario IVA

50 % consumer of  $\geq 1$  MW consumers source power from outside and Discom sells the surplus power to the remaining consumers on Pro rata basis

#### Scenario IV B

50% of all  $\geq 1$  MW consumer/ (having express feeder) source power from local Discom & Discom sells the surplus power in open market @ 4.74 Rs/Unit





## Scenario – I A

**All  $\geq 1$  MW consumers source power from out side and Discom sells surplus power to its existing consumers on pro-rata basis**

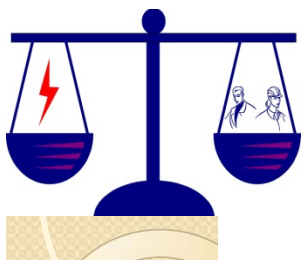
	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	Formulae
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	<b>W</b>
	Total Revenue with Subsidy	Rs. Cr.				3317	<b>X</b>
	•Tariff Income	Rs. Cr.				2746	<b>Y</b>
	•Subsidy Amount	Rs. Cr.				76	<b>Z</b>
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	<b>O</b>
	•Other Income	Rs. Cr.				59	<b>P</b>
	Average Revenue Realization	Rs. /kWh				4.64	<b>S=X*10/W</b>
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	<b>A</b>
	Average cost of Supply	Rs./kWh				4.76	<b>B=A*10/W</b>
	<b>Tariff Income with FPPPA</b>	<b>Rs. Cr.</b>	<b>1390.613</b>	<b>221</b>	<b>1570</b>	<b>3182</b>	<b>C</b>
	<b>Average revenue Reliasation (Tariff Income)</b>	<b>Rs. /kWh</b>	<b>5.49</b>	<b>5.67</b>	<b>3.71</b>	<b>4.45</b>	<b>D=C*10/W</b>
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			<b>E</b>
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			<b>F</b>
	Average revenue realization $\geq 1$ MW	Rs. /kWh	6.35	5.67			<b>G=F*10/E</b>
	Consumers $\geq 1$ MW source power from out side	MUs	<b>1642</b>	<b>388</b>			<b>H=E</b>
	<b>Loss of revenue due to such OA consumers</b>	<b>Rs. Cr.</b>	<b>1043</b>	<b>221</b>			<b>I=F</b>
	Revenue from such OA consumers by levy of CSS (Paisa 39 /kWh)	Rs.Cr.	<b>64</b>	<b>15</b>			<b>J=H*0.39/10</b>
	Revenue from sale of such surplus power to all consumer categories on pro-rata basis	Rs.Cr.	<b>198</b>	<b>0</b>	622	820	<b>K</b>
	Revenue from wheeling charges (Paisa 11/kWh)	Rs. Cr.	<b>20</b>	<b>5</b>			<b>L=(H*0.11(1+10%))/10</b>
	<b>Total Revenue Realization</b>	<b>Rs. Cr</b>	<b>629</b>	<b>20</b>	<b>2193</b>	<b>2842</b>	<b>M=L+K+J+C-I</b>
	<b>Average Revenue Realization</b>	<b>Rs./ kWh</b>				<b>3.97</b>	<b>N=M/W</b>
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	<b>Rs. Cr</b>				<b>340</b>	<b>Q=C-M</b>



# Scenario – IB

All  $\geq 1$  MW consumers source power from out side and Discom sells surplus power to its subsidized consumers on pro-rata basis

	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	Formulae
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	<b>W</b>
	Total Revenue with Subsidy	Rs. Cr.				3317	<b>X</b>
	•Tariff Income	Rs. Cr.				2746	<b>Y</b>
	•Subsidy Amount	Rs. Cr.				76	<b>Z</b>
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	<b>O</b>
	•Other Income	Rs. Cr.				59	<b>P</b>
	Average Revenue Realization	Rs. /kWh				4.64	<b>S=X*10/W</b>
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	<b>A</b>
	Average cost of Supply	Rs./kWh				4.76	<b>B=A*10/W</b>
	<b>Tariff Income with FPPPA</b>	<b>Rs. Cr.</b>	<b>1390.613</b>	<b>221</b>	<b>1570</b>	<b>3182</b>	<b>C</b>
	<b>Average revenue Realization (Tariff Income)</b>	<b>Rs. /kWh</b>	<b>5.49</b>	<b>5.67</b>	<b>3.71</b>	<b>4.45</b>	<b>D=C*10/W</b>
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			<b>E</b>
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			<b>F</b>
	Average revenue Realization $\geq 1$ MW	Rs. /kWh	6.35	5.67			<b>G=F*10/E</b>
	Consumers $\geq 1$ MW source power from out side	MUs	<b>1642</b>	<b>388</b>			<b>H=E</b>
	Loss of revenue due to such OA consumers	Rs. Cr.	<b>1043</b>	<b>221</b>			<b>I=F</b>
	Revenue from such OA consumers by levy of CSS	Rs.Cr.	<b>64</b>	<b>15</b>			<b>J=H*0.39/10</b>
	Revenue from sale of such surplus power to subsidized consumer categories on pro-rata basis	Rs.Cr.	<b>0</b>	<b>0</b>	610	610	<b>K</b>
	Revenue from wheeling charges (Paisa 11/kWh)	Rs. Cr.	<b>20</b>	<b>5</b>			<b>L=(H*0.11(1+10%))/10</b>
	<b>Total Revenue Realization</b>	<b>Rs. Cr</b>	<b>431</b>	<b>20</b>	<b>2180</b>	<b>2631</b>	<b>M=L+K+J+C-I</b>
	<b>Average Revenue Realization</b>	<b>Rs./kWh</b>				<b>3.68</b>	<b>N=M/W</b>
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	<b>Rs.Cr.</b>				<b>551</b>	<b>Q=C-M</b>



## Scenario – IIA

All  $\geq 1$  MW consumers source power from out side and Discom sells surplus power outside

	Consumer categories	Unit	HT consumers	Railways	Other categories	All Categories	
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	W
	Total Revenue with Subsidy	Rs. Cr.				3317	X
	•Tariff Income	Rs. Cr.				2746	Y
	•Subsidy Amount	Rs. Cr.				76	Z
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	O
	•Other Income	Rs. Cr.				59	P
	Average Revenue Realization	Rs./kWh				4.64	$S=X*10/W$
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	A
	Average cost of Supply	Rs./kWh				4.76	$B=A*10/W$
	<b>Tariff Income with FPPPA</b>	<b>Rs. Cr.</b>	1390.613	221	1570	3182	C
	<b>Average revenue Realization (Tariff Income)</b>	<b>Rs./kWh</b>	5.49	5.67	3.71	4.45	$D=C*10/W$
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			E
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			F
	Average revenue Realization $\geq 1$ MW	Rs./kWh	6.35	5.67			$G=F*10/E$
	Consumers $\geq 1$ MW source power from out side	MUs	1642	388			H=E
	Loss of revenue due to such OA consumers	Rs. Cr.	1043	221			I=F
	Revenue from such OA consumers by levy of CSS	Rs.Cr.	64	15			$J=H*0.39/10$
	Revenue from sale of such surplus power to out side	Rs.Cr.	0	0	1059	1059	K
	Revenue from wheeling charges (Paisa 11/kWh)	Rs. Cr.	20	5			$L=(H*0.11(1+10\%))/10$
	<b>Total Revenue Realization</b>	<b>Rs. Cr</b>	431	20	2629	3080	$M=L+K+J+C-I$
	<b>Average Revenue Realization</b>	<b>Rs./kWh</b>				4.31	$N=M/W$
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	<b>Rs. Cr.</b>				102	$Q=C-M$



## Scenario – IIB

All  $\geq 1$  MW consumers source power from out side and Discom doesn't schedule such surplus power

	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	W
	Total Revenue with Subsidy	Rs. Cr.				3317	X
	•Tariff Income	Rs. Cr.				2746	Y
	•Subsidy Amount	Rs. Cr.				76	Z
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	O
	•Other Income	Rs. Cr.				59	P
	Average Revenue Realization	Rs. /kWh				4.64	$S=X*10/W$
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	A
	Average cost of Supply	Rs./kWh				4.76	$B=A*10/W$
	<b>Tariff Income with FPPPA</b>	<b>Rs. Cr.</b>	1390.613	221	1570	3182	C
	<b>Average revenue realisation (Tariff Income)</b>	<b>Rs. /kWh</b>	5.49	5.67	3.71	4.45	$D=C*10/W$
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			E
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			F
	Average revenue Realization $\geq 1$ MW	Rs. /kWh	6.35	5.67			$G=F*10/E$
	Consumers $\geq 1$ MW source power from out side @Rs.4.74	MUs	1642	388			H=E
	Loss of revenue due to such OA consumers	Rs. Cr.	1043	221			I=F
	Revenue from such OA consumers by levy of CSS	Rs.Cr.	64	15			$J=H*0.39/10$
	Saving from Energy Charge by not purchasing power @ Variable cost o: Rs. 1.82/kWh	Rs.Cr.	299	71			K
	Revenue from wheeling charges (Paisa 11/kWh)	Rs. Cr.	20	5			$L=(H*0.11(1+10\%))/10$
	Total Revenue Realization	Rs. Cr	730	91	1570	2391	$M=L+K+J+C-I$
	Average Revenue Realization	Rs/kWh				3.34	$N=M/W$
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	Rs Cr.				791	$Q=C-M^{43}$



## Scenario – IIIA

All  $\geq 1$  MW consumers source power from local Discom & Discom sells the power at the same retail tariff

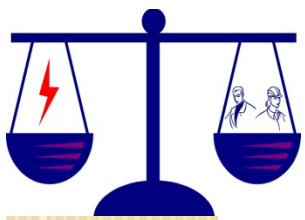
	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	
<b>A)</b>	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	W
	Total Revenue with Subsidy	Rs. Cr.				3317	X
	•Tariff Income	Rs. Cr.				2746	Y
	•Subsidy Amount	Rs. Cr.				76	Z
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	O
	•Other Income	Rs. Cr.				59	P
	Average Revenue Realization	Rs. /kWh				4.64	$S=X*10/W$
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	A
	Average cost of Supply	Rs./kWh				4.76	$B=A*10/W$
	<b>Tariff Income with FPPPA</b>	Rs. Cr.	1390.613	221	1570	3182	C
	Average revenue realisation (Tariff Income)	Rs. /kWh	5.49	5.67	3.71	4.45	$D=C*10/W$
<b>B)</b>	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			E
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			F
	Average revenue realization $\geq 1$ MW	Rs. /kWh	6.35	5.67			$G=F*10/E$
	Consumers $\geq 1$ MW source power from Discom	MUs	1642	388			H=E
	Revenue from such OA consumers by selling power at same retail tariff	Rs. Cr.	1043	221			I=F
	Revenue from such OA consumers by levy of CSS	Rs.Cr.	0	0			J
	Revenue from wheeling charges (Paise 11/kWh)	Rs. Cr.	20	3			$K=(H*0.11(1+10\%))/10$
	Total Revenue Realization	Rs.Cr	1410	225	1570	3206	L=K+C+J
	Average Revenue Realization	Rs/kWh				4.48	M=L/W
<b>C)</b>	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	Rs.Cr				- 24	N=C-M



## Scenario – IIIB

All  $\geq 1$  MW consumers source power from local Discom & Discom sells the power at 10% higher retail tariff

	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	W
	Total Revenue with Subsidy	Rs. Cr.				3317	X
	•Tariff Income	Rs. Cr.				2746	Y
	•Subsidy Amount	Rs. Cr.				76	Z
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	O
	•Other Income	Rs. Cr.				59	P
	Average Revenue Realization	Rs. /kWh				4.64	$S=X*10/W$
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	A
	Average cost of Supply	Rs./kWh				4.76	$B=A*10/W$
	<b>Tariff Income with FPPPA</b>	Rs. Cr.	1390.613	221	1570	3182	C
	Average revenue realisation (Tariff Income)	Rs. /kWh	5.49	5.67	3.71	4.45	$D=C*10/W$
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			E
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			F
	Average revenue Realization $\geq 1$ MW	Rs. /kWh	6.35	5.67			$G=F*10/E$
	Consumers $\geq 1$ MW source power from local Discom	MUs	1642	388			H=E
	Revenue from such OA consumers by selling power at 10% higher retail tariff	Rs. Cr.	1043	221			I=F
	Revenue from such OA consumers by levy of CSS	Rs.Cr.	0	0			J
	Revenue from wheeling charges (Paise 11/kWh)	Rs. Cr.	20	3			$K=(H*0.11(1+10\%))/10$
	Total Revenue Realization	Rs. Cr	1515	248	1570	3333	$L=C+I+J+K-F$
	Average Revenue Realization	Rs./kWh				4.66	$M=L/W$
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	Rs.Cr				- 151	$N=C-M^{45}$



## Scenario – IV A

50% of all  $\geq 1$  MW consumers source power from local Discom & Discom sells the surplus power to the remaining consumers on Pro rata basis

	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	W
	Total Revenue with Subsidy	Rs. Cr.				3317	X
	•Tariff Income	Rs. Cr.				2746	Y
	•Subsidy Amount	Rs. Cr.				76	Z
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	O
	•Other Income	Rs. Cr.				59	P
	Average Revenue Realization	Rs./kWh				4.64	$S=X*10/W$
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	A
	Average cost of Supply	Rs./kWh				4.76	$B=A*10/W$
	<b>Tariff Income with FPPPA</b>	Rs. Cr.	1390.613	221	1570	3182	C
	Average revenue Realization (Tariff Income)	Rs./kWh	5.49	5.67	3.71	4.45	$D=C*10/W$
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			E
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			F
	Average revenue Realization $\geq 1$ MW	Rs./kWh	6.35	5.67			$G=F*10/E$
	Revenue from 50 % Consumers $\geq 1$ MW source power from local discom	Rs. Cr	574	121			H=E
	Revenue from sale of surplus power to other categories on pro rata basis .	Rs. Cr.	159	18	260		I=F
	Revenue from such OA consumers by levy of CSS	Rs. Cr.	32	08			J
	Revenue from wheeling charges (Paise 11/kWh)	Rs. Cr.	20	5			$K=(H*0.11(1+10\%))/10$
	Total Revenue Realization	Rs. Cr	1132	152	1570	2854	$L=C+H+I+J+K-F$
	Average Revenue Realization	Rs./KWh				3.99	$M=L/W$
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	Rs. Cr				328	$N=C-M$ <sup>46</sup>





## Scenario – IV B

50% of all  $\geq 1$  MW consumers source power from local Discom & Discom sells the surplus power in open market @ 4,74 Rs/Unit

	Consumer categories	Unit	HT Consumers	Railways	Other categories	All Categories	
A)	<b>Total Revenue Realization (Existing)</b>						
	Total Sales	MU	2533	388	4233	7154	W
	Total Revenue with Subsidy	Rs. Cr.				3317	X
	•Tariff Income	Rs. Cr.				2746	Y
	•Subsidy Amount	Rs. Cr.				76	Z
	•FPPPA Charges @61 Paise /kWh	Rs. Cr.				436	O
	•Other Income	Rs. Cr.				59	P
	Average Revenue Realization	Rs. /kWh				4.64	$S=X*10/W$
	Total Annual Revenue Requirement	Rs. Cr.				3404.3	A
	Average cost of Supply	Rs./kWh				4.76	$B=A*10/W$
	<b>Tariff Income with FPPPA</b>	Rs. Cr.	1390.613	221	1570	3182	C
	Average Revenue Realization (Tariff Income)	Rs. /kWh	5.49	5.67	3.71	4.45	$D=C*10/W$
B)	<b>Total Revenue Realization (Revised)</b>						
	Consumption of Consumers $\geq 1$ MW	MUs	1642	388			E
	Total Revenue Realization in Rs. Cr. $\geq 1$ MW	Rs. Cr.	1043	221			F
	Average Revenue Realization $\geq 1$ MW	Rs. /kWh	6.35	5.67			$G=F*10/E$
	Revenue from 50 % Consumers $\geq 1$ MW source power from local discom.	Rs. Cr	574	121			H=E
	Revenue from sale of surplus power in open market @ 4.74/unit	Rs. Cr.	389	92			I=F
	Revenue from such OA consumers by levy of CSS	Rs. Cr.	32	8			J
	Revenue from wheeling charges (Paise 11/kWh)	Rs. Cr.	20	5			$K=(H*0.11(1+10\%))/10$
	Total Revenue Realization	Rs. Cr.	1362	226	1570	3159	L=
	Average Revenue Realization	Rs./kWh				4.42	$M=L/W$
C)	<b>Gap ( +ve Losses &amp; -ve Gain)</b>	Rs. Cr				23	$N=C-M$





# Open Access Consumer $\geq$ 1 MW

Particulars	Long term	
	Case I	Case II
Power Purchase cost assumed	4.00	3.00
HT Industry Tariff $\geq$ 1 MW : MGVCL	5.74	5.74
Intra State Open Access		
Open Access Charges Payable including Losses	1.25	1.09
Net Cost payable by intra-State OA Consumers (including cost of procurement)	5.25	4.09
Difference (Rs/ kWh)-Intra State	-0.49	-1.65
Inter State Open Access within the region (VWR)		
Open Access Charges Payable including Losses	2.36	1.97
Net Cost payable by inter-State OA Consumers (including cost of procurement)	6.36	4.97
Difference (Rs/ kWh)-Inter State	0.62	-0.77



## Forum of Regulators

# Thank You!

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