FORUM OF REGULATORS (FOR)

WORKING GROUP REPORT

ON

"METERING ISSUES"

AUGUST, 2009

FORUM OF REGULATORS (FOR)
Sectt: C/o Central Electricity Regulatory Commission (CERC)
3rd & 4th Floor, Chanderlok Building, 36 Janpath, New Delhi
www.forumofregulators.org

Table of Contents

S.No.	Contents	Page No.
i)	**Executive Summary**	**i - ii**
I	**Introduction**	1-6
II	**Enabling Legal and other Provisions on Metering Issues**	7-9
	1. Provisions in the Electricity Act, 2003	7
	2. National Electricity Policy (NEP)	8
	3. National Tariff Policy	8
	4. Consultative Committee	8
	5. Resolution adopted by the Chief Minister's Conference on Power (28th May,2007)	9
III	**Status of Metering in States / Utilities and Road Map**	10-12
IV	**Installation of Meters**	13-15
V	**Testing of Meters**	16-17
VI	**Replacement and Rectification of Defective Meters**	18
VII	**Reading of Meters and Billing**	19-20
VIII	**Assessment of Consumption in Respect of Un-metered Supply**	21
IX	**Metering of Distribution Transformers**	22
X	**Appropriate Metering Technologies**	23-25
	1. Time of the Day (TOD) Metering	23
	2. kVAh Metering as a check on Power Factor	23
	3. Pre-paid Metering	24
XI	**Summary of Recommendations**	26-31

ANNEXURES

S.No.	Contents	Page No.
I	Minutes of the Meeting of the Working Group on “Metering Issues”	32-59
II	List of Participants in the Second Meeting of the Working Group on “Metering Issues”	60
III	Status of Consumer and DTS Metering and practices	61-185
IV	Presentation – NDPL	186-213
V	Presentation – CEA	214-221
VI	Presentation – WBSEDCL	222-235
VII	Presentation – WBSEDCL	236-250
VIII	Presentation - UERC	251-293
IX	Copy of CEA’s Regulations on installation and operation of meters	294-313
X	Extract on Metering and Billing in the DERC Supply Code Performance Standard Regulation, 2007	314-327
XI	Anti Tampering features approved by DERC	328
XII	Supreme Court Judgments	329-365
XIII	Note of CEA on ‘Open Standard Communication Protocol for Electrical Energy Metering’	366-368
XIV	Schedule – III, extract from the DERC Supply Code and Standard of Performance Regulations, 2007	369-375
XV	kVAh Billing Issues	376-381
XVI	Sample specifications of APFC panels	382-390

EXECUTIVE SUMMARY

In accordance with the provision of the Electricity Act, 2003 in Section 55, no licensee shall supply electricity, after the expiry of two years from the appointed date, except through installation of a correct meter in accordance with the regulations to be made in this behalf by the Authority (means the Central Electricity Authority) with a proviso that the State Commission may, by notification, extend the said period of two years for a class or classes of persons or for such area as may be specified in that notification. The National Electricity Policy reinforces this provision of the Act. The National Tariff Policy provides incentives to encourage metering and billing based on metered tariffs.

Given the above statutory provision and the fact that proper and correct metering is an essential pre-requisite for systematically implementing most of the distribution reform measures, including that of reduction of aggregate transmission and commercial s (AT&C) losses in a time-bound manner, the Forum of Regulators (FOR) in its meeting held on September 26,2008 felt the need for a thorough examination of issues relating to metering, analysis of factors inhibiting states and utilities to properly and correctly meter and bill all consumption of electricity in a transparent manner and to check unnoticed wastage and pilferage. For this purpose, it constituted a 'Working Group on Metering Issues' for detailed examination.

The issues examined and deliberated upon by the Working Group included : (a) road map for 100 percent metering; (b) meter installation standards and practices; (c) adherence to CEA's regulations; (d) distribution transformers (DT) metering for energy accounting; (e) consumer indexing; (f) third-party testing of meters; (g) time of the day (TOD) metering, kVAh metering, and pre-paid metering; (h) metering of agricultural consumers; (i) measurement of unmetered supply; (j) meter reading and billing practices; (k) consumer inducement measures through tariff intervention; and (l) innovative and new metering technologies, etc.

Metering Issues

The report adopted by FOR in its meeting held on June 12, 2009 has made several recommendations on metering and billing. Some pertinent ones are as follows:

- While endeavouring to achieve 100 percent metering within the targetted time frame and to ensure installation of meters as per CEA regulations and in accordance with code on installation and testing as per new BIS standard, robust and cost-effective technology for Automated Meter Reading (AMR) should be evolved specifically for rural areas.
- The State Electricity Regulatory Commissions (SERCs) should lay down a time frame for replacing electro-mechanical meters with advanced technology meters, focusing on high-loss areas.
- Adopt appropriate procedures for installation of meters, third-party testing of meters through accredited institutions and companies including financially supporting them.
- Undertake and complete consumer indexing on a time-bound basis.
- Transformer metering to be undertaken compulsorily with focus on energy accounting and should be read through remote control devices.
- Use appropriate metering technology including TOD metering, pre-paid metering, kVAh metering etc.
- Suitable tariff intervention by SERCs to induce and encourage consumers to prefer metered supply.

****

I INTRODUCTION

1. The Forum of Regulators (FOR) is a statutory body constituted under section 166(2) of the Electricity Act, 2003. It is headed by the Chairperson, Central Electricity Regulatory Commission (CERC), with Chairpersons of all State Electricity Regulatory Commissions (SERCs) as its members. FOR has been entrusted with the responsibility of evolving a common and coordinated approach to various issues concerning SERCs in the country. One of the important functions of FOR is to undertake research on issues relevant to power sector regulation, either in-house or through outsourcing. With this objective in view, FOR has established working groups to look into various regulatory matters that impinge on the electricity sector. Some SERCs are members of these working groups.

2. In its meeting held on September 26,2008, FOR observed that the following matters had not received sufficient attention:

(i) Proper and correct metering, which is an essential prerequisite for systematic implementation of distribution reform measures; and
(ii) Reduction in aggregate transmission and commercial (AT&C) losses in a time-bound manner.

It, therefore, felt that there was a need for: (i) a thorough examination of issues relating to metering; (ii) analysis of factors inhibiting utilities / states to properly and correctly meter and bill all consumption of electricity supplied in a transparent manner; and (iii) check unnoticed wastage and pilferage. FOR, therefore, constituted a Working Group on Metering Issues for detailed deliberations and to make suitable recommendations.

3. The Working Group consists of the following members:

(i)	Chairperson, CERC	…	Chairman of the Working Group
(ii)	Chairperson, AERC	…	Member
(iii)	Chairperson, GERC	…	Member
(iv)	Chairperson, HERC	…	Member
(v)	Chairperson, KSERC	…	Member
(vi)	Chairperson, MERC	…	Member
(vii)	Chairperson, TNERC	…	Member
(viii)	Chairperson, UERC	…	Member
(ix)	Secretary, CERC	…	Member
(x)	Deputy Chief (RA), CERC	…	Coordinator.

4. Besides the above members, a representative of the Central Electricity Authority (CEA), Shri K. Venugopal, Member DERC and Shri V.K. Khanna, Advisor FOR have also been included as special invitees to this Working Group. It was decided that this Working Group would inter alia consider the relevant provisions of the Electricity Act, 2003, the National Electricity Policy, Tariff Policy, CEA's regulations on installation and operation of meters, the best practices adopted with regard to metering by some of the progressive states and give its recommendations on the following issues:

- Strategy to achieve complete metering in all the states in a time-bound manner particularly, metering of consumers and distribution transformers (DTs);.
- Measures to ensure proper and correct recording of electricity supplied through meters;
- Measures to induce consumers to opt for metered supply;
- Mechanism and norms for best assessment of measurement of electricity in cases of select categories or target groups where, due to certain adverse geographical conditions, installation or operation of meters is likely to take some time;
- Monitoring mechanism at the field and corporate level of utilities to watch and ensure implementation of:
    - Proper installation and operation of meters
    - Replacement of defective meters
    - Meter reading and billing

Metering Issues

- Realization of gains from metering DTs and subsequently improving the quality of supply and service;
- Use of prepaid meters;
- Appropriate metering technology for different category of consumers; and
- Any other relevant issue.

5. The first meeting of the Working Group was held on November 11, 2008 at CERC. (See Annexure- I for a copy of the minutes of the meeting.)

6. At this meeting, the Group emphasized the need for the latest data on the status of category wise metering and practices of consumers and DTs metering. It deliberated on major areas of concern covering a roadmap for 100 percent metering of consumers. This includes: (i) meter installation standards and practices and whether CEA's regulation in this regard are being adhered to by utilities or not; (ii) consumer indexing; (iii) third-party testing; (iv) Time of the Day (TOD) metering; (v) kVAh metering (to check on power factor); and (vi) pre-paid metering and issues concerning metering of agricultural consumers. Alongside metering, the group touched upon the most pertinent issue of meter reading and billing which is so crucial for augmenting revenue generation of utilities. The inducement to consumers to opt for metering or metered supply through tariff intervention by SERCs and other promotional and publicity measures by utilities were also addressed. The Group also felt the need to study the practices in the area of metering, reading and billing in those states and utilities that have taken innovative measures and adopted new technologies with success.

7. The second meeting of the Working Group was held at Almora, Uttarakhand on February 21, 2009. (See Annexure- II for list of participants.)

8. The report on the status of metering prepared by the FOR Secretariat was presented and the members of the group were briefed at the meeting. (See Annexure-III for a copy of the report**.)**

Metering Issues

9. The following presentations were made:

(i) The CEO of North Delhi Power Limited (NDPL), New Delhi (a joint venture of Tata Power and Government of National Capital Territory of Delhi (GONCTD) and the Head (Commercial) made a presentation on metering at NDPL and their experience on loss reduction and theft prevention. (See Annexure-IV for a copy of the presentation.)

The highlights of the presentation are:

- When NDPL took over the business of distribution in Delhi, AT&C losses were more than 50 percent, the concept of IT was non-existent, and consumer services and supply systems were on the verge of collapse;
- NDPL's endeavour to improve metering, billing and supply systems to eradicate the inherited problems of supply in the areas under their jurisdiction enabled the reduction of AT&C losses by about 17 percent within five years.
- NDPL adopted open standards for meter communication protocols, and Devices Language for Message Specification (DLMS) and Companion Specifications Energy Metering (COSEM) defined in IEC 62056;
- Electronic meters with continuous tamper proofing upgrades were provided;
- Group metering and scaling (using directly pluggable meters at premises) were used to prevent tampering;
- Guidelines and standards were laid down for meter reading methods;
- Automated Meter Reading (AMR) and Hand Held Devices (HHD) for meter reading were used;
- Smart card and spot billing were also adopted;
- Majority of billing (around 70 percent) was based on GSM communication technology;
- Low power radium, Power Line Carrier Communications (PLCC) and split metering were used;
- In the case of split metering, data through PLCC was transferred from meters and the pole to display devices at the consumers' premises;

Metering Issues

- All government department consumers up to 45 kW were shifted to pre-paid meters;
- Reduction of provisional billing to less than one percent, that is even lower than the maximum level of 2 percent prescribed by DERC; and
- Instant release of new connections (3-13 days time for installation of new meters) was made possible through the use of GIS;

(ii) The Chief Engineer, CEA made a presentation on metering issues covering salient features of existing regulations and proposed amendments, new metering solutions, protocol for communication with meters, kVAh metering etc. (See Annexure-V for a copy of the presentation.)**.**

It was pointed out that for third-party testing of meters, the party should have the capability of down-loading data, checking accuracy of meters and cases of tampering including DC/harmonic injections. The party selected should be well equipped to undertake tamper analysis. Some anti-tamper features have already been provided in the CEA and DERC regulations. New features can be approved and incorporated by the SERCs. The CEA is in the process of laying down detailed procedures for field testing of meters according to IEC's standards and for common protocol for meters as testing through the Central Power Research Institute (CPRI) or other accredited laboratories is costly.

(iii) The West Bengal State Electricity Distribution Company Ltd. (WBSEDCL) also made presentations on metering and reduction on AT&C losses achieved by them in West Bengal through various metering innovations and through spot billing. (See Annexures-VI and VII for a copy of these presentations.)

(iv) The UERC also gave a brief presentation about its experiences on metering and billing issues. (See Annexure-VIII**.)**

Metering Issues

10. The Group felt that the entire gamut of metering, reading of meters and billing depends on how seriously the matter is taken by the states and utilities, consumer cooperation and vigilance. Effective implementation in the larger interest of both consumers and utilities will depend on numerous factors. The regulatory role will include: (i) tariff intervention that induces consumers to opt solely for metering and metered supply; (ii) various checks and balances to ensure that the ultimate goal of metering serves the purpose; and finally, (iii) punitive action as per law in cases of non-compliance or default.

11. The report of the Working Group has made recommendations after incorporating the relevant issues. The report is presented in the following chapters:

Chapter II: Enabling Legal and other Provisions on Metering Issues
Chapter III: Status of Metering in States and Utilities and Road Map
Chapter IV: Installation of Meters
Chapter V: Testing of Meters
Chapter VI: Replacement and Rectification of Defective Meters
Chapter VII: Reading of Meters and Billing
Chapter VIII: Assessment of Consumption for Un-Metered Supply
Chapter IX: Metering of Distribution Transformers
Chapter X: Appropriate Metering Technologies
- i Time of Day (TOD) Metering
- ii kVAh Metering
- iii Pre-paid Metering

Chapter XI: Summary of Recommendations

II Enabling Legal and Other Provisions on Metering Issues

1. Provisions in the Electricity Act, 2003.

- ***Use, etc. of meters (Section 55)***
  - *No licensee shall supply electricity, after the expiry of two years from the appointed date, except through installation of a correct meter in accordance with the regulations to be made in this behalf by the Authority;*

    PROVIDED that the licensee may require the consumer to give him security for the price of a meter and enter into an agreement for the hire thereof, unless the consumer elects to purchase a meter:

    PROVIDED FURTHER that the State Commission may, by notification, extend the said period of two years for a classes of persons or for such area as may be specified in that notification.
  - *For proper accounting and audit in the generation, transmission and distribution or trading of electricity, the Authority may direct the installation of meters by a generating company or licensee at such stages of generation, transmission or distribution or trading of electricity and at such locations of generation, transmission or distribution or trading, as it may deem necessary.*
  - *If a person makes default in complying with the provisions contained in this section or the regulations made under sub-section (1), the Appropriate Commission may make such order as it thinks fit for requiring the default to be made good by the generating company or licensee or by any officers of a company or other association or any other person who is responsible for its default.*

- ***The Electricity Supply Code Section [1]50***
  - *The State Commission shall specify an electricity supply code to provide for recovery of electricity charges, intervals for billing of electricity charges, disconnection of supply of electricity for non-payment thereof, restoration of supply of electricity, measures for preventing tampering, distress or damage to electrical plant or electrical line or meter, entry of distribution licensee or any person acting on his behalf for disconnecting supply and removing the meter, entry for replacing, altering or maintaining electric lines or electrical plants or meter and such other matters.*

2. National Electricity Policy (NEP)

Para 5.4.8 to 5.4.10 of National Tariff Policy and relevant to metering issues as reproduced below:

5.4.8 *The Act mandates supply of electricity through a correct meter within a stipulated period. The Authority should develop regulations as required under section 55 of the Act within three months.*

5.4.9 *The Act required all consumers to be metered within two years. The SERCs may obtain from the Distribution Licenses 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.*

5.4.10 *Modern information technology systems may be implemented by the utilities on a priority basis, after considering cost and benefits, to facilitate creation of network information and customer data base which will help in management of load, improvement in quality, detection of theft and tampering, customer information and prompt and correct billing and collection. Special emphasis should be placed on consumer indexing and mapping in a time-bound manner. Support is being provided for information technology based systems under the Accelerated Power Development and Reforms Programme (APDRP).*

3. National Tariff Policy

- Sub-para 3 of Para 8.4 of the National Tariff Policy, emphasizing the metered tariff, states that:

  '*The State Commission may provide incentives to encourage metering and billing based on metered tariffs, particularly for consumer categories that are presently un-metered to a large extent. The metered tariffs and the incentives should be given wide publicity.*'

4. Consultative Committee

Even the Consultative Committee of Members of Parliament of the Ministry of Power, in its meeting on May 12, 2005 opined that 100 percent metering of consumers is a must.

5. Resolution adopted by the Chief Minister's Conference on Power (May 28, 2007).

On the very pertinent issue of reduction of AT&C losses and establishing the necessary baseline data which would appropriately flow from proper and correct metering, one of the resolutions adopted by the last Chief Ministers' Conference on May 28, 2007 is of relevance, and is reproduced below:

> *"The Conference recognizes that the current level of AT&C losses constitute a grave threat to the viability of the power sector and the distribution segment, which is currently losing about Rs.47,000 crore per annum, is the weakest link in the power system; and resolves that the States commit themselves to achieve and sustain drastic reduction in the overall AT&C losses through the next five years, and at least to a level of 15% in the APDRP project areas as has been demonstrated by the participating States in 163 towns and cities. Towards this end, the States with appropriate assistance from the Centre would establish the necessary baseline data and IT applications for energy accounting and auditing, besides ensuring a resolute elimination of electricity theft, which is negating various investments and initiatives for power sector reforms. It is further reiterated that where free or subsidized power is provided to a section of Consumers, the State Governmen. shall ensure upfront payment of the same to the utilities."*

6. The above enabling legal and other provisions form the basic premise for examination of various issues relating to metering and making recommendations thereon by the Working Group.

III. Status of Metering in States and Utilities and Road Map

1. The current status of consumer metering and DT metering in the states and Discoms ending December, 2008 as culled from the metering report in Annexure-III**,** is abstracted in Table 1.

Table 1: Current Status of Consumer Metering and DT Metering in States/ Discoms

State	Discom	Percentage of consumer metering	Percentage of DT metering	Remarks
Haryana	DHBVNL	97	15	100% metering except Agri. (61%)
	UHBVNL	92	14	100% except Agri (32%)
Himachal Pradesh	HPSEB	100	99	About 10% meters stopped
Gujarat	UGVCL	93	58	100% metering except Agri. (30%)
	PGVCL	93	18	100% metering except Agri. (35%)
	MGVCL	99	55	100% metering except Agri. (56%)
	DGVCL	97	65	100% metering except Agri. (43%)
	Torrent (Ahd.)	100	100	
	Torrent (Surat)	100	100	
Bihar	BSEB	35 (Dom. & Agri.) 71 (Others)	8	
Karnataka	Bangalore ESCO	87	40	100% except Agri. (7%) and KJ (57%)
	Hubli ESCO	100	NA	Except Agri.
	Mysore ESCO	94	25	100% except Agri. (24%)
	Gulbarga ESCO	72.5	NA	Except Agri. & Domestic
	Mangalore	97	6.5	Except Agri. & Domestic
	Hukeri RE Coop.	86	25	100% except Agri. (33%)

Madhya Pradesh	Poorva Kshetra Vitran Co. Ltd.	68	7.5	100% except Agri. (7.5%)
	Madhya Kshetra	82	8.7	Except Agri. (8.7%)
	Paschim Kshetra	77	50	Except Agri (50%)
Maharashtra	MSEDCL	100	51	Except Agri. (44%)
	Reliance	100	100	
	Tata Power	100	100	
	BEST	100		
	Mula-Pravara	74		100% except Agri. (16%)
Orissa	CESCO	87	29	Except Agri. (9%), KJ (40%)
	NESCO	65	1	Except Agri. (21%), Dom. (64%)
	WESCO	96	78	
	SOUTHCO	99	85	KJ (18%)
Punjab	PSEB	86	5	Except Agri. (9.7%)
Uttar Pradesh	Noida Power Co.	83	NA	
Uttarakhand	UPCL	98	41	Except Agri. (87%)
Tripura	Power Dept.	92	39	100% except KJ (48%)
Delhi	BSES – YPL	100	100	
	BSES – RPL	100	95	
	NDPL	97	97	100% except JJ cluster

2. It is observed that consumer metering (except agricultural consumers) is quite satisfactory in the case of Discoms in these states except in case of Bihar State Electricity Board (BSEB). The marginal shortfalls in realizing the last milestone of achieving 100 percent consumer metering, is mainly on account of difficulties in metering supply to agricultural consumers, Kutir Jyoti single point light connections, and JJ clusters.

3. As for DT metering, far more needs to be done, except in the case of Himachal Pradesh and private Discoms.

Metering Issues

4. In order to achieve 100 percent consumer metering in a time-bound manner, practically all SERCs have issued directions and have made appropriate provisions in their regulations and the electricity supply code. Target dates set by them for achieving this are being meticulously followed and monitored by SERCs. However, due to certain ground realities, geophysical, socio-economic and political reasons, difficulties are being encountered by utilities for metering supply to agriculture and IP sets and to some degree in metering single point light connections to below poverty line (BPL) families and scheduled caste (SC) / scheduled tribe (ST) households in rural areas under Kutir Jyoti Programme, Government of India (GOI). The Working Group felt that for metering supply to agriculture, IP sets and KJ connections, the process of persuasion should continue and, if need be , the time period could be extended. However, once reasonable timelines have been set, no laxity on the part of utilities should be permitted and punitive action taken in accordance with the provision of the Electricity Act.

5. After considering the status of metering for street lighting connection, the Working Group, recommended that metering of supply for street lighting should be made compulsory.

6. The Group felt that in order to accomplish the task of 100 percent metering of agricultural consumers and ensuring that readings are taken regularly in a cost-effective manner, a robust and cost-effective technology for remote meter reading, especially agriculture in rural areas, is a prerequisite. Hence, the CEA should take up a research and development project for developing such a cost-effective Automatic Meter Reading (AMR) technology suitable for application in rural areas.

7. In order to encourage or induce consumers to opt for metered supply, appropriate tariff intervention should be made by SERCs, such as lower rates for metered supply as compared to a flat rate supply. The state governments should also be advised to limit the subsidy provisions for metered consumption up to specified limits. Such a policy of the Government of Delhi has proved effective in motivating the consumers to adopt metering.

IV. Installation of Meters

1. All SERCs should specifically lay down in their supply code that: (i) no supply will hereafter be given by them without installation of proper and correct meters; and (ii) meters installed conform to the standards and specifications as laid down by CEA in their regulations issued under Section 55 of the Electricity Act and are also in accordance with the Code on installation and testing as per the new BIS Standards. (See Annexure-IX for a copy of CEA's regulations on installation and operation of meters.)

2. Some of the guiding principles for installation of meters that should be kept in view by the utilities are enumerated below:

(i) If a consumer chooses to procure the meter himself, it should conform to the CEA's regulations and the licensee will test, install and seal the meter.

(ii) The distribution licensee has the option to install the meter either inside the house or outside, such as on the pole etc.

(iii) In case of the latter, the responsibility of safe custody of a metering unit would be that of the licensee company. However, for the meter installed within the consumer's premises, the responsibility of maintenance and safe custody would be that of the consumer's. The responsibility for maintaining the meter and keeping it in working order at all times, whether installed inside the house or outside would be that of the licensee.

(iv) The meter shall be sealed in accordance with relevant CEA regulations which provide that the lead seal shall not be used in new meters. The licensee companies shall even replace old lead seals on a time-bound basis for which SERCs should issue the requisite direction to the licensee.

(v) An appropriate procedure for the installation of a meter, including the sealing, is necessary to fix the responsibility on the officer of the licensee if any malpractice or manipulation is detected at a later stage. The DERC has provided such a procedure in its supply code. (See Annexure-X for the relevant extract on Metering and Billing in the DERC Supply Code Performance Standard Regulation, 2007 which can be adopted by all the SERCs.)

(vi) Additional features in the meters to be procured by the distribution licensees have to be approved by the SERCs. The list of standard features stipulated by DERC (Annexure - XI) should be used by other SERCs as guidelines.

3. The Working Group observed that a large numbers of electro-mechanical meters are still in use in a number of states. Keeping in view the advancement in metering technology and the related benefits in reducing losses, there is a need to phase out the electro-mechanical meter in a time-bound manner. The metering regulation specified by CEA has left this timeframe to the discretion of SERCs. The SERCs should specify this timeframe immediately and the replacement of electro-mechanical meters by static meters should be taken up on a priority basis in high loss urban areas.

4. In order to increase the confidence of consumers in new metering technologies such as static meters, the following measures may be implemented :

a. Awareness about the methods of installation may be created;
b. Any required changes in the wiring in the consumers' premises, keeping in view the new technology, should be anticipated in advance and preventive action should be taken. For example, the problem of common neutral was detected in Delhi only after the receipt of numerous complaints from the consumers; and
c. Special checking of the wiring of the premises of the consumer or meter may be undertaken in cases where consumption goes up by more than 30 percent after the change of meter.

5. While examining the issues concerning installation of meters, the question of metering of supply being injected into the grid by small-sized renewable system promoted in various states on a priority basis came up for consideration of the Group. After deliberation, the Group recommended that export-import meter in respect of such injection of supply may be used for interface metering as provided in CEA's metering regulations.

V. Testing of Meters

1. Presently, in most of the states and utilities, third-party testing of meters through an accredited institution is not in vogue. It has been tried, only selectively in the states of Gujarat, Haryana, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra and Rajasthan. After review and deliberation on this issue, the Working Group recommends that

(a) the practice of third-party testing should be introduced in all states with full earnestness; and

(b) it should be ensured through accredited institutions and companies.

2. The Working Group was informed that CEA is working with Bureau of Indian Standard (BIS) to settle the methodology for field testing of meters and International Electrotechnical Commission (IEC) standard on field testing of meters are expected to be ready shortly.

3. The Working Group recommends that to avoid frivolous complaints about meters the cost of field testing of meters should be borne by the licensee only if the meter has been supplied by him and is found faulty during the testing. However, in case the consumer demands field testing of the meter, the cost of testing should be borne by the consumer in case the meter is not found to be faulty.

4. The SERCs shall also direct the licensee companies to conduct periodic inspection, testing and calibration of meters according to Rule 57 of the Electricity Rule and lay down the periodicity for meter testing. The directions issued should be scrupulously followed. The periodicity of testing the static meters should be fixed keeping in view the costs involved in testing, and the cost of replacing the old meter with a new meter.

Metering Issues

5. In one of its judgment, the Supreme Court has ruled that data downloaded from a meter is an admissible evidence. In another case, the Supreme Court has ruled that installing static meters was in order. (See Annexure-XII for a copy each of these two Supreme Court judgments.)

6. There is a need to continuously upgrade the anti-tamper features since even the latest technologies become prone to tampering in due course of time. The CEA should carry out this exercise periodically and apprise FOR which in turn should disseminate the information to SERCs. It was brought to the notice of the Working Group that there was a case of tamper of the optical port in Punjab. In such a case, wireless technologies could be used to download data from the meter.

7. As regards the identification and selection of accredited agencies for third-party testing of meters, the Group suggested that there should be NABL accreditation of facilities being authorized or an electrical inspector may be authorized to do the testing. The Group agreed that private franchisees may be permitted to establish such facilities. To promote development of facilities for third-party testing of meters, SERCs should financially support the initial few independent accredited laboratories in the area of licensee through an appropriate provision in ARR to give assurance of servicing of investments made by such independent parties in the initial four to five years.

VI. Replacement and Rectification of Defective Meters

1. Though the state-wise statistics of meters that are defective, stuck, stopped or burnt are not readily available, it is a well known fact that it is prevalent on a large scale in states and distribution utilities. The Electricity Supply Code Regulations notified by various SERCs contain provisions for replacement or rectification of defective meters – running fast or slow, meters not recording, that is stuck meters, burnt meters etc. -- within a specified time period, including the basis of billing during the period the meter remains defective. All the SERCs must ensure that such provisions are meticulously observed by the licensee companies, both in letter and spirit, to generate confidence among consumers and at the same time not lose any revenue on account of defective meters. It is recommended that the SERCs should seek from their licensee companies reports of all such replacement and rectification of meters done on quarterly or half yearly basis, as may be specified by them.

2. As regards the time frame for replacement of faulty meters, it was suggested that instead of micro managing utility affairs, the SERCs should set AT&C loss reduction targets along with a mechanism of incentive and penalty as has been laid down by DERC in its Standard of Performance Regulations. Likewise, for reading of meters provision of penalties etc. as made in the DERC's Supply Code could be considered by other SERCs. The Group also considered the time frame for replacement of electro=mechanical meters with electronic meters and agreed that replacement should be taken up area-wise with high loss areas accorded priority.

3. A similar approach was agreed to by the Group in so far as consumer indexing and energy auditing is concerned.

VII. Reading of Meters and Billing

1. The Working Group observed that though in some states meters have been provided, very often they are not being read and billing does not take place in terms of actual metered consumption. If this is the case, then the whole objective of metering gets defeated. Apart from universal metering of electricity supply to all consumers, the reading of meters and billing in a transparent and effective manner is equally important. To ensure this, utilities must adopt consumer indexing in their respective areas and states.

2. It is recommended that the SERCs should direct the utilities to complete the consumer indexing within a period of two years. While phasing the implementation of consumer indexing, high priority should be given to high loss areas.

3. In order that the reading of meters and billing is done properly and correctly, the Working Group recommends that:

(a) The consumers' meters should be down-loadable in order to minimize the billing mistakes. To ensure inter-operatibility of meters supplied by various manufacturers, open protocol with standardized software should be adopted. The CEA is working on this project. (See Annexure-XIII for a note on 'Open Standard Communication Protocol for Electrical Energy Metering'.)

(b) All meters shall be read in every billing cycle. Wherever it is not possible to read meters due to non-availability of any consumer or the consumer's premises being found locked, provisional bills compiled on the basis laid down in the Electricity Supply Code of the concerned state shall be raised. Such provisional billing shall not be permitted for more than two billing cycles at a stretch and thereafter no provisional bill shall be issued. The SERCs should mandate in their Regulations on Supply Code and Standard of Performance that no more than two

successive bills are raised provisionally. Non-compliance of this requirement should be dealt with severely and penal action taken as per the provision of the Electricity Act against the concerned officer. In its Standard of Performance Regulation, the DERC has already made provision for penalties on the licensee if more than two bills are issued other than on the basis of actual reading. (See Annexure-XIV for a copy of Schedule III extracted from the DERC Supply Code and Standard of Performance Regulations, 2007.)

(c) To incentivise regular meter reading, the percentage of bills issued on the basis of actual reading taken may be incorporated as one of the parameters in the scheme of incentives to the staff for good performance.

(d) Meters of all high-end consumers say, HT Industrial with connected load of 25 KW and above should be read through remote reading devices and the consumption pattern should be monitored on a daily basis.

(e) It is not practical to take manual reading of the meters of individual agricultural consumers monthly or bi-monthly. The UERC has permitted six monthly billing along with waiver of surcharge for the intervening months. Till such time a cost-efficient technology for AMR in the rural area emerges, the methodology adopted by UERC may be replicated taking into consideration the local conditions.

4. While the long-term solution lies in achieving 100 percent AMR, a beginning may be made with group metering. The need for research and development (R&D) in AMR and segregation of agriculture feeder was also emphasized. In case segregation of feeders does not become fully feasible, the practice of subtracting the consumption from input should be continued.

VIII. Assessment of Consumption in Respect of Unmetered Supply

1. Prevalence of unmetered supply in most of the states is largely in respect of supply to agricultural consumers and IP sets. Presently, the methodology adopted for assessing the supply to individual agricultural consumers and billing the same varies from state to state. This issue was deliberated at length by the Working Group, and it was viewed that till the time metering of each individual agricultural consumer is completed, DT based group metering could be a feasible and practical option**.** In the case of group metering, the metering module can be mounted on a pole or near the transformer and group display be placed at a height as per IS 15707. The consumption recorded on the meter at the transformer is borne by the concerned consumers on a pro-rata basis depending on the horse power of their pumpsets. If the transformer has both metered and unmetered consumers, the metered consumption is to be subtracted from the total consumption to arrive at unmetered consumption before pro-rata sharing. This suggestion should be implemented only if acceptable to consumers to prevent any objections that are raised later. DT metering will otherwise also serve a larger and useful purpose of energy accounting.

2. In order to estimate the amount of electricity supplied to flat rate agricultural consumers, either the method of scientific sampling of the metered consumers or the method of average of all the metered consumers should be adopted. The tariff for metered consumption should be much lower than the tariff for unmetered consumption. This would motivate the agricultural consumers to opt for metering.

IX. Metering of Distribution Transformers

1. In view of the prevalence of large-scale thefts of electricity and high distribution losses, the metering of DTs hardly needs any emphasis. It enables measurement of losses on transformers, identifies areas of thefts, takes care of energy accounting, and monitors its supply, quality and reliability. Its usefulness will be enhanced by consumer indexing and metering and identification with DT.

2. As regards reading of DT meters, AMR technological capabilities exist for use with DT meters. This enables supply of real time information to utilities at the central level and eliminates the need for physical data collection at each location.

3. The Group noted that in the area of DT metering, not much had been achieved so far in most states except, however, in case of Himachal Pradesh and private Discoms. The Working Group recommended that DT metering should be made compulsory in order to realize the objective of energy accounting. Reading of such meters should be through remote control devices. Appropriate technological solutions, depending upon the available communication infrastructure, needs to be practised, particularly in rural areas.

X Appropriate Metering Technologies

Time of the Day Metering

1. Time of the Day (TOD) metering enables the implementation of time varying prices under which the price per unit of electricity varies according to the TOD with higher tariff rates at peak periods and low rates at off-peak periods. These time varying tariffs send price signals to consumers that reflect the underlying cost of generating, transmitting and supplying electricity, and enabling resources to be allocated more judiciously and efficiently. Furthermore, price based demand response can reduce or shape consumer demand particularly to reduce load at peak hours on the electricity system. Hence, TOD metering assumes importance in the context of propagating and implementing demand side management (DSM) and achieving energy efficiency. The Working Group, therefore, recommends that TOD metering and automatic meter reading system shall necessarily be introduced by SERCs wherever not already done. To begin with, at least high-end consumers with the connected load of 25KW and above should be covered under TOD metering and pricing.

kVAh Metering as a Check on Power Factor

2. Poor power factor generally caused by industrial and non-domestic consumers give rise to overloading of the network, higher load losses and voltage dips. It harms other consumers as well in the system. It is here that kVAh metering in place of conventional kWh metering assumes importance to keep a check on the power factor. It is recommended that, to begin with, in respect of all high-end consumers say with connected load 20 KW and above, tariff on kVAh basis shall be introduced wherever the same has not already been done**.** Tariff structure should be such that low power factor cases are penalized. For high- end consumer, both lagging and leading power factors may be incorporated. (See Annexure-XV for a note on kVAh billing issues presented by CEA.)**.** The CEA's suggestion that kVAh may be calculated based on

vector sum of active and reactive energy may be kept in view. Furthermore, the Group was apprised by CEA that M/s Torrent, the distribution company in Surat, Gujarat has used Automatic Power Factor Corrector (APFC) panels near the transformers for maintaining power factor near to unity. These panels were found to be fairly effective. (See Annexure-XVI for sample specifications of APFC panels.)

3. Considering the importance of kVAh metering, the Working Group expressed the desirability of setting common standards for kVAh metering by CEA expeditiously.

Pre-paid Metering

4. The standard business model of electricity retailing by utilities involves billing the consumers for the amount of electricity consumed in the previous month(s). There are, however, cases in many areas where utilities find it difficult to recover the amount billed or recovery is very poor. For such consumers or areas, it would be logical for utilities to install pre-payment meters, requiring the consumers to make advance payments before electricity can be used. If the credit is exhausted, the supply of electricity is cut off. Such meters are used for consumers considered to be a high credit risk. The Working Group notes that while some experiments to install pre-payment system are going on, but due to lack of social acceptance, there is bound to be resistance to its implementation. This in turn may have to be overcome sooner rather than later to improve recoveries. After going through the details of the presentation made by NDPL, the Working Group observed that metering methodologies and technologies including prepaid metering being deployed and those being tested by NDPL in New Delhi were very laudable with positive outcome. Every utility should therefore make attempts to reach that level after taking into account cost-benefit implications. Further, use of pre-paid meters has been found useful in Delhi, particularly, in case of supply to government departments where the load is below 45 KW. The use of pre-paid meters should be encouraged. In order to promote the use of pre-paid meters, the Working Group recommends that the SERCs may

consider giving a rebate in tariff applicable to consumers opting for pre-paid metering.

5. In order to ensure compliance with the requirements of CEA regulation, pre-paid metering technologies should also conform to BIS standards or other applicable standards.

XI. Summary of Recommendations

1. In the endeavor to achieve complete metering in all states in a time-bound manner, utilities must ensure that meters are installed as per standards and specifications laid down by CEA in their metering regulations and in accordance with the code on installation and testing as per the new BIS standards. (See para 1 Chapter IV.)

2. In order to accomplish the objective of 100 percent metering of agricultural consumers and the reading of meters regularly in a cost-effective manner, robust and cost-effective technology for remote meter reading in rural areas is a pre-requisite. The CEA may undertake a R&D project for developing such a cost-effective AMR technology suitable for application in rural areas. (See para 6 Chapter III.)

3. The metering of supply for street lighting should be made compulsory (See para 5 Chapter III.)

4. In order to ensure proper metering and correct billing, consumer indexing is important. Each utility must put in place consumer indexing universally in their respective areas and states. To achieve this objective, SERCs should direct the utilities to furnish a time-bound programme for completing the consumer indexing. It is desirable that consumer indexing is completed within a period of two years. High priority should be given to high-loss areas. (See para 1 & 2 Chapter VII.)

5. Time of the day metering is important while propagating and implementing Demand Side Management (DSM) and achieving energy efficiency. Hence, TOD metering and automatic meter reading system should be introduced wherever it has not already been done. High-end consumers with the connected load of 25KW and above should be covered under TOD metering. (See para 1 Chapter X.)

6. The consumer meters should be down-loadable in order to minimize the billing mistakes. To ensure inter-operatibility of meters supplied by various manufacturers, open protocol with standardized software should be adopted. The CEA is working on this project. (See para 3 (a) Chapter VII.)

7. In order to ensure regular reading of meters, the SERCs should stipulate in their Regulations on Standard of Performance that not more than two successive bills are raised provisionally. Non-compliance with this requirement should be dealt with as per the provision of the Electricity Act against the concerned officer. The DERC has provided in its Standard of Performance Regulations, for penalties on the licensee if more than two bills are issued other than on the basis of actual reading. The same may be considered by all the SERCs. (See para 3 (b) Chapter VII.)

8. To incentivise regular meter reading, the percentage of bills issued on the basis of actual reading taken may be incorporated as one of the parameters in the scheme of incentives to the staff for good performance. (See para 3 (c) Chapter VII.)

9. Meters of all high-end consumers say, HT Industrial or others with connected load of 25 KW and above should be read through remote reading devices and the consumption pattern should be monitored on a daily basis. (See para 3 (d) Chapter VII.)

10. In order to encourage or induce consumers to opt for metered supply, appropriate tariff intervention should be made by SERCs in terms of lower rates for metered supply as compared to flat rate supply. The state governments may also be advised to limit the subsidy provisions for metered consumption and up to specified limits. Such a policy of the Government of Delhi has proved effective in motivating the consumers to adopt metering. (See para 7 Chapter III.)

11. It has not been found practically possible to take manual reading of the meters of the individual agricultural consumers either monthly or bi-monthly. The UERC has permitted six monthly billing along with waiver of surcharge for the intervening months. Till the time a cost-efficient technology for AMR in rural

area emerges, the methodology adopted by UERC may be replicated with due consideration of the local conditions**.** (See para 3 (e) Chapter VII.)

12. In order to estimate the amount of electricity supplied to flat rate agricultural consumers, either the method of scientific sampling of the metered consumers or the method of average of all the metered consumers should be adopted. The tariff for metered consumption should be adequately lower than the tariff for unmetered consumers. This would motivate the agricultural consumer to adopt the metering. (See para 2 Chapter VIII.)

13. Till the time metering of each individual agricultural consumer is completed, DT based group metering could be a feasible and practical option. In the case of group metering, the metering module can be mounted on a pole or near the transformer and group display be placed at a height as per IS 15707. The consumption recorded on the metering at the transformer is borne by the concerned consumers pro-rata, based on the horse power of their pumpsets. If the transformer has both metered and un-metered consumers, the metered consumption is to be subtracted from the total consumption for arriving at un-metered consumption before pro-rata sharing. (This practical and reasonable preposition should be implemented only if acceptable to consumers so that there is no problem later in its implementation.) Nonetheless, the DT metering will otherwise also serve a larger and useful purpose of energy accounting. (See para 1 Chapter VIII.)

14. An appropriate procedure for installation of meters including the sealing is necessary to pinpoint the responsibility of the officer of the licensee if any malpractice or manipulation is detected later on. The DERC has provided such a procedure in its supply code. The same may be adopted by all the SERCs. (See para 2(v) Chapter IV.)

15. Additional features in the meters to be procured by the distribution licensees are required to be approved by the SERCs. A list of standard features in this respect as propagated by DERC for adoption may be used by other SERCs as well, as guidelines. (See para 2 (vi) Chapter IV.)

Metering Issues

16. A large number of electro-mechanical meters are still in use in a number of states. Keeping in view the advancement in metering technology and the related benefits in reducing losses, there is a need to phase out the electro-mechanical meter in a time-bound manner. The metering regulations specified by the CEA have left this timeframe to the discretion of SERCs. The SERCs should specify this timeframe immediately and the exercise of replacing the electro-mechanical meters by static meters should be taken up on a priority basis in high-loss urban areas. (See para 3 Chapter IV.)

17. In order to increase the confidence of the consumers in new metering technologies such as static meters, the following measures may be implemented :

    a. Awareness about the methods of the installation may be created.

    b. Any required changes in the wiring in the consumer premises keeping in view the new technology should be anticipated in advance and preventive action should be taken. For example, the problem of common neutral was detected in Delhi only after receipt of numerous complaints from the consumers.

    c. Special checking of the wiring of the premises of the consumer or meter may be resorted to in case where consumption goes up by more than 30 percent after the change of the meter. (See para 4 Chapter IV.)

18. The periodicity of testing the static meters should be fixed keeping in view the costs involved in testing and the cost of replacing the old meter with a new meter. (See para 4 Chapter V.)

19. In one of its judgment, the Supreme Court has ruled that data downloaded from a meter is an admissible evidence. In another case, the Supreme Court has ruled that installing static meters was in order. (See para 5 Chapter V.)

20. There is a need to upgrade the anti-tamper features continuously since even the latest technologies become prone to tampering in due course of time. The CEA may carry out this exercise periodically and apprise FOR so that the information can be disseminated to all the SERCs. (See para 6 Chapter V.)

Metering Issues

21. Recently, a case of tampering of optical port has come to notice in Punjab. Wireless technologies should be considered to download the data from the meter. (See para 6 Chapter V.)

22. Third-party testing of meters should be ensured through accredited institutions and companies. The CEA is working with BIS to settle the methodology for field testing of meters. It is recommended that the cost of field testing of meters should be borne by the licensee only if the meter has been supplied by him and the same is found faulty during the testing. However, in case the consumer demands field testing of meters, the cost of testing should be borne by the consumer in case the meter is not found to be faulty. (See para 1, 2 & 3 Chapter V.)

23. In order to promote development of facilities for third-party testing of meters, SERCs may consider financially supporting the initial few independent accredited laboratories in the area of the licensee through an appropriate provision in ARR to give assurance of servicing of investments made by such independent parties in the initial four to five years. (See para 7 Chapter V.)

24. Distribution transformer metering, which so far has not received the due emphasis in many states, should be made compulsory especially with a view to realizing the objective of energy accounting. Reading of such meters should be through remote control devices. Appropriate technological solution depending upon the available communication infrastructure needs to be found, particularly in rural areas. (See para 3 Chapter IX.)

25. Use of pre-paid meters has been found useful in Delhi, particularly, in case of supply to government departments where the load is below 45 KW. Use of pre-paid meters should be encouraged. In order to promote the use of pre-paid meters, the SERCs may consider giving a rebate in tariff applicable to consumers opting for pre-paid metering. Further, in order to ensure compliance with the requirements of CEA regulation, pre-paid metering technologies should also conform to BIS standards or other applicable standards. (See para 4 & 5 Chapter X.)

Metering Issues

26. In order to keep a check on the power factor, kVAh metering assumes importance. In respect of all high-end consumers, say with connected load 20 KW and above, tariff on kVAh basis shall be introduced wherever the same has not already been done. The tariff structure should be such that low power factor cases are penalized. For high-end consumers, both lagging and leading power factors may be incorporated. The CEA's suggestion that kVAh may be calculated based on the vector sum of active and reactive energy may be kept in view. It would be highly desirable for CEA to expeditiously bring out common standards for kVAh metering. (See para 2 & 3 Chapter X.)

27. In order to promote injection of surplus power into the grid by small-sized renewable energy generation devices, export-import meter may be used for interface metering. The CEA's metering regulations provide for the same. (See para 5 Chapter IV.)

****

ANNEXURES

/ANNEXURE – I /

MINUTES OF THE MEETING OF THE WORKING GROUP ON "METERING ISSUES"

Venue : CERC, Conference Room, Janpath, New Delhi

Date : 7th November, 2008

Member Present :

(1) Dr. Pramod Deo, Chairperson, CERC / FOR
(2) Dr. P.K. Mishra, Chairperson, GERC
(3) Shri V.J. Talwar, Chairperson, UERC
(4) Shri A. Velayutham, Member, MERC
(5) Shri B. Jeyaraman, Member, TNERC
(6) Shri Alok Kumar, Secretary, CERC
(7) Shri S.K. Chatterjee, Dy. Chief (RA), CERC

Special Invitees:

(1) Shri Prasad Ranjan Ray, Chairperson, WBERC
(2) Shri K. Venugopal, Member, DERC
(3) Ms. Anjali Chandra, CEA
(4) Shri V.K. Khanna, Advisor, FOR
(5) Shri A.K. Rajput, Dy. Director, CEA

At the very outset Secretary CERC / FOR welcomed the Chairperson CERC / FOR, other Members and special invitees to the first meeting of the Working Group on "Metering Issues". Initiating the discussion, he briefed about the background to the constitution of this Working Group and its Terms of Reference (copy of TOR is at **Appendix-I**). Referring to the background note prepared and circulated by FOR Secretariat to the Members of the Working Group, he cited the relevant provisions of the Electricity Act, 2003, National Electricity Policy, Tariff Policy, Advice relating to metering of consumers by the Consultative Committee of members of Parliament of the Ministry of Power and one of the resolutions

adopted by the Chief Minister's Conference on Power on 28th May, 2007, as contained in the note. State-wise status of consumer metering as currently available and circulated with the background note presents a varied picture. While a few of the States are reported to have achieved 100% consumer metering, there are many other States where the position is far from satisfactory and appropriate ways and means have to be found to realize the goal of cent percent metering. Data as currently available presents only the overall position of metering. He felt that a meaningful analysis would only emerge from consumer category-wise metering for which the data has yet to be collated by FOR Secretariat from various States / Utilities. Similarly, along with this, data on DTS metering would also be needed.

2. Shri V.J. Talwar, Chairperson, UERC made a presentation on metering and billing system as obtaining in UPCL (Uttrakhand Power Corporation Limited), a distribution utility in the State of Uttrakhand. A copy of the presentation is enclosed at **Appendix-II**. He explained that while the status of consumer metering in the State is reported to be as high as 97%, the position obtaining on the ground with respect to meter reading and billing is very different. Detailed analysis of billing data of UPCL for 19 months (from April, 2006 to October, 2007) carried out by the Commission revealed that only half of the consumer have been billed on actual consumption basis and the remaining on assumed consumption basis year after year, categorized as NR (Not Read), ADF (Appear Defective), IDF (Identified Defective) or RDF (Reading Defective). Many of the consumers, so called metered, were billed without any basis. The analysis also revealed that a large number of consumers, though on record were metered consumers, they were actually without meters but shown with fictitious meter numbers. Consumer category wise analysis of data leads one to believe that there is no seriousness on the part of the Distribution Utility to metering, billing and thereon to improve revenue collection and efficiency. It was found that HT Industrial consumers which are only 890 in number in the whole State and account for 40% of electricity consumption are still being billed on manual basis at Division level and most of these appear to have neither been verified nor checked at corporate level. Analysis revealed that for many of these HT Industrial units which operate round the clock the load factor is extremely poor (below 5% in number of cases), clearly indicating the maladies of the metering and billing system without any regard to the revenue or finances of the Utility. Likewise, numerous deficiencies in the metering and billing systems have come to light in respect of the other categories of the consumers.

Chairperson, UERC mentioned that the finding of this study on metering and billing in the State as attempted by the Commission have been sent to State Government and made available to UPCL, the distribution utility for remedial action on time bound basis with the advice to set up a proper monitory

mechanism as well at the State level to watch and review the progress and report the same to the Commission from time to time at regular intervals.

3. Thereafter, Shri K. Venugopal, Member, DERC picked up each of the Terms of Reference of the Group and citing his own experience of metering operation and issues, elaborated on the experience of Delhi in achieving cent percent metering of consumers and as to how they have been able to manage DTS metering with success.

4. The representative of CEA gave the details about relevant technical standard for designing of meters and installation of meters.

5. From these discussions, general consensus emerged on the following points:-

(i) While endeavoring to achieve complete metering in all States in a time bound manner it must be ensured by the Utilities that meters installed are as per standard and specification laid down CEA in their metering regulations and in accordance with the Code on installation and testing as per the new BIS standards.

(ii) Third party testing of meters should be ensured through accredited institutions. CEA is working with BIS to settle the methodology for field testing of meters. Regulations are still not clear as to who will bear the cost of field testing of the meters.

(iii) Distribution Transformer Metering which so far has not received, the due emphasis in many of the States, should be made compulsory and reading of such meters should be through remote control devices. Appropriate technological solution depending upon the available communication infrastructure needs to be found, particularly for rural areas.

(iv) Meters of all high-end consumers say, HT Industrial or others with connected load of 25 KW and above should be read through remote reading devices and the consumption pattern should be monitored on daily basis.

(v) To encourage or induce consumers to prefer metered supply, appropriate tariff intervention, should be made by SERCs in terms of lower rates for metered supply as compared to flat rate supply.

(vi) To keep a check on the power factor, KVAh metering assumes importance. To begin with, in respect of all high-end consumers say with connected load 20 KW and above, tariff on KVAh basis shall be introduced wherever the same has not already been done. Tariff structure should be such that low power factor cases are penalized.

CEA was requested to examine the software related issue, if any, in use of KVAh billing method.

(vii) To ensure proper metering and correct billing, Consumer Indexing becomes important. Each utility must put in place the same universally in their respective areas/ States.

(viii) TOD metering assumes importance even in the context of propagating and implementing Demand Supply Management (DSM) and achieving energy efficiency. Hence, TOD metering and automatic meter reading system shall necessarily be introduced wherever not already done. To begin with, at least for high-end consumers with the connected load of 25KW and above should be covered under TOD metering.

(ix) Given the ground reality, the metering of agriculture consumers requires a different consideration. Till the time metering of each individual agriculture consumer is completed, DT based group metering appears to be feasible and practical solution. The consumption recorded on the metering at transformer is to be borne by the concerned consumers on pro-rata on the basis of the horse power of their pumpsets. If the transformer has both metered and un-metered consumers, the metered consumption is to be subtracted from the total consumption for arriving at un-metered consumption before pro-rata sharing. The FOR Secretariat may examine the judgement of the Appellate Tribunal given in the case of Maharashtra regarding the DT based group metering.

(x) It has not been found practically possible to take reading of the meters of the individual agricultural consumers monthly or bi-monthly. UERC has permitted six monthly billing along with waiver of surcharge for the intervening months. This may be replicated with due consideration of the local conditions.

(xi) The consumer meters should be down-loadable in order to minimize the billing mistakes.

(xii) In order to ensure regular reading of the meters, the SERCs may provide in their Regulations on Standard of Performance that not more than two successive bills would be raised provisionally. Non-compliance with this requirement should be dealt with under section 149 of the Electricity Act against the concerned officer.

(xiii) To incentivise regular meter reading, the percentage of bills issued on the basis of actual reading taken may be incorporated as one of the parameters in the scheme of incentive to the staff for good performance.

(xiv) Additional features in the meters to be procured by the distribution licensees are required to be approved by the SERCs. Shri K.

Venugopal, Member, DERC was requested to give a list of standard features in this respect which may be used by the SERCs as guidelines.

(xv) To increase the confidence of the consumers in new metering technologies such as static meters, the following measures may be implemented :-

a. Awareness about the methods of the installation may be created.
b. Any changes in the wiring in the consumer premises keeping in view the new technology should be anticipated in advance and preventive action should be taken. For example, the problem of common neutral was detected in Delhi only after receipt of numerous complaints from the consumers.
c. Special checking of the wiring of the premises of the consumer or meter may be resorted in case where consumption goes up by more than 30% after the change of meter.

(xvi) Metering of supply for street lighting should be made compulsory.

(xvii) Use of load limitors needs to be encouraged to prevent excessive consumption by lifeline (BPL) Consumers.

(xviii) Use of pre-paid meters has been found useful in Delhi, particularly, in case of supply to Government Departments where the load is below 45 KW. Use of pre-paid meters should be encouraged but any discount in the bill should be borne by the utility as it will be receiving payments in advance.

(xix) Cost of meters should not be recovered from the consumer lump sum. It should either be recovered as monthly rent or as a part of ARR.

6. Secretary CERC / FOR mentioned that it may take about one and a half to two months for FOR Secretariat to collect, generate and collate all the relevant data and put forth the analysis before the Working Group with suitable draft recommendations on the lines indicated in this meeting.

7. It was decided that in the next meeting of the Working Group, two or three utilities preferably from Andhra Pradesh, West Bengal, Mumbai and Delhi which have taken some concrete innovative measures in metering and adoption of new technologies may be invited to make presentation before the Working Group.

8. The next meeting of the Working Group will be held in early January, 2009.

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

****

/ APPENDIX-I /

FORUM OF REGULATORS (FOR)
Secretariat: C/o Central Electricity Regulatory Commission (CERC)
3rd & 4th Floor, Chanderlok Building, 36, Janpath, New Delhi-110001
Telephone No. 011-23353503 Fax No. 011-23753923

As decided by the Forum of Regulators in its meeting held on 26th September, 2008 a Working Group on **"Metering Issues"** has since been constituted. The Terms of Reference (TOR) for the Working Group requires inter-alia consideration of the relevant provisions of the Electricity Act, 2003, National Tariff Policy, CEA's regulations on installation and operation of meters, the best practices adopted in this direction by States and to give its recommendations on:-

i) Strategy to achieve complete metering in all the States in a time bound manner – particularly consumer metering and Distribution transformers metering.
ii) Measures to ensure proper and correct recording of electricity supplied through meter.
iii) Measures to induce consumers to prefer metered supply.
iv) Mechanism and norms for best assessment of measurement of electricity in cases or select categories or target groups where due to certain adverse geographical / topographical conditions, installation or operation of meters is likely to take some more time.
v) Monitoring mechanism at field and corporate level of utilities to watch and ensure implementation of :-
   a) Proper installation and operation of meters.
   b) Replacement of defective meters
   c) Meter reading and billing.
vi) Realization of gains of Distribution transformer metering and thereon improving the quality of supply and service.
vii) Use of prepaid meters.
viii) Appropriate metering technology for different category of consumers.
ix) Any other relevant issue.

The Working Group is required to submit its report / recommendation by end of January '09 for consideration of Forum.

Relevant background not on various issues for consideration of the Working Group, is **enclosed**.

"FOR" WORKING GROUP

BACKGROUND NOTE
ON
"METERING ISSUES"

I. Relevant Provisions in the Electricity Act, 2003.

- ***Use, etc. of meters(Section 55)***

  - *No licensee shall supply electricity, after the expiry of two years from the appointed date, except through installation of a correct meter in accordance with the regulations to be made in this behalf by the Authority;*

    PROVIDED that the licensee may require the consumer to give him security for the price of a meter and enter into an agreement for the hire thereof, unless the consumer elects to purchase a meter:

    PROVIDED FURTHER that the State Commission may, by notification, extend the said period of two years for a classes of persons or for such area as may be specified in that notification.

  - *For proper accounting and audit in the generation, transmission and distribution or trading of electricity, the Authority may direct the installation of meters by a generating company or licensee at such stages of generation, transmission or distribution or trading of electricity and at such locations of generation, transmission or distribution or trading, as it may deem necessary.*

  - *If a person makes default in complying with the provisions contained in this section or the regulations made under sub-section (1), the Appropriate Commission may make such order as it thinks fit for requiring the default to be made good by the generating company or licensee or by any officers of a company or other association or any other person who is responsible for its default.*

- ***The Electricity Supply Code Section (56)***

  - *The State Commission shall specify an electricity supply code to provide for recovery of electricity charges, intervals for billing of electricity charges, disconnection of supply of electricity for non-payment thereof, restoration of supply of electricity, measures for preventing tampering, distress or damage to electrical plant or electrical line or meter, entry of distribution licensee or any person acting on his behalf for disconnecting supply and removing the meter, entry for replacing, altering or maintaining electric lines or electrical plants or meter and such other matters.*

II. Provisions of "National Electricity Policy" (NEP)

- Para 5.4.8 to 5.4.10 of National Tariff Policy and relevant to metering issues as reproduced below:-

  5.4.8 *The Act mandates supply of electricity through a correct meter within a stipulated period. The Authority should develop regulations as required under section 55 of the Act within three months.*

  5.4.9 *The Act required all consumers to be metered within two years. The SERCs may obtain from the Distribution Licenses 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.*

  5.4.10 *Modern information technology systems may be implemented by the utilities on a priority basis, after considering cost and benefits, to facilitate creation of network information and customer data base which will help in management of load, improvement in quality, detection of theft and tempering, customer information and prompt and correct billing and collection. Special emphasis should be placed on consumer indexing and mapping in a time-bound manner. Support is being provided for information technology based systems under the Accelerated Power Development and Reforms Programme (APDRP).*

III. Tariff Policy

- Sub-para 3 of Para 8.4 of Tariff Policy, emphasizing on metered tariff, states that:

  '*The State Commission may provide incentives to encourage metering and billing based on metered tariffs, particularly for consumer categories that are presently un-metered to a large extent. The metered tariffs and the incentives should be given wide publicity'.*

- Prepaid meters (Sub-para 4 of Para 8.3 of Tariff Policy):

  4. Extent of subsidy for different categories of consumers…… ***Use of prepaid meters can also facilitate this transfer of subsidy to such consumers.***

IV. Consultative Committee

Even the Consultative Committee of Members of Parliament of Ministry of Power, in its meeting on 12th May, 2005 opined that cent percent metering of consumers is a must.

V. Resolution adopted by the Chief Minister's Conference on Power (28th May, 2007)

On the very pertinent issue of reduction of AT&C losses and establishing the necessary baseline data which would appropriately flow from proper and correct metering, one of the resolutions adopted by the last Chief Ministers' Conference on 28th May, 2007 is of relevance, and is reproduced below:

> *"The Conference recognizes that the current level of AT&C losses constitute a grave threat to the viability of the power sector and the distribution segment, which is currently losing about Rs.47,000 crores per annum, is the weakest-link in the power system; and resolves that the States commit themselves to achieve and sustain drastic reduction in the overall AT&C losses through the next five years, and at least to a level of 15% in the APDRP project areas as has been demonstrated by the participating States in 163 towns and cities. Towards this end, the States with appropriate assistance from the Centre would establish the necessary baseline data and IT applications for energy accounting and auditing, besides ensuring a resolute elimination of electricity theft, which is negating various investments and initiatives for power sector reforms. It is further reiterated that where free or subsidized power is provided to a section of Consumers, the State Govt. shall ensure upfront payment of the same to the utilities".*

VI. Status of Metering

Data on consumer metering available for all the States as up to 2006 is at **Appendix-I**

Meaningful analysis of consumer metering would only emerge from the current status of metering consumer category wise which from the various source documents is not readily available. Data on metering consumer category wise is to emanate from Distribution Utilities. Regulatory Information Management System (RIMS) of 'FOR' provide formats on metering data category wise. For our analysis this data of Utilities would need to be collated on priority through SERCs for taking a view on strategies to enforce achievement of 100% metering of all categories of consumers and the time frame for the same. Along with this data on metering of Distribution Transformers (DTS) and the extent to which this metering has been utilized to identify area of pilferage and improve supply conditions would also need to be collected through SERCs for analysis and taking an appropriate view on taking this program of DTS metering forward.

VII. Directions issued by the SERCs for metering

Almost all SERCs have issued directions on metering of consumers and provisions have appropriately been made in their regulations on release of new connections as also in the Electricity Supply Code. Status of compliance of the directions in this regard would need to be provided by all SERCs. It will be only based on analysis

of same that would facilitate to chalk out the strategy for future course of action by SERCs.

VIII. Issues for Consideration

(i) Despite directions having been issued to achieve cent percent consumer metering in a time bound basis and the relevant regulations being in place, in a large number of State, there are still cases of unmetered supply electricity. Ways have to be found to strictly enforce the provisions of regulations on metering so as to totally comply with provision of the Electricity Act.

(ii) To assess the quantum of unmetered supply as realistically as possible, practices followed in SERCs vary according to the conditions prevailing in their respective States. A view would need to be taken on the adoption of the best practices in this regard.

(iii) To encourage consumers to prefer metered supply, the course of adopting of differential tariff rates could be one of the measure. Wherever such a course has been practiced, the impact would need to be analyzed to arrive at consensus on such a measure to encourage metering.

(iv) CEA's Regulations on installment and operation of meters cover various facets of proper and correct metering of electricity supply. Whether and what steps SERCs should take to enforce applications of these regulations in letter and spirit by the utilities. Similarly, for enforcement of the provision of the Electricity Supply Code with respect to metering, testing, replacement etc.

(v) **Need for monitoring mechanism -** Besides building up an appropriate monitoring mechanism in the utilities for ensuring proper and correct metering of supply, whether some sort of monitoring mechanism would need to be created in SERCS to verify the input in this regard provided by utilities.

(vi) **New Technologies -** What should be the broad criteria for introduction of new technologies like pre-paid meters, TOD meters, automatic meter reading systems etc. by the utilities and ways to enlarge the same by SERCs.

(vii) **Distribution Transformers (DTS)} Metering -** Whether SERCs should insist for evaluating impact of DTS metering by utilities to assess the gains of such investment.

(viii) **Practical and cost effective methods for metering of supply to agricultural consumers.**

(ix) Necessary safeguards and confidence building measures for increasing the acceptance of new metering technologies in the consumers.

****

Appendix-I

CONSUMER METERING STATUS

S. No.	STATE	2001-02			2005-06		
		Numbers (Lakh)	Metered (Lakh)	%age	Numbers (Lakh)	Metered (Lakh)	%age
1	Andhra Pradesh	113.20	90.50	80	157.46	150.47	96
2	Arunachal Pradesh	1.30	0.70	54	1.13	0.52	46
3	Assam	9.50	6.50	68	12.74	12.09	95
4	Bihar	23.76	17.16	72	12.50	6.23	50
5	Chattisgarh	18.70	11.20	60	22.91	15.81	69
6	Delhi	27.10	26.26	97	26.65	26.65	**100**
7	Goa	4.00	3.80	95	3.96	3.86	97
8 a	Gujarat (GEB)	69.21	63.55	92	74.77	69.57	93
8 b	Gujarat (Torrent/AEC)				12.64	12.64	**100**
8 c	Gujarat (Torrent/SEC)				5.20	5.20	**100**
9	Haryana	35.11	32.65	93	39.17	36.12	92
10	Himachal Pradesh	16.50	15.10	92	16.97	16.97	**100**
11	Jammu & Kashmir	10.00	4.00	40	10.00	4.00	40
12	Jharkhand				6.53	4.90	75
13	Karnataka	85.00	48.40	57	128.89	105.68	82
14	Kerala	62.50	58.00	93	77.99	77.99	**100**
15	Madhya Pradesh	63.29	35.46	56	64.92	46.50	72
16 a	Maharashtra (BEST)				667.00	666.00	**100**
16 b	Maharashtra (MSEB)	129.00	109.00	84	135.32	118.12	87
16 c	Maharashtra (REL)				24.95	24.95	**100**
17	Manipur	1.70	1.40	82	1.70	1.40	82
18	Meghalaya	1.40	0.90	64	1.68	0.84	50
19	Mizoram	1.04	0.48	46	1.28	1.27	99
20	Nagaland	1.50	1.10	73	1.88	1.14	61
21	Orissa	14.50	11.50	79	21.49	17.45	81
22	Punjab	52.71	44.68	85	58.94	50.39	85
23	Rajasthan	53.05	43.25	82	58.45	54.78	94
24	Sikkim	0.70	0.30	43	0.65	0.60	92
25	Tamilnadu	147.68	117.42	80	170.33	148.13	87
26	Tripura	1.80	1.20	67	2.28	1.84	81
27	Uttar Pradesh	78.10	46.03	59	88.06	80.38	91
28	Uttaranchal	8.54	7.09	83	9.87	7.73	78
29	West Bengal	38.00	32.00	84	47.27	45.89	97
30	Chandigarh	1.81	1.54	85	1.97	1.97	**100**
31	Daman &Diu				0.52	0.52	**100**
32	Pondicherry				2.19	2.11	96
Total		**1070.70**	**831.17**	**78**	**1970.26**	**1820.70**	**92**

/ APPENDIX-II /

ANALYSIS OF UPCL'S BILLING SYSTEM

1

BACKGROUND

- Numerous complaints about arbitrary and irregular billing by UPCL had been received.
- The Commission randomly picked up sample billing data and analyzed it.
- Analysis revealed major irregularities.
- The Commission, therefore, decided to carry out a detailed analysis of billing data from April 2006 to October 2007.

2

FINDINGS

- Only half of the consumers have been billed on actual consumption basis.
- Remaining consumers were billed on assumed consumption basis for years such as:
  - Meters of large number of consumers (NR) are not read as a practice.
  - Meters appear defective (ADF) but not verified/tested.
  - Meters Identified defective (IDF) but not replaced.
  - Meter reading defective (RDF) but not verified and corrected.
- Consumers were billed even without any basis.
- Large number of un-metered consumers were wrongly shown as metered with fictitious meter numbers.
- Despite accumulation of huge arrears, supply to defaulting consumers continued.

3

METHODOLOGY

- Commission Collected billing data from all the 28 Divisions of all Categories for the period April 2006 to Oct 2007.
- Billing data for High End HT Industrial Consumers was available in the form of copies of bills. Relevant information from each bill (890 consumers X 19 months) was entered in Commission's data base manually by Commission's Staff.
- Billing data for other LT categories was available in Soft Form, but in different platforms (MS Access, MS Excel, Text mode).
- Transportation of data from different platforms on to one platform.

4

METHODOLOGY

- Commission Developed software to analyze the current status of billing. Software gives:
  - Month-wise, division-wise, category-wise status of billing.
  - List of consumers whose meters
    - had not been read.
    - Appeared defective.
    - Identified defective.
    - Reading defective etc.

    For a period longer than specified (say 90 billing cycles).
  - List of Consumers who are billed on lower tariff.
  - List of Consumers with poor Load factor and also slab-wise load factor summary.
  - List of Consumers whose arrears are > Rs 1 Lac as on October 2007.
  - And many more functions.

5

RESULTS OF ANALYSIS

6

BILLING OF HT INDUSTRIAL CONSUMERS

- There are only 890 consumers in this category accounting for more than 40% consumption in the state.
- Bills are made manually at Division level and are neither verified nor checked at Corporate level.
- Analysis revealed extremely poor load factor of many HT industrial unit operating round the clock.

7

LT CONSUMERS

- Computerized Billing for most of the LT Consumers is being done by out-side agency situated at Meerut and Delhi.
- Categories covered under 'computerized' billing are:
  - Domestic (More than 10 Lac)
  - Non-domestic (about 1 Lac)
  - LT Industry (up to 100 BHP) (more than 5,000)
  - Public Water Works (about 400)
  - Private Tube wells (about 20,000)
- Billing of other categories such as Government irrigation System, Public lighting etc is still being done manually and thus no analysis has been done for these categories.

8

BILLING STATUS - DOMESTIC

- About 70% consumers are billed on actual meter reading basis.
- Meters of 15 – 18 % consumers are 'Not Read' and about 10 % meters remained defective.
- Shockingly meters of 367 consumers have not been read for more than 15 years and another around 37,000 meters have not been read for more than 5 years.
- Similarly 2118 Identified Defective Meters have not been replaced for more than 15 years and another 10000 meters for more than 5 years.

Show % Chart

Show Number Chart

9

Billing Status – Non-domestic

- Subsidizing Category with highest tariff.
- Only 75% consumers are billed on actual meters reading.
- About 10 % meters are Not Read month after month and another 6% comes under 'Not Accessible' class.
- 10% meters remained defective.
- About 191 meters have not been read for more than 5 years.
- More than 650 Identified Defective Meters have not been replaced for 5 years and above.

Show % Chart Number Chart

10

BILLING STATUS – LT INDUSTRIAL

- Small in number, about 8000 only.
- Still less than 80% meters are read regularly.
- Meters of about 14% consumers are 'Not Read' and another 3% remained 'Not Accessible' month after month.
- About 4% defective meters have not been replaced.
- Meters of 32 consumers have not been read for more than 5 years and
- Around 330 defective meters have not been replaced for more than years.

Show % Chart Number Chart 11

PUBLIC WATER WORKS

- Only 15-20% consumers are billed on actual consumption. These consumers contribute up to 40% of consumption by this category.
- About 50% Meters of this category not read every month and such consumers contribute less than 30% of consumption. Apparently these consumers (NR) are under-billed month after month.
- Unacceptable high number (>25 %) of meters remained defective through out this period.
- Number of consumers appear to be LT Industrial Consumers are being billed under this category (@Rs 2.25/kWh only against Rs 2.45/kWh + Fix charges as Rs 45/BHP) causing revenue loss. 12

PRIVATE TUBE WELLS

- **Analysis revealed that only 10-12% consumers are billed on actual reading basis and meters of more than 80% consumers are Not Read regularly.**
- Metered 'NR' consumers are being billed at lower 'Fixed Charges' than those Un-metered consumers.

13

EXTREMELY LOW LOAD FACTOR

- **Load Factor of a large number of consumers in every category has been extremely low.**

LOAD FACTOR	U/mth	Non-dom		LT Industry		Domestic		PTW	
		%	No.	%	No.	%	No.	%	No.
LESS THAN 1%	7.44	4.06	3514	2.59	212	3.19	14969	0.79	227
LESS THAN 5%	37.2	31.53	27288	21.19	1737	33.03	154988	3.53	1012
LESS THAN 10%	74.4	55.63	48146	51.35	4209	55.15	258783	6.44	1846
LESS THAN 15%	111.6	67.19	58151	70.76	5800	77.90	365534	50.96	14611
LESS THAN 20%	148.8	73.06	63231	80.35	6586	82.41	386697	52.16	14955
LESS THAN 25%	186	88.67	76741	91.10	7467	85.27	400117	52.77	15130
MORE THAN 25%	186	11.33	9806	8.89	729	14.73	69118	47.22	13539

14

MOUNTING ARREARS

(All Figures in Rupees)

	ARREARS		
Category	April,07	Octber,07	Increase
Domestic	130,47,31,622	140,23,81,956	9,76,50,334
Non-domestic	94,01,06,895	103,57,58,032	9,56,51,137
LT Industry	26,68,79,890	2,67,72,2887	8,42,997
PWW	40,81,64,084	47,97,97,470	7,16,33,386
PTW	56,37,13,126	58,12,55,449	1,75,42,323
TOTAL	348,35,95,617	376,69,15,794	28,33,20,177

Note : Arrears have increased by 8% during just six months period.

15

PENDING ARREARS OF DIFFERENT CATEGORIES (BILL BASIS)

(All Figures in Rupees)

BILL	ARREARS AS on OCT,07					
BASIS	**DOM**	**NDOM**	**LT INDUS.**	**PWW**	**PTW**	**TOTAL**
AcRd	291,359,111	192,175,445	28,356,985	50,623,546	12,925,277	575,440,364
NR	353,506,002	145,180,028	23,594,694	89,593,048	401,845,199	1,013,718,971
NA	82,628,168	49,649,772	14,151,869	25,812,034	2,658,655	174,900,498
ADF	28,907,061	22,927,445	4,144,441	21,707,620	2,181,888	79,868,455
IDF	192,895,523	139,081,247	25,602,146	172,023,503	1,229,692	530,832,111
RDF	23,029,325	25,752,110	1,890,286	4,506,479	507,882	55,686,082
MIN	1,971,123	2,800	0	0	0	1,973,923
W/O	227,517,184	114,218,373	31,552,751	55,735,941	116,093,953	545,118,202
SB	125,091,424	231,872,445	95,050,706	52,959,849	30,533,507	535,507,931
NB	75,648,157	114,901,168	43,379,009	6,835,451	13,279,395	254,043,180
TOTAL	1,402,553,078	1,035,760,833	267,722,887	479,797,471	581,255,448	3,767,089,717

Supply of Consumers with arrears amounting to about Rs 79 crs only has been disconnected and supply of consumers having arrears about Rs 300 crs out of 376 crs has been left untouched.

16

OTHER FINDINGS

- Uttrakhand is predominantly a hilly State with some areas like Dehradun, Haridwar, Roorkee, Kashipur in plain areas.
- Load density is higher in plain areas.
- General perception is that loads in hilly areas are scattered and therefore meter reading could be difficult in these areas.
- Contrarily analysis revealed that situation is comparatively better in Hilly areas.
- Performance of Haridwar, Roorkee, Kotdwar and Rudrapur Divisions – all lying in plain areas is very poor.
- One of data file pertaining to Haridwar Division showed that meters of 99.73% consumers had not been read.
- About 8-10% consumers in all categories are wrongly shown as metered consumers and are billed on provisional basis.
- Analysis also revealed that a large number of consumers have been provided with two connections with same meter. One connection having huge arrears had been shown as disconnected.

17

USAGE OF THIS ANALYSIS

- The results of the Analysis has been extensively used in finalising the Tariff Order for 2007-08 and 2008-09. Some of the instances where the results had been used are:
- Fixing Loss reductions target for 2008-09
  - UPCL proposed to achieve loss level of 29.20% for FY 2007-08 against target level of 24.32% set by Commission.
  - The results of analysis showed that UPCL has not been able to capture the losses correctly as its metering and billing system is in complete mess. The position could have been improved dramatically if corrective steps were taken in due earnest manner and target set by Commission could have been achieved.
  - The Commission, therefore, did not revise the opening level trajectory (24.32%) and fixed a further reduction target of 2% for 2008-09

18

USAGE OF THIS ANALYSIS

- UPCL had proposed to introduce slab based Tariff for domestic and non-domestic consumers. Since UPCL's metering and billing system is in complete mess, introduction of slab based tariff would not have given desired results but on the other hand would have created more problems and accordingly has not been accepted by the Commission.
- On the same ground Very high prohibitive proposed tariff for 'Unmetered Domestic (Rural)' category was not accepted .
- The Commission was able to devise load factor based tariff for industrial consumers after detailed analysis of monthly data on load factor for each industrial unit.

19

USAGE OF THIS ANALYSIS

- Considering the fallacies of manual billing, UPCL has been directed to stop manual billing and raise only computerised bills for all consumers w.e.f. 1.7.2008.
- UPCL has been provided with list of consumers with extremely low load factor and has been directed to undertake testing of meters of such consumer on priority.
- Considering unacceptably low load factors for a large number of industrial consumers, the Commission was pushed into introducing Minimum Guaranteed Charges (MGC) for industrial consumers.
- UPCL has been provided with list of consumers having Arrears more than Rs one Lac and has been directed to recover their legitimate dues from these consumers with six months.
- UPCL has also been provided with lists of consumers whose meters has not been read for more than 2 years and has been directed to read meters of such consumers and rectify their bills with in two months.
- Similarly lists of consumers whose defective or 'appeared defective' meters has not been replaced for more than 2 years has been given to UPCL with directions to replace them with in two months.

20

USAGE OF THIS ANALYSIS

- With the help of billing data base created in the Commission, and software developed for the purpose, Commission could evaluate revenue impact of:
  - ToD Tariff.
  - Minimum Guaranteed Consumption Charges.
  - Introduction of fixed charges for all categories.
  - Introduction of kVAh based tariff for LT Industrial Consumers and non-domestic consumer having contracted load above 25 kVA.

21

PATH FORWARD

- **Matter was taken up with UPCL management on 21st Feb 2008 and again on 17th April 2008 and following action plan has been agreed:**
- **On Manual Billing of HT Industrial & Government Consumers:**
  - **Centralised Billing for all consumers having contracted load of 25 kW and above shall be completed by end of June 2008.**
  - **Automatic Meter Reading (AMR) of high end consumers with contracted load of more than 100 kW by end of Oct, 2008.**
  - **No manual bill for any category shall be prepared and distributed after 30th June 2008 and such consumers shall be brought under centralised billing.**
- **On Billing irregularities:**
  - **NR, ADF and RDF classes shall be eradicated by end of Oct,2008**
  - **NA & IDF classes shall be brought to less than 1% level by end of Oct 2008**
  - **UPCL shall submit Division-wise quarterly action plan to achieve the above targets**
- **On Mounting Arrears**
  - **Initiate rigorus drive to recover pending arrears and also propose to out-source this activity.**
- **On Extremely low load factor**
  - **UPCL has signed MoU with CPRI for meter testing. Testing of meters (along with CTs and PTs) of Industrial Consumers having poor load factor would commence during 2nd week of May 2008.**
- **Rigorous monitoring of Action Plan is absolutely necessary and would be carried out by Commission and also by Secretary (Energy), GoUK**

22

23

BILLING STATUS - DOMESTIC

(All Figures in %)

BILLING-ON BASIS	BILLING CYCLE-I				BILLING CYCLE-II		
	APR	JUN	AUG	OCT	MAY	JUL	SEPT
ACTUAL READING	72.4	71.92	71.03	71.39	70.58	70.4	69.21
METER NOT READ (NR)	13.48	14.7	16.34	15.17	16.08	16.15	17.59
METER NOT ACCESSIBLE (NA)	3.72	3.71	3.14	2.89	3.06	3.24	2.84
APPEARED DEFECTIVE (ADF)	1.29	1.42	1.43	1.38	1.71	1.7	1.72
IDENTIFIED DEFECTIVE (IDF)	6.4	6.51	6.74	7.37	6.65	6.61	6.98
READING DEFECTIVE (RDF)	1.33	1.33	1.26	1.34	1.5	1.45	1.58

Back

24

DOMESTIC- BILLING STATUS

(All Figures in Numbers)

BILLING STATUS	FOR NUMBER OF YEARS						
	>15	10-15	5-10	2-5	1-2	0.1-1	TOTAL
Not Read	367	1346	36923	15477	23146	79383	156642
Not Access.	56	161	728	3119	4213	19841	28118
Appear Def	341	1405	3137	2735	4718	2481	14817
Reading Def	12	58	491	2677	7543	3155	13936
Identified Defective.	2118	4238	9953	18989	14350	19230	68878
TOTAL	2894	7208	51232	42997	53970	124090	282391

Back

25

BILLING STATUS - NON-DOMESTIC

(All Figures in %)

BILLING-ON BASIS	APR	MAY	JUN	JUL	AUG	SEPT	OCT
ACTUAL READING	74.75	74.17	76.48	75.3	74.41	75.14	75.58
METER NOT READ (NR)	9.22	9.18	8.5	9.37	11.57	10.6	9.32
METER NOT ACCESSIBLE (NA)	5.44	5.58	5.12	5.33	4.21	4.12	4.48
APPEARED DEFECTIVE (ADF)	1.14	1.13	1.2	1.18	1.28	1.24	1.21
IDENTIFIED DEFECTIVE (IDF)	6.76	6.7	6.86	6.92	7.15	7.37	7.85
READING DEFECTIVE (RDF)	1.44	1.36	1.29	1.32	1.32	1.52	1.53

Back

26

NON DOMESTIC – BILLING STATUS

(All Figures in Numbers)

BILLING STATUS	NUMBER OF BILLING CYCLES						
	>90	60-90	30-60	12-30	6-12	1-6	TOTAL
Not Read	26	165	339	1291	1379	5668	8868
Not Access.	8	28	61	380	854	2923	4254
Appear Def.	20	47	105	188	620	178	1158
Reading Def.	4	6	25	178	996	243	1452
Identified Def.	50	606	865	1551	1873	2516	7461
TOTAL	108	852	1395	3588	5722	11528	23193

Back

27

LT INDUSTRY

(All Figures in %)

BILLING-ON BASIS	APR	MAY	JUN	JUL	AUG	SEPT	OCT
ACTUAL READING (%)	76.6	79.7	78.9	80	79.8	78.5	79.9
NOT READ (NR) (%)	13.9	12.6	13	11	12.9	14.7	12.8
NOT ACCESSIBLE (NA) (%)	1.96	2.61	1.99	3.09	2.81	2.74	2.87
APPEARED DEFECTIVE (ADF)	0.52	0.51	0.81	0.67	0.83	0.7	0.78
IDENTIFIED DEFECTIVE (IDF)	2.7	2.49	2.61	2.61	2.74	2.68	2.87
READING DEFECTIVE (RDF)	1.01	0.97	1.25	1.03	0.91	0.7	0.74

Back

28

LT INDUSTRY – BILLING STATUS

(All Figures in numbers)

BILLING STATUS	NUMBER OF BILLING CYCLES						
	>90	60-90	30-60	12-30	6-12	1-6	TOTAL
Not Read	10	22	29	116	127	532	836
Not Access.	0	0	0	19	34	112	165
Appear Def.	1	3	8	5	31	6	54
Reading Def.	0	1	1	7	27	3	39
Identified Def.	7	317	28	77	45	67	541
TOTAL	18	343	66	224	264	720	1635

Back

29

SUMMARY LT INDUSTRY

- Only 70-75% LT industrial consumers are being billed on actual meter reading.
- About 17% Meters of this category not read every month.
- About 10% meters remained defective through out this period.
- Performance of Haridwar and Roorkee Divisions is again worst.
- There has been no significant improvement over the period under review.

30

PUBLIC WATER WORKS

(All Figures in %)

	APR		MAY		JUN		JUL		AUGUST		SEPT		OCT	
Basis	No	Cons	NO.	Cons	NO.	Cons	NO.	Cons	NO.	Cons	NO.	Cons	NO.	Cons
AR	19.6	31.1	15.5	25.2	15.4	35.8	14.8	20	19.4	40.3	16.5	32.4	22.8	41.8
NR	34.7	19.8	43	38.6	49.2	31.7	48.2	27.8	44	27.3	49	33.1	39.3	23.9
NA	13.8	13.3	12.5	11.6	4.47	6.49	5.29	8.56	4.99	2.32	3.86	3.02	6.1	3.86
ADF	3.86	3	3.56	2.71	3.63	26.5	4.18	16.6	4.43	3.37	3.58	2.86	3.98	3.64
IDF	25.9	25.5	23.7	15.8	25.7	16.9	25.9	19.6	26	25.9	25.6	27.3	27.1	26.2
RDF	1.65	1.17	1.27	0.8	1.4	0.85	1.39	0.97	1.11	0.84	1.1	0.89	0.8	0.58
NB	0.28	6.12	0.25	5.26	0.26	5.64	0.28	6.42	0	0	0.26	0.44	0	0

31

PRIVATE TUBE WELLS

(All Figures in %)

BILLING-ON BASIS	APR	MAY	JUN	JUL	AUG	SEPT	OCT
ACTUAL READING	12	9.5	11	11	9	9.7	13
NOT READ (NR)	61	67	67	68	70	70	68
NOT ACCESSIBLE (NA)	1.9	0.6	1.6	1.3	1.2	1.3	1.1
APPEARED DEFECTIVE (ADF)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
IDENTIFIED DEFECTIVE (IDF)	0.8	0.7	0.8	0.9	0.9	0.9	1
READING DEFECTIVE (RDF)	0.4	0.5	0.4	0.3	0.3	0.3	0.3
MINIMUM	3.4	0.00	0	0.00	0.00	0.00	0.00
WITH OUT BASIS	19	19	18	18	18	17	16
PERM. DISCONNECTED(SB)	0.2	1.7	0	0.00	0.00	0.00	0
TEMP. DISCONNECTED (NB)	0.3	0.4	0.4	0.4	0.00	0.00	0.00

32

PRIVATE TUBE WELLS – BILLING STATUS

(All Figures in numbers)

BILLING STATUS	NUMBER OF BILLING CYCLES						
	>90	60-90	30-60	12-30	6-12	1-6	TOTAL
Not Read	4	10	1887	4250	3227	5898	15276
Not Access.	0	0	12	36	26	143	216
Appear Def.	0	0	23	15	18	14	70
Reading Def.	0	0	13	8	16	23	60
Identified Def.	0	2	15	42	46	95	200
TOTAL	4	12	1950	4351	3332	6173	15822

33

/ ANNEXURE-II /

List of Participants in the Second Meeting of the Working Group on "Metering Issues"

1. Dr. Pramod Deo, Chairperson, CERC
2. Shri Rakesh Nath, Chairperson, CEA
3. Shri V.J. Talwar, Chairperson, UERC
4. Shri Bhaskar Chatterji, Chairperson, HERC
5. Dr. P.K. Mishra, Chairperson, GERC
6. Shri C. Balakrishnan, Member, KSERC
7. Shri A. Velayutham, Member, MERC
8. Shri Venu Gopal, Member, DERC
9. Shri B. Jeyaraman, Member, TNERC
10. Shri Himadri Dutta, Member, AERC
11. Shri Alok Kumar, Secretary, CERC
12. Shri Alok Gupta, Chief Engineer, CEA
13. Shri Sunil Wadhwa, CEO, NDPL
14. Shri Praveen Chorghade, Head (Commercial), NDPL
15. Shri R.K. Singh, ME, NDPL
16. Shri Pankaj Prakash, Secretary, UERC
17. Shri S. Mukherjee, SE, WBSEDCL
18. Shri P. Bhattacharya, SE, WBSEDCL

FORUM OF REGULATORS (FOR)

STATUS OF

"CONSUMER AND DTS METERING AND PRACTICES"

FORUM OF REGULATORS (FOR)
Sectt: C/o Central Electricity Regulatory Commission (CERC)
3rd & 4th Floor, Chanderlok Building, 36 Janpath, New Delhi
www.forumofregulators.org

Q1. Current status of metering – consumer category-wise and distribution transformers metering (as per format enclosed).

S. No.	SERC	REPLY
1.	APERC	
2.	AERC	
3.	BERC	The details are enclosed.
4.	CSERC	Current status of consumer category-wise metering and distribution transformer metering as on 31.03.08 is given in the enclosed sheets.
5.	DERC	**BSES Yamuna Power Limited :** Enclosed **BSES Rajdhani Power Limited :** Enclosed **North Delhi Power Limited :** Enclosed
6.	GERC	**UGVCL :** Enclosed **PGVCL :** Enclosed **MGVCL :** Enclosed **DGVCL :** Enclosed **Torrent power ltd. (Ahmedabad) :** Enclosed **Torrent Power Ltd. (Surat) :** Enclosed **Distribution Transformer Metering:** Enclosed
7.	HERC	The status is enclosed.
8.	HPERC	The requisite information is enclosed in the format. However the exact data on the segregation of the Electro mechanical, electronics and TOD meters will be supplied later on, as this data is to be supplied by the field units for which requisite directions have been issued.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** Consumer category wise and distribution transformer metering as per the format enclosed. **Hubli Electricity Supply Company Limited:** Enclosed. **Chamundeshwari Electricity Supply Corporation Limited:** Enclosed **The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri :** Enclosed **Gulbarga Electricity Supply Company Limited :** Details furnished as per format enclosed. **Mangalore Electricity Supply Company Ltd.:** Enclosed
12.	KSERC	All consumers including agriculture are metered
13.	MPERC	Enclosed
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) :** Enclosed **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**:

		Enclosed **The Tata Power Company Ltd.-Distribution (TPC-D)**: Enclosed **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Enclosed **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Enclosed
15.	MsERC	
16.	OERC	**CESU:** Enclosed **NESCO:** Enclosed **WESCO:** Enclosed **SOUTHCO:** Enclosed
17.	PSERC	Enclosed.
18.	RERC	Nil
19.	TNERC	1. The details regarding consumer metering as per the required format is not readily available. The same will be furnished after getting the required details from TNEB 2. Distribution Transformer metering: (a) No. of Distribution Transformers as on 30.09.08 – 1,83,878 (b) No of metered Distribution Transformers – 93,101 (c) Of (b) above, numbers for which reading being taken by remote control devices is Nil.
20.	TERC	Status of metering ending 2008 is given as per format enclosed.
21.	UERC	Consumer category wise and distribution transformer metering, as per performa is enclosed.
22.	UPERC	Data has been asked from the discoms. **NOIDA Power Company Limited :** Given as per format.
23.	WBERC	**WBSEDCL:** Enclosed **DPSC Ltd.:** Format enclosed. Since distribution license is for operating at above 400 Volt there is no distribution transformer. **CESC Ltd.:** Format enclosed. **DPL :** Format enclosed.

STATUS OF METERING

TERC

Year : Ending March 2008
State: Tripura
DISCOM: Tripura State Electricity Corporation Limited

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Kutirjyoti	54967	0	26210	0	26210	47.68
2	Domestic	274828	68707	206121	0	274828	100.00
3	Commercial	34887	6977	27909	0	34886	100.00
4	Irrigation	2982	895	2087	0	2982	100.00
5	Industrial	3708	556	3091	61	3708	100.00
6	Tea, Coffee & Rubber garden	18	0	18	0	18	100.00
7	Bulk Supply	300	0	298	2	300	100.00
8	Public Lighting	683	300	383	0	683	100.00

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **7082 Nos.**

b. No. of Metered DTs **2750 Nos. DT metering is in progress**

c. of (b) above, numbers for which reading being taken by remote control devices: **(All remote control)**

TRIPURA ELECTRICITY REGULATORY COMMISSION

Month	Particulars	Div-I	Div-II	Div-III	Div-IV	Div-V	Div-VI	Div-VII	Div-VIII	Div-IX	Div-X	GED	Total
April '07	Meters replaced in the month (No.)	268	54	165	65	55	156	0	99	72	94	7	**1035**
May '07	Meters replaced in the month (No.)	276	39	279	57	35	148	57	115	N.R.	62	12	**1080**

June '07	Meters replaced in the month (No.)	288	63	269	57	60	104	15	140	46	78	11	**1131**
July '07	Meters replaced in the month (No.)	216	302	273	134	41	112	42	99	79	102	11	**1411**
Aug. '07	Meters replaced in the month (No.)	285	162	326	127	665	191	43	125	70	24	2	**2020**
Sep. '07	Meters replaced in the month (No.)	192	39	156	128	665	110	12	87	41	23	11	**1464**
Oct. '07	Meters replaced in the month (No.)	186	30	130	76	2	97	16	69	43	51	5	**705**
Nov. '07	Meters replaced in the month (No.)	278	54	0	35	2	185	16	95	18	18	0	**701**
Dec. '07	Meters replaced in the month (No.)	421	42	250	110	56	247	44	104	55	47	0	**1376**
Jan. '07	Meters replaced in the month (No.)	655	171	348	269	149	200	87	92	165	100	5	**2241**
Feb. '07	Meters replaced in the month (No.)	391	229	330	183	82	229	355	138	192	121	2	**2252**
Mar. '07	Meters replaced in the month (No.)	227	175	242	151	131	153	144	99	202	57	4	**1585**
TOTAL		**3683**	**1360**	**2768**	**1392**	**1943**	**1932**	**831**	**1262**	**983**	**777**	**70**	**17001**

STATUS OF METERING

KERC

Bangalore Electricity Supply Company Limited

1. CONSUMER METERING:

Year : As on 31.03.2008

State: Bangalore

DISCOM: Bangalore Electricity Supply Company Limited

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers*				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	BJ/KJ	602697				346460	57.49
2	Domestic	4483613				4483613	100
3	Commercial	577533				577533	100
4	Agricultural	616733				46392	7.52
5	LT Industrial	127888				127888	100
6	Water Supply	31914				31914	100
7	Street Light	35834				33919	95
8	Temporary	52421				52421	100
9	HT	5914				5914	100
TOTAL		**6534547**				**5706054**	**87.32**

*The details with respect to type of meters are not available.

a) All interface points and EHT installations are provided with ETV (static) meters of 0.2 accuracy.
b) All the HT installations are provided with electronic (static) meters of 0.5 accuracy.
c) All installations with 40 HP and above are provided with LT CT trivector meter with class of accuracy 0.5.
d) All LT3, LT4 above 10 HP, LT5 are provided with ETV (static) meters.
e) The consumer meters for domestic and less than 40 HP are of electromechanical High Precision / whole current meters.

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **114086**

b. No. of Metered DTs **45236**

c. of (b) above, numbers for which reading being taken by remote control devices**: ----

****Remote control devices are not provided for reading the meters installed to DTCs.**

STATUS OF METERING

Hubli Electricity Supply Company Limited

Year : As on 31.03.2008
State: Karnataka

DISCOM: HESCOM

1. CONSUMER METERING:

Status of metering of HESCOM for the month of Oct., 2008

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers*				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	HT (Comprising HT-1, HT-2, HT-3 & HT-4 tariffs)	1169	Nil	1155	14	1169	100
2	LT-1	64837			Nil		
3	LT-2	1746705	1746672	33	Nil	1746705	100
4	LT-3	229812	229630	182	Nil	229812	100
5	LT-4	475066			Nil		
6	LT-5	63371	58835	4536	Nil	63371	100
7	LT-6	33556	33524	32	Nil	33556	100
8	LT-7	7776			Nil		

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : _____

b. No. of Metered DTs **:** _____

c. of (b) above, numbers for which reading being taken by remote control devices: _____

STATUS OF METERING

KERC

Chamundeshwari Electricity Supply Corporation Limited

1. CONSUMER METERING:

Year : As on 31.03.2008
State: Karnataka
DISCOM: CESC, Mysore

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	LT-1	306223	279110	14695	0	293805	95.94
2	LT-2	1190092	1026135	163923	0	1190058	100
3	LT-3	130802	108938	21864	0	130802	100
4	LT-4	131214	24966	6602	0	31568	24.06
5	LT-5	21818	17736	4082	0	21818	100
6	LT-6 w/s	21764	18367	2970	0	21337	98.04
7	LT-6 Street Light	5711	5629	82	0	5711	100
8	LT-7	2045	832	1213	0	2045	100
9	HT	837	174	663	0	837	100
	TOTAL	**1810506**	**1481887**	**216094**	**0**	**1697981**	**93.78**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **41127**

b. No. of Metered DTs **: 10209**

c. of (b) above, numbers for which reading being taken by remote control devices: **Readings are not being taken by remote control devices in CESC, Mysore**

STATUS OF METERING

KERC

The Hukkeri Rural Electric Co-Op Society Ltd., Hukeri

1. CONSUMER METERING:
Year : As on 31.03.2008
State: Karnataka
DISCOM: The Hukeri Rural Electric Co-Op Society Ltd., Hukeri

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Lighting & AEH LT-2(a)	59666	59652	14		59666	100
2	Educational Inst. LT-2(b)	49	46	03		49	100
3	Commercial LT-3	4805	4762	43		4805	100
4	IP-Set (up to 10 HP) LT-4(a)	17492	5693			5693	32.55
5	IP-Set (above 10 HP) LT-4(b)	14	14			14	100
6	Pvt. Horticulture LT-4(c)	2	2			2	100
7	Industrial LT-5(b)100	1493	1479	14		1493	100
8	Public Lighting LT-6	222	222			222	100
9	Water Supply LT-6	476	476	3		476	100
10	Water Supply HT-1	3		5		3	100
11	Industrial HT-2(a)	5		5		5	100
12	Commercial HT-2(b)	5		3		5	100
13	Lift Irrigation HT-3	3				3	100
	TOTAL	**84235**	**72346**	**90**	**0**	**72436**	

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **41127**

b. No. of Metered DTs **: 10209**

c. of (b) above, numbers for which reading being taken by remote control devices: **Readings are not being taken by remote control devices in CESC, Mysore**

STATUS OF METERING

UPERC

Year : Ending March 2008

State: _____

DISCOM: NOIDA Power Company Limited

1. CONSUMER METERING:

S.No.	Consumer Category	Number of metered Consumers	Number of Unmetered Consumers	Total number of consumers	Percentage metering %
1	Domestic	29338	5824	35162	
2	Industrial	1114	NA	1114	
3	Commercial	1403	NA	1403	
4	Agriculture	190	1063	1253	
5	Railway	NA	NA	NA	
6	Public Lighting	2	1	3	
7	Public Works	32	NA	32	
8	Others	2248	NA	2248	

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **……**

b. No. of Metered DTs **……**

c. of (b) above, numbers for which reading being taken by remote control devices: **……**

STATUS OF METERING

HPERC

Year : Ending March 2008

State: Himachal Pradesh

DISCOM: Himachal Pradesh State Electricity Board

1. CONSUMER METERING: 100%

Sr.No.	Consumer Category	No. of consumers as on 31.03.2008	No of metered Consumers			Total	Percentage metering
1	**Domestic**						
	a. Antodaya	1000				1000	
	b. Others						
	0-150	1361701				1361701	
	151 & above	203472				203472	
	Domestic Total	**1566173**				**1566173**	
2	**NDNCS**						
	0-20 kW	13715				13715	
	20-100 kW	1801				1801	
	NDNCS Total	**15516**				**15516**	
3	**Commercial Supply**						
	0-20 kW	203819				203819	
	20-100 kW	2978				2978	
	Above 100 kW	1771				1771	
	Commercial Supply Total	**208568**				**208568**	
4	**SMS**						
	0-20 kW	25800				25800	
	Above 20 kW	6688				6688	
	SMS Total	**32488**				**32488**	
5	**Large Supply**						
	HT upto 200 kVAh/kVA						
	HT Balance						
	LS HT Total	**1096**				**1096**	
6	**Large Supply**						
	EHT upto 300 kVAh/kVA						
	EHT Balance						
	LS EHT Total	**18**				**18**	
7	**WPS**						
	LT	3427				3427	
	HT	133				133	
	EHT	0				0	
	WPS Total	**3560**				**3560**	
8	**Street Lighting**	592				592	
9	**Agri Pumping Supply**						
	0-20 kW	11884				11884	

	20-100 kW	477				477	
	Agri Pumping Total	**12361**				**12361**	
10	**Bulk Supply**						
	LT	71				71	
	HT	90				90	
	BS Total	**161**				**161**	
11	**TM**						
	0-20 kW	2027				2027	
	20-100 kW	135				135	
	TM Total	**2162**				2162	
	GRANT TOTAL	**1,842,695**				**1,842,695**	

Note: The exact detail of the electro-mechanical, electronics & TOD meters will be supplied on receipt of information from the field units.

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **19930 (Ending 6/08)**

b. No. of Metered DTs: **19657 (Ending 6/08)**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

GERC

Year : _____

State: _____

DISCOM: UGVCL

1. CONSUMER METERING:

S. No.	Consumer Category	Number of Consumers	Nos. of metered consumers			Total number of consumers	Percentage metering %
			Nos. of Electro Mechanical Meters	Nos. of Electronic meters	Nos. of ToD meters		
1	Residential	1723720	1698470	25250	0	1723720	100
2	Commercial	211078	205928	5150	0	211078	100
3	Industrial LT	29279	5017	23512	750	29279	100
4	Public Lighting	6967	6967	0	0	6967	100
5	Agriculture	213559	51833	5760	0	57593	26.96
6	Public Water Works	11020	1047	9423	550	11020	100
7	Industrial HT	1622	0	0	1622	1622	100
8	Railway Traction	1	0	0	1	1	100
	Total	**2197246**	**1969262**	**69095**	**2923**	**2041280**	**92.90**

1.2 PGVCL

S. No.	Consumer Category	Number of Consumers		Nos. of metered consumers			Total number of consumers	Percentage metering %
				Nos. of Electro Mechanical Meters	Nos. of Electronic meters	Nos. of ToD meters		
1	Residential	2512850		2512850				100
2	Commercial	462244		462244				100
3	Public Lighting	4494		3996	500			100
4	LT Industrial	75797		27797	48000			100
5	Water Works	10909		8909	2000			100
6	High Tension Consumer	2139			2139**			100
7	Agriculture	Metered	134005	33005	35000			100
		Unmeter	259361	0	0			34.60

		ed					
	Total	**3461799**					**92.50%**

**** All High Tension Consumers are provided with the ToD facility Meter.**

1.3 MGVCL

S. No.	Consumer Category	Number of Consumers	Nos. of metered consumers			Total number of consumers	Percentage metering %
			Nos. of Electro Mechanical Meters	Nos. of Electronic meters	Nos. of ToD meters		
1	Residential	1746777	1654408	92369		1746777	100
2	Commercial	219495	210515	8980	8980	219495	100
3	Industrial LT	23811		23811	23811	23811	100
4	Public Lighting	4796		4769	4796	4796	100
5	Agriculture	59684	3675	29733	29733	33408	55.97
6	Public Water Works	7085	283	6802	6802	7085	100
7	Industrial HT	994		994	994	994	100
8	Railway Traction	6		6	6	6	100
	Total	**2062648**	**1868881**	**167464**	**75122**	**2036372**	**98.73**

1.4 DGVCL

S. No.	Consumer Category	Number of Consumers	Nos. of metered consumers			Total number of consumers	Percentage metering %
			Nos. of Electro Mechanical Meters	Nos. of Electronic meters	Nos. of ToD meters		
1	Residential	01442439	1018260	424179	0	1442439	100
2	Commercial	207629	101801	105827	0	207629	100
3	Industrial LT	47301	5377	41924	0	47301	100
4	Industrial HT	1932	0	644	1288	1932	100
5	Street Light	3618	2690	928	0	3618	100
6	Tram way	0	0	0	0	0	0
7	Railway	5	0	1	4	5	100
8	Irrigation	81279	31485	3031	0	34516	42.47
9	Public Water Works	7318	4509	2809	0	7318	100
10	Military	0	0	0	0	0	0
11	Licensee	1	0	0	1	1	100
	Total	**1791522**	**1164122**	**579343**	**1293**	**1744759**	**97.40**

1.5 Torrent Power Ltd. (Ahmedabad)

S. No.	Consumer Category	Number of Consumers	Nos. of metered consumers			Total number of consumers	Percentage metering %
			Nos. of Electro Mechanical Meters	Nos. of Electronic meters	Nos. of ToD meters		
1	RGP	1105602	386667	685968	33360	1105995	100
2	CGP	238311	78437	155518	18476	252431	100
3	IGP	1201	658	493	100	1251	100
4	LTP2	44739	15582	37866	36534	89982	100
5	LTP1	7982	2236	7222	6510	15968	100
6	LTMD2	9423	2416	5266	11174	18858	100
7	LTMD1	1132	176	761	1331	2268	100
8	LTPAG	440	227	304	352	883	100
9	HT	754	0	0	771	771	100
	Total	**1409584**	**486399**	**893398**	**108608**	**1488407**	**100**

1.6 Torrent Power Ltd. (Surat)

S. No.	Consumer Category	Number of Consumers	Nos. of metered consumers			Total number of consumers	Percentage metering %
			Nos. of Electro Mechanical Meters	Nos. of Electronic meters	Nos. of ToD meters		
1	RGP	344924	84309	197093	73366	354768	100
2	CGP	102542	27131	56617	21537	105285	100
3	LPT	57993	20548	43840	52266	116654	100
4	LTMD	1023	56	587	1397	2040	100
5	LTPAG	247	83	142	219	444	100
6	GLP	1391	151	771	683	1605	100
7	Temp	571	38	282	241	561	100
8	HT	161	0	0	161	161	100
	Total	**508852**	**132316**	**299332**	**149870**	**581518**	**100**

1.7 Distribution Transformer Metering

	UGVCL	PGVCL	MGVCL	DGVCL	TPL (A)	TPL(S)
(a) No. of DTs	109493	113451	40582	39654	5133	2169
(b) No. of Metered DTs	57273	19643	54.54%	22278	5133	2169
(c) No. for which reading being taken by remote control device out of (b) above	Nil	Nil	Nil	Nil	Nil	Nil

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **……..**

b. No. of Metered DTs **……**

c. of (b) above, numbers for which reading being taken by remote control devices:**……..**

STATUS OF METERING

UERC

Year : Ending March 2008

State: Uttarakhand

DISCOM: Uttarakhand Power Corporation Limited

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic	1075455	400211	647405	10101	1057717	98.35
2	Commercial	125090	24900	70190	30000	125090	100.00
3	Industrial	8475	810	2555	5110	8475	100.00
4	PTW	19697	2110	9415	5709	17234	87.49
5	Public Water Works	850	180	320	350	850	100.00
6	STW/Pump canals	878	340	210	328	878	100.00
7	Railway Traction	1	1	0	0	1	100.00
8	Public Lamp	350	150	195	0	345	98.57
TOTAL		**1230796**	**428702**	**730290**	**51598**	**1210590**	**98.35**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **34219 Nos.**

b. No. of Metered DTs **13895 (40.61%)**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

***Electronic meters installed in Domestic and Commercial category are singly phase in most cases and these single phase meters have no TOD facility. 3 phase electronic meter, mostly have TOD facility.**

STATUS OF METERING

MPERC

Year : Ending March 2008
State: Madhya Pradesh
DISCOM 1: Madhya Pradesh Poorv Kshetra Vidyut Vitaran Company Limited, Jabalpur (East)

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	HT Consumers	720	-	-	720	720	100.00
2	LT Consumers						
i.	Domestic	1724716	1084558	298350	0	1382908	80.18
Ii	Non-Domestic	200376	198547	1829	0	200376	100.00
iii	Industrial	28789	28704	85	0	28789	100.00
iv	Agriculture	780326	173895	57844	0	231739	29.70
v	Others	11573	8317	3256	0	11573	100.00
	Total	**2745780**	**1494021**	**361364**	**0**	**1855385**	**67.57**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **51919**

b. No. of Metered DTs **3840**

c. of (b) above, numbers for which reading being taken by remote control devices: _____

STATUS OF METERING

MPERC

Year : Ending March 2008
State: Madhya Pradesh
DISCOM 2: Madhya Pradesh Kshetra Vidyut Vitaran Company Limited, BHOPAL (CENTRAL)

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	HT Consumers	953	-	-	953	953	100.00
2	LT Consumers						
i.	Domestic	1437315	460079	804048	0	1264127	87.95
ii	Non-Domestic	181530	9167	172363	0	181530	100.00
iii	Industrial	22277	446	21831	0	22277	100.00
iv	Agriculture	289807	42812	64219	0	107031	36.93
v	Others	12556	2511	10045	0	12556	100.00
	Total	**1943485**	**515015**	**1072506**	**0**	**1587521**	**81.68**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **68392**

b. No. of Metered DTs **5929**

c. of (b) above, numbers for which reading being taken by remote control devices: **4250**

STATUS OF METERING

MPERC

Year : Ending March 2008
State: Madhya Pradesh
DISCOM 3: Madhya Pradesh Pashim Kshetra Vidyut Vitaran Company Limited, INDORE (WEST)

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	HT Consumers	1464	-	-	1464	1464	100.00
2	LT Consumers						
i.	Domestic	1942063	527999	1246929	0	1774928	91.39
ii	Non-Domestic	241799	24329	213931	3539	241799	100.00
iii	Industrial	34103	213	33890	0	34103	100.00
iv	Agriculture	460615	814	9857	0	10671	2.32
v	Others	14784	1158	13626	0	14784	100.00
	Total	**2693364**	**554513**	**1518233**	**3539**	**2076285**	**77.09**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **82187**

b. No. of Metered DTs **41028**

c. of (b) above, numbers for which reading being taken by remote control devices: **7896**

STATUS OF METERING

BERC

Year : Ending March 2008
State: Bihar
DISCOM 3: Bihar State Electricity Board, Patna

1. CONSUMER METERING: There are about 9.64 lacs Consumer Comprising of Kutir Jyoti (Rural), Domestic (1) (Rural), NDS (Rural), Street Lioght, Irrigation.

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic-II	874646	661582	352000	NIL	1013582	35%
	Kutir Jyoti (Urban)	2574					
2	N.D.S.-II	134626					
	N.D.S. – III	1736					
3	L.T. Industries (LTIS-I&II)	12933	4071	10402	NIL	14473	71%
4	Public Water Works LTIS-III	762					
5	High Tension I, II, III & HTSS	763					
6	Railway Traction I & II	15					
	Total	**1028055**					

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **50,490**

b. No. of Metered DTs **4187**

c. of (b) above, numbers for which reading being taken by remote control devices: **NIL**

STATUS OF METERING

KERC

Year : Ending March 2008
State: Karnataka
DISCOM 3: Gulbarga Electricity Supply Company Limited (Gulbarga)

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	LT-1	443598	295984	-	-	-	66.723
2	LT-2	1106756	1092131	-	-	-	98.679
3	LT-3	158124	158088	-	-	-	99.977
4	LT-4(a)	244635	44433	-	-	-	18.163
5	LT-4(b)	991	430	-	-	-	43.391
6	LT-4(c)	51	13	-	-	-	25.490
7	LT-5 a to d	32545	30804	1734	7	-	100.000
8	LT-6	12629	10997	-	-	-	87.077
9	LT-6(i)	8050	7314	-	-	-	90.857
10	LT-7	4599	4599	-	-	-	100.000
LT Total		**2011978**	**1644793**	**1734**	**7**	**-**	**81.750**
11	HT-1	63	-	63	-	-	100.000
12	HT-2 (a)	531	-	524	7	-	100.000
13	HT-2 (b)	184	-	184	-	-	100.000
14	HT-3 (a)	105	-	105	-	-	100.000
15	HT-3 (b)	0	-	0	-	-	0
16	HT-4	28	-	28	-	-	100.000
17	KPC	1	-	1	-	-	100.000
HT Total		**912**	**-**	**905**	**7**	**-**	**100.000**
Grand Total		**2012890**	**1455866**	**2639**	**14**	**-**	**72.459**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **……**

b. No. of Metered DTs **……**

c. of (b) above, numbers for which reading being taken by remote control devices: **……**

STATUS OF METERING

KERC

Year : Ending March 2008
State: Karnataka
DISCOM 2: Mangalore Electricity Supply Company Ltd

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	LT-1	133068	96861	4736	0	101597	76.35%
2	LT-2	1060580	943627	116953	0	1060580	100%
3	LT-3	141855	128904	12951	0	141855	100%
4	LT-4	183737	148754	20358	0	169112	92.04%
5	LT-5	19093	14218	4868	7	19093	100%
6	LT-6	23020	20815	2205	0	23020	100%
7	LT-7	2559	2125	434	0	2559	100%
8	HT	740	0	731	9	740	100%
	Total	**1564652**	**1355304**	**163236**	**16**	**1518556**	**97.05%**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **26994**

b. No. of Metered DTs **: 1759**

c. of (b) above, numbers for which reading being taken by remote control devices: **……**

STATUS OF METERING

MERC

Year : Ending March 2008
State: Maharashtra
DISCOM 3: Maharashtra State Electricity Distribution Company Ltd. (MSEDCL)

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Residential	11921367	6877305	5044062	0	11921367	100
2	Commercial	1170353	521447	648906	0	1170353	100
3	LT-Industrial	269135	3832	0	265303	269135	100
4	PWW – LT	43786	43676	110	0	43786	100
5	AG – Total	2624412	421578	738631	0	2624412	44.21
	AG – Metered	1160209	421578	738631	0	1160209	100
	AG – Unmetered	1464203	0	0	0	0	0
6	Streetlight	70749	67154	3595	0	70749	100
7	Poultry	11263	9710	1553	0	11263	100
8	Hording & Advt.	1748	1641	107	0	1748	100
9	Temp. supply	13672	9518	4154	0	13672	100
10	Cremotorium / Burial	117	105	12	0	117	100
LT Total							
HT Total							
Grand Total							

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **2,56,798**

b. No. of Metered DTs **: 1,18,821**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

Current Status of Distribution Transformers (DTCs) metering as on 31.12.2008

a. No. of DTCs : **2,68,079**

b. No. of Metered DTs **: 1,36,824**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

MERC

Year : Ending March 2008
State: Maharashtra
DISCOM 3: Reliance Infrastructure Ltd.

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	HT Residential	17	0	20	20		100
2	HT Industrial	417	0	479	632		100
3	LT Residential	2259124	403954	1878800	2161		100
4	LT Commercial	366159	63132	309331	9238		100
5	LT Industrial	20933	4340	20586	6268		100
6	Others	6092	186	6114	3554		100

2. DISTRIBUTION TRANSFORMER METERING: (as on 31st July 2008)

a. No. of DTCs : **4962**

b. No. of Metered DTs **: 4962**

c. of (b) above, numbers for which reading being taken by remote control devices: **100% -**

All DTs with electronic meters & communication facility

STATUS OF METERING

MERC

Year : Ending March 2008
State: Maharashtra
DISCOM : Tata Power Company

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Railway	3	Nil	16	16	0	100%
2	HT Industrial	48	Nil	74	74	74	100%
3	HT Commercial	52	Nil	59	59	59	100%
4	HT Public	16	Nil	21	21	21	100%
5	LT2P Industrial	583	Nil	624	624	624	100%
6	LT2P Commercial	703	Nil	798	798	798	100%
7	LT 1P Industrial	1116	Nil	1116	1116	0	100%
8	LT 1P Commercial	1905	Nil	1970	1970	0	100%
9	Residential	19205	Nil	19555	19555	0	100%
Total		**23631**	Nil	**24233**	**24233**	**1576**	

2. DISTRIBUTION TRANSFORMER METERING: (as on 31st July 2008)

a. No. of DTCs : **325**

b. No. of Metered DTs **: 325**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

Billing on Actual Consumption Basis

Year : Ending March 2008

State: Maharashtra

Discom: Tata Power Company

Sl. No	Consumer Category	No of consumers	No. of Consumers whose billing done on actual consumption basis	Percentage billing on actual consumption basis
1	Railway	3	3	100%
2	HT Industrial	48	48	100%
3	HT Commercial	52	52	100%
4	HT Public	16	16	100%
5	LT2P Industrial	583	583	100%
6	LT2P Commercial	703	703	100%
7	LT 1P Industrial	1116	1116	100%
8	LT 1P Commercial	1905	1905	100%
9	Residential	19205	19205	100%
Total		**23631**	**23631**	

Restoration of Power Supply in case of Burnt Meters
(Regulation 7.1 of MERC, Standards of Performance Regulations, 2005)

Month & Year	Total No. of Complaints received	No. (%) where defect was restored within stipulated time
1	**2**	**3**
FY 2007-08		
April -07	2	100%
May -07	3	100%
June -07	7	100%
July -07	1	100%
August -07	2	100%
September -07	0	NA
October -07	1	100%
November -07	1	100%
December -07	1	100%
January -08	0	NA
February -08	1	100%
March -08	4	100%

STATUS OF METERING

MERC

Year : Ending March 2008
State: Maharashtra
DISCOM : BEST Undertaking

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Residential	692989	665165	30392	735	696292	
2	Commercial	236347	224802	22214	5457	252473	
3	Industrial	13618	10600	2943	874	14417	
4	Others	1238	1166	426	0	1592	
5	H.T.	123	0	0	123	123	
Total		**944315**	901733	**55975**	**7189**	**964897**	

2. DISTRIBUTION TRANSFORMER METERING: (as on 31st July 2008)

a. No. of DTCs : **2706**

b. No. of Metered DTs **: Nil**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

MERC

Year : Ending March 2008
State: Maharashtra
DISCOM : The Mula-Pravara Electric Co.Op. Society Ltd. Shrirampur

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
A	LT Connection						
1	Residential	89303	55726	33577	0	89303	100.00
2	Commercial	10470	4597	5871	2	10470	100.00
3	Industrial	2360	257	2089	14	2360	100.00
4	Street Light	409	266	163	0	429	104.89
5	Water Works	408	157	251	0	408	100.00
6	Agriculture	46554	2397	5053	0	7450	16.00
7	Poultry	96	26	70	0	96	100.00
Total		**149600**	**63426**	**47074**	**16**	**110516**	**73.87**
B	HT Connections						
1	HT Industrial	35	1	0	34	35	100.00
2	HT Water Works	9	2	1	6	9	100.00
3	HT Ag. (LIS)	26	21	3	2	26	100.00
Total		**70**	**24**	**4**	**42**	**70**	**100.00**
Grand Total		**149670**	**63450**	**47078**	**58**	**110586**	**73.89**

2. DISTRIBUTION TRANSFORMER METERING: (as on 31st July 2008)

a. No. of DTCs : **3097**

b. No. of Metered DTs **: Nil**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

OERC

Year : Ending March 2008
State: Orissa
DISCOM : CESU

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage of working metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total working meter	
1	Kuti Jyoti	6018	2397	0	0	2397	40%
2	Domestic – urban	292842	131250	129309	0	260559	89%
3	Domestic-Rural	595318	357946	153387	0	511333	86%
4	Commercial – Urban	50194	0	40529	6941	47470	95%
5	Commercial – Rural	36819	0	32295	796	33091	90%
6	Small Industry	6457	0	6040	0	6040	94%
7	Medium Industries	1033	0	0	1001	1001	97%
8	Irrigation	6499	0	556	0	556	9%
9	Public lighting	297	0	0	127	127	43%
10	Public Water Works < 100 KW	1261	0	51	991	1042	83%
11	Public Institution < 100 KW	5369	0	479	3454	3933	73%
LT Total		**1002107**	**491593**	**362646**	**13310**	**867549**	**87%**
12	Large Industris < 132 KV	227	0	0	213	213	94%
13	Mini-Steel Plants	4	0	0	4	4	100%
14	General Purpose	259	0	0	254	254	98%
15	Bulk Supply – DOM	100	0	0	99	99	99%
16	Public Water Works >100 KW	29	0	0	29	29	100%

17	Public Institution > 100 kW	76	0	0	74	74	97%
HT Total		**695**	**0**	**0**	**673**	**673**	**97%**
18	Heavy Industries	1	0	0	1	1	100%
19	Power Intensive Industries	7	0	0	7	7	100%
20	Railway Traction	5	0	0	5	5	100%
21	Large Industries < 132 KV	4	0	0	4	4	100%
EHT Total		**17**	**0**	**0**	**17**	**17**	**100%**
Grand Total		**1002819**	**491593**	**362646**	**14000**	**868239**	**87%**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **17685**

b. No. of Metered DTs **: 5104**

c. of (b) above, numbers for which reading being taken by remote control devices: **……..**

STATUS OF METERING

OERC

Year : Ending March 2008
State: Orissa
DISCOM : NESCO

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage of working metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total working meter	
	LT Category						
1	Domestic	504395	219631	105000	0	324631	64.4
2	Kutir Jyoti	817		786		786	96.2
3	Others						
4	General Purpose >= 10KW	1383	150	1100	85	1335	96.5
5	General Purpose >= 10KW	42792	995	32510		33505	78.3
6	Irrigation	9365	1927			1927	20.6
7	Agro Industries	41	0	31	10	41	100.00
8	Street lighting	157	30			30	19.1
9	LT Industrial (S)	4194	0	4075	0	4075	97.2
10	LT Industrial (M)	612		512	100	612	100.00
11	Specified Public Purpose	3878	1851	500		2351	60.6
12	Public Water Works < 10 KW	769	579	100		679	88.3
13	Large Industry						
LT Total		**568403**	**225163**	**144614**	**195**	**369972**	**65.09**
HT Category							
14	Bulk Supply (Domestic)	16			16	16	100
15	Irrigation						
16	Agro Industries	5			5	5	100
17	Public Institution >	7			7	7	100

	100 KW						
18	Commercial						
19	Medium Industry						
20	General Purpose	28			28	28	100
21	Public Water Works > 100 KW	6			6	6	100
22	Large Industry Below 132 kV	242			242	242	100
23	Power Intensive Industry	1			1	1	100
24	Mini Steel Plant						
25	Railway Traction						
26	Emerg. Supply to CPPs						
27	Colony Consumption						
28	Special Tariff						
	HT Total	**305**			**305**	**305**	**100**
	EHT Category						
29	General Purpose						
30	Large Industry at 132 kV	8			8	8	100
31	Railway Traction	5			5	5	100
32	Heavy Industry						
33	Power Intensive Industry	4			4	4	100
34	Power Intensive Industry						
35	Mini Steel Plant						
36	Emerg. Supply to CPPs.	3			3	3	100
37	Colony Consumption						
38	Special Tariff						
	EHT Total	**20**	**0**	**0**	**20**	**20**	**100**
	Grand Total	**568728**	**225163**	**144614**	**520**	**370297**	**65.1**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **18090**

b. No. of Metered DTs **: 101**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

OERC

Year : Ending March 2008
State: Orissa
DISCOM : WESCO

1. CONSUMER METERING:

Consumer Category	Consumers as on 31.03.08	Metered consumers as on 31.03.08	Electro-mechanical	Electronic	TOD	Total working meter	% of Working metering
Domestic	430397	412718	407674	4701	343	412718	96%
Kutir Jyoti	5947	5703	5703	0	0	5703	96%
Others	0	0	0	0	0	0	
Total Domestic	**436344**	**418421**	**413377**	**4701**	**343**	**418421**	**96%**
Gen. Purpose<110 kva	42351	40545	36371	1780	2394	40545	96%
Irrigation, Pumping & Agriculture	10502	10009	8609	1375	25	10009	95%
Public Light	334	330	247	77	6	330	99%
LT Ind. (S) Supply	4238	4238	0	0	4238	4238	100%
LT Ind. (M) Supply	1002	1002	0	0	1002	1002	100%
Specified public purpose	3124	3124	2340	490	294	3124	100%
Public Water Works & Sewerage Pumping	0	0	0	0	0	0	
<= 110 Kva	828	828	75	558	195	828	100%
=> 110 Kva	10	10	0	0	10	10	100%
Total Public Water Works	**62389**	**60086**	**47642**	**4280**	**8164**	**60086**	**100%**
General Purpose >= 110 Kva	2	2	0	0	2	2	100%
Large Industry	3	3	0	3	0	3	100%
Total LT	**5**	**5**	**0**	**3**	**2**	**5**	**96%**
Bulk Supply Domestic	15	15	0	1	14	15	100%
Irrigation	0	0	0	0	0	0	
Specified Public Purpose	12	12	0	1	11	12	100%

Gen. Purpose < 110 Kva	0	0	0	0	0	0	
HT Industrial (M) Supply	0	0	0	0	0	0	
General Purpose >= 110 Kva	47	47	0	0	47	47	100%
Public Water Work & Sewerage Pumping	10	10	0	0	10	10	100%
Large Industry	430	430	0	4	426	430	100%
Power Intensive Industry	8	8	0	0	8	8	100%
Mini Steel Plant	9	9	0	0	9	9	100%
Railway Traction	1	1	0	0	1	1	100%
Colony Consumption	0	0	0	0	0	0	100%
Total HT	**532**	**532**	**0**	**6**	**526**	**532**	100%
General Purpose	0	0		0	0	0	100%
Large Industry	7	7		1	6	7	100%
Railway Traction	6	6		6	0	6	100%
Heavy Industry	3	3		0	3	3	100%
Power Intensive Industry	3	3		2	1	3	100%
Mini Steel Plant	2	2		0	2	2	100%
Energy Supply to CPP	0	0		0	0	0	100%
Colony Consumption	0	0		0	0	0	100%
Total EHT	**21**	**21**	**0**	**9**	**12**	**21**	100%
Grand Total	**499291**	**479065**	**461019**	**8999**	**9047**	**479065**	**96%**

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **16,101**

b. No. of Metered DTs **: 12,558**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

OERC

Year : Ending March 2008
State: Orissa
DISCOM : SOUTHCO

1. CONSUMER METERING:

S. No.	Consumer Category	Total Consumers	Total Meters	Electro Mechanical Meter	Electronic Meter	TOD Meter	Total working meter	Percentage of Working Metering
	LT Category							
1 (i)	Domestic							
(ii)	Kutir Jyoti< 30kwh/month	7087	1249	820	429	0	1249	18
(iii)	Others	463888	463274	258899	204375	0	463274	100
	Total Domestic	**470975**	**464523**	**259719**	**204804**	**0**	**464523**	**99**
2	LT General (Commercial)	43543	43543	3199	40265	79	43543	100
3	Irrigation	5003	4804	1187	3534	83	4804	96
4	Public Lighting (Street Light)	665	665	218	447	0	665	100
5	LT Industrial (Small Industry)	2641	2641	79	2385	177	2641	100
6	LT Industrial (M) (Medium Industry)	685	685	0	480	205	685	100
7	Specified Public Prupose (Pub, Instn.)	4652	4637	438	4136	63	4637	100
8	Public Water Works	1039	1039	204	823	12	1039	100
9	General Purpose	3	3	0	3	0	3	100
10	Large Industry	2	2	0	2	0	2	100
	Total LT	**58233**	**58019**	**5325**	**52075**	**619**	**58019**	**99**
	HT Category							
11	Bulk Supply – Domestic	8	8	0	2	6	8	100
12	Irrigation	0	0	0	0	0	0	100
13	Specified Public Purpose (Pub. Institution)	23	23	0	5	18	23	100
14	LT General	0	0	0	0	0	0	100

	(Commercial)							
15	HT Industrial (M) (Medium Industry)	244	244	0	89	155	244	100
16	General Purpose	32	32	0	10	22	32	100
17	Public Water Works	13	13	0	3	10	13	100
18	Large Indsutry	70	70	0	3	67	70	100
19	Power Intensive Industry	1	1	0	0	1	1	100
20	Mini Steel Plant	0	0	0	0	0	0	100
21	Railway Traction	0	0	0	0	0	0	100
22	Colony Consuption	0	0	0	0	0	0	100
	Total HT	**391**	**391**	**0**	**112**	**279**	**391**	**100**
	EHT Category	0	0	0	0	0	0	100
23	General Purpose	3	3	0	0	3	3	100
24	Large Industry	8	8	0	0	8	8	
25	Railway Traction	0	0	0	0	0	0	
26	Heavy Industry	0	0	0	0	0	0	
27	Power intensive industry	0	0	0	0	0	0	
28	Mini Steel Plant	0	0	0	0	0	0	
29	Emergency Supply to CPP	0	0	0	0	0	0	
30	Colony Consumption	0	0	0	0	0	0	
31	VBC (Special Tariff)	0	0	0	0	0	0	
	Total EHT	**11**	**11**	**0**	**0**	**11**	**11**	**100**
	Grand Total	**529610**	**522944**	**265044**	**256991**	**909**	**522944**	**99**

Abstract of Metering

Licensee	Consumer Category	No. of Consumers	No of Metered Consumers				% of working Metering
			No. of Electro-mechanical Meters	No. of Electronic Meters	No. of TOD Meters	Total working meter	
CESU	LT	1002107	491593	362646	13310	867549	87%
	HT	695	0	0	673	673	97%
	EHT	17	0	0	17	17	100%
	Total	**1002819**	**491593**	**362646**	**14000**	**868239**	**87%**
NESCO	LT	568403	225163	144614	195	369972	65.09%
	HT	305	0	0	305	305	100
	EHT	20	0	0	20	20	100

	Total	**568728**	**225163**	**144614**	**520**	**370297**	**65.1**
WESCO	LT	498738	461019	8984	8509	478512	96
	HT	532	0	6	526	532	100
	EHT	21	0	9	12	21	100
	Total	**499291**	**461019**	**8999**	**9047**	**479065**	**96**
SOUTHCO	LT	529208	265044	256879	619	522542	99
	HT	391	0	112	279	391	100
	EHT	11	0	0	11	11	100
	Total	**529610**	**265044**	**256991**	**909**	**522944**	**99**
ORISSA	LT	2598456	1442819	773123	22633	2238575	86.2
	HT	1923	0	118	1783	1901	98.9
	EHT	69	0	9	60	69	100
	Total	**2600448**	**1442819**	**773250**	**24476**	**2240545**	**86.2**

2. DISTRIBUTION TRANSFORMER METERING:

This has not been furnished by SOUTHCO. However, the information available with OERC is as below:-

a. No. of DTCs : **10,906**

b. No. of Metered DTs **: 9,236**

c. of (b) above, numbers for which reading being taken by remote control devices: **Not furnished**

STATUS OF METERING

PSERC

Year : Ending March 2008
State: Punjab
DISCOM : _____

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %	Remarks
			No. of Electro-mechanical Meters	No. of Electronic Meters	No. of TOD Meters	Total		
1	DS	4361304	2048800	2312504	-	4361304	100	
2	NRS	756601	328118	428483	-	756601	100	
3	SP	82333	4532	77801	-	82333	100	
4	MS	21916	6	21910	-	21916	100	
5	LS	4988	0	4988	0	4988	100	
6	BS	371	-	371	-	371	100	
7	RT	7	-	7	-	7	100	
8	PL	1208	186	3001	-	3187	100	Information relates to 18 circles computerized till date. Normally more than one meter is installed against one connection. 3187 metes are installed against 1208 connections.
9	AP	973074	49978	44742	-	94720	9.73	
Total		**6201802**	**2431620**	**2893807**	**-**	**5325427**	**85.87**	

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **2.80 Lac**

b. No. of Metered DTs **: 13288 Nos.**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

HERC

Year : Ending March 2008
State: Haryana
DISCOM : DHBVNL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic	1578353	598689	979664	-	1578353	100
2	Commercial	188783	53118	135665	-	188783	100
3	Street Light	519	93	426	-	519	100
4	Public Places / Water Supply etc.	7243	1514	5729	-	7243	100
5	LT Industrial	38679	1960	36716	0	38676	99.99
6	HT Industrial	4386	0	4386	-	4386	100
7	Agriculture	171710	48719	55467	0	104186	60.68
8	Others	52	0	52	-	52	100
Total		**1989725**	**704093**	**1218105**	**0**	**1922198**	**96.61**

2. DISTRIBUTION TRANSFORMER METERING:

Description	**DT Metering**	**Feeder Metering**
	Total No. of DTs	Total No. of Feeders
Numbers	98978	2289
With data Downloadable	14435	2082
Electronic (Non-downloadable)	383	207
EM type	0	0
Total Metered	**14818**	**2289**

STATUS OF METERING

HERC

Year : Ending March 2008
State: Haryana
DISCOM : UHBVNL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic	1778756	818840	959916	0	1778756	100
2	Commercial	235134	45092	190042	0	235134	100
3	Street Light	586	67	519	0	586	100
4	Public Places / Water Supply etc.	5907	354	5553	0	5907	100
5	LT Industrial	32565	1832	30733	0	32565	100
6	HT Industrial	2705	13	2692	0	2705	100
7	Agriculture	269441	52908	34288	0	87196	32.36
8	Others	434	46	388	0	434	100
Total		**2325528**	**919152**	**1224131**	**0**	**2143283**	**92.16**

2. DISTRIBUTION TRANSFORMER METERING:

Description	**DT Metering**	**Feeder Metering**
	Total No. of DTs (as on 30.06.07)	Total No. of Feeders (as on10.08)
Numbers	112436	2480
With data Downloadable	16350	1866
Electronic (Non-downloadable)	1270	456
EM type	0	158
Total Metered	**17620**	**2480**

STATUS OF METERING

DERC

Year : Ending March 2008
State: Delhi
DISCOM : BSES - YPL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic	788999	7132	778334	778334	785466	99.55
2	NDLT*	245745	3267	242478	242478	245745	100
3	GCC*	4795	0	4795	4795	4795	100
4	KCC*						
a)	SIP*	17994	563	17431	17431	17994	100
b)	LIP*	503	0	503	503	503	100

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **3178**

b. No. of Metered DTs **: 3138**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

***NDLT :** Non-Domestic Low Tension
GCC : Government Consumer Cell
KCC : Key Consumer Cell
SIP : Small Industrial Power
LIP : Large Industrial Power

STATUS OF METERING

DERC

Year : As of December 2008
State: Delhi
DISCOM : BSES - RPL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic	1224801	62837	1153983	1153983	1216820	99.35
2	NDLT*	193410	8414	184996	184996	184996	100
3	GCC*	8446	0	8446	8446	8446	100
4	KCC*						
a)	SIP*	9640	117	9523	9523	9640	100
b)	LIP*	1220	0	1220	1220	1220	100

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTCs : **6268**

b. No. of Metered DTs **: 5958**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

***NDLT :** Non-Domestic Low Tension
GCC : Government Consumer Cell
KCC : Key Consumer Cell
SIP : Small Industrial Power
LIP : Large Industrial Power

STATUS OF METERING

DERC

Year : Ending March 2008
State: Delhi
DISCOM : North Delhi Power Limited

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %
			No. of Electro-mechanical Meters	No. of Electrocnic Meters	No. of TOD Meters	Total	
1	Domestic	719499	26809	692690	226846	719499	100
2	JJ Cluster	30489	0	0	0	0	0
3	Non-Domestic	134415	6015	128400	8238	134415	100
4	Industrial	34664	516	34148	18626	34664	100
5	Agriculture	3849	1237	2612	2094	3849	100
	Total	**922916**	**34577**	**857850**	**255804**	**892427**	**97**

Note:
1. No. of Electronic Meter is inclusive of TOD Complaint Meters.
2. As on Jan '09, No. of Electro-Mechanical Meters has been reduced to 21052.
3. As on Jan '09, No. of Unmetered Connection has been reduced to 18850.

2. DISTRIBUTION TRANSFORMER METERING:

a. No. of DTs : **2959**

b. No. of Metered DTs **: 2868**

c. of (b) above, numbers for which reading being taken by remote control devices: **Nil**

STATUS OF METERING

WBERC

Year : Ending March 2008
State: West Bengal
DISCOM : WBSEDCL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %	No. of Dtrs	No. of metered Dtrs	No. for which reading is being taken by RCD
			Electro Mechanical	Electronic Except TOD	TOD	Total				
1	Domestic	5941767	3387630	2533901	34	5921565	99.66%	85145	28237	28237
2	Commercial	800217	386814	412496	907	800217	100.00%			
3	Industrial	86043	5534	77737	2772	86043	100.00%			
4	Agricultural	117917	6545		65927	72472	61.46%			
5	Others	8162	6671		158	6829	83.67%			
	Total	**6954106**	**3793194**	**3024134**	**69798**	**6887126**	**99.04%**			

Year : Ending March 2008
State: West Bengal
DISCOM : DPL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %	No. of Dtrs	No. of metered Dtrs	No. for which reading is being taken by RCD
			Electro Mechanical	Electronic Except TOD	TOD	Total				
1	Domestic	30837	12000	17264	1573	30837	100%	290	0	0
2	Commercial	3197	1528	1654	15	3197	100%			
3	Industrial	329			329	329	100%			
4	Agricultural	4		4		4	100%			
5	Others	273		107	166	273	100%			
	Total	**34640**	**13528**	**19029**	**2083**	**34640**	**100%**			

Year : Ending March 2008
State: West Bengal
DISCOM : DPSCL

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %	No. of Dtrs	No. of metered Dtrs	No. for which reading is being taken by RCD
			Electro Mechanical	Electronic Except TOD	TOD	Total				
1	Domestic	16		16		16	100%		*	
2	Commercial	87		90		90	100%			
3	Industrial	323		298	32	330	100%			
4	Agricultural	1			1	1	100%			
5	Others	45		26	19	45	100%			
	Total	**472**	**0**	**430**	**52**	**482**	**100%**			

Year : Ending March 2008
State: West Bengal
DISCOM : CESC Ltd.

1. CONSUMER METERING:

S. No.	Consumer Category	No. Of Consumers	No. of Metered Consumers				Pecentage metering %	No. of Dtrs	No. of metered Dtrs	No. for which reading is being taken by RCD
			Electro Mechanical	Electronic Except TOD	TOD	Total				
1	Domestic	1866251	1847665	119086	8407	1975158	100%		**	
2	Commercial	283333	356596	22992	7671	387259	100%			
3	Industrial	59737	77294	3055	17731	98080	100%			
4	Others	4454	4252	31	621	4904	100%			
	Total	**2213775**	**2285807**	**145164**	**34430**	**2465401**	**100%**			

Note: In earlier days, many consumers were provided with more than one meter (one for light load and other for high energy intensive equipment) and sometimes three single phase meters instead of one three phase meter were provided to consumers having three phase connection. So the number of meters exceeds the number of consumers in some cases above. Presently this practice is not prevailing, but historical data brought forward is causing the imbalance.

* No Distribution Transformer

** CESC has provided metering at its distribution station transformer (33/11 kV of 33/6 kV) levels. Meter readings are taken regularly for energy accounting purpose. CESC's distribution network configurations of CESC System are predominantly ring-main. Network configurations are changed to maintain security of supply and quicker

restoration of supply in the event of outage. Metering at such levels may not serve the purpose of accurate energy audit. However, CESC is installing progressively meters on distribution transformers (11/0.4 kV, 6/0.4 kV) in theft prone areas for the purpose of energy audit. Meter reading/monitoring for such distribution transformersis is done at a remote place through GSM (Global System for /Mobile) communication. A number of theft prone areas, thereby have been identified and authorities kept apprised.

Q2. Whether third party testing of meters through accredited agencies / institutions has been practiced by the utilities in the State, and if so, the experience thereof for improvement in metering practices.

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Not yet fixed. However BSEB has approached Birla Institute of Technology, Patna to establish a Lab for the purpose.
4.	CSERC	Practice of third party meter testing through accredited agencies has not yet been started.
5.	DERC	**BSES Yamuna Power Limited :** Third Party testing of meter through accreditation agencies was practiced by our utility for following activity related to metering: • Incoming Lot Inspection (Electronic Meters) • Testing of Energy meters at inter DISCOM energy exchange points of grids • HT Consumers • Consumers insisting for testing by Third Party Independent test agency (M/s CPRI. Bangalore and M/s ERTL (N) Delhi notified by the DERC) We had very good experience in terms of • Enhancement of consumer satisfaction • Improvement of meter quality • Valuable feedback regarding metering practices **BSES Rajdhani Power Limited :** Third Party testing of meter through accreditation agencies was practiced by our utility for following activity related to metering: • Incoming Lot Inspection (Electronic Meters) • Testing of Energy meters at inter DISCOM energy exchange points of grids • HT Consumers • Consumers insisting for testing by Third Party Independent test agency (M/s CPRI. Bangalore and M/s ERTL (N) Delhi notified by the DERC) We had very good experience in terms of • Enhancement of consumer satisfaction • Improvement of meter quality • Valuable feedback regarding metering practices
6.	GERC	**UGVCL:** • NABL accredited Meter Testing Laboratory of UGVCL is functional at Sabarmati. • Yes. Third party meter testing through accredited lab has been practiced. Since April-08 to Dec-08 total 355 nos. of third inspections were carried out. The consumers have shown their

		`positive reaction to the quality of working and are satisfied with the procedure. **PGVCL:** • No third party testing is carried out after installation. However prior to price bid opening, meter sample is tested at accredited lab to check quality. Further after receipt of material in store sample testis done at accredited lab. **MGVCL:** • Not incepted the practice of testing of consumer meters through outside agencies. • Established state of art testing facility at Baroda which has been accredited with NABL, New Delhi. • All potable electronic standard meters being used by field offices have been tested and certified. • All consumer meters are periodically tested at site with the held of meters duly calibrated by NABL laboratory. **DGVCL:** • Company's lab situated at Kapodra is a Hi-Tech Lab having Reference Standard Meters having class of accuracy of 0.05, which is calibrated by National Accreditation Board for Testing and Calibration Laboratories (NABL) M/s YMPL (Yadav Measurements Private Ltd., Udaipur) **TPL** • They have NABL accredited laboratory for meter testing at Ahmedabad. The infrastructure at Surat also meets the standards to get the meters tested at their meter laboratory. Normally, consumer gets satisfied with the accuracy test carried out at their laboratory. However, the consumer has the option for third party meter testing through other accredited laboratories.
7.	HERC	Third party meter testing is got done through Govt. of India NABL laboratory on sample meters before accepting the consignment of meters.
8.	HPERC	The Hon'ble Commission had already specified the accredited agencies for third party meter testing and which has been implemented by the Board.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited: ----------** **Hubli Electricity Supply Company Limited:----------** **Chamundeshwari Electricity Supply Corporation Limited: -----** **The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri : ----------**

		Gulbarga Electricity Supply Company Limited : ---------- **Mangalore Electricity Supply Company Ltd.:----------**
12.	KSERC	Third party testing meters is in practice in Kerala. The third party is the Electrical Inspectorate of Govt. of Kerala. No complaints on the arrangement have been reported.
13.	MPERC	M/s. CPRI, Bhopal and IREDA, Ahmedabad have been authorized by the Commission for carrying out third part testing of meters. These facilities are being utilized by the utilities for getting the consumers meter tested, if so desired by the consumer. In addition, the Regulations notified by the Commission stipulate that the utilities are required to ensure testing of meters against the supplies made by the meter manufacturers in these laboratories. Not only the samples of the meter submitted at the time of placing the orders by the utilities are got tested from these laboratories but the meter taken randomly from the supplies received by the utilities are also being tested in the quantity as per the required ISS. This has brought about improvement in the quality of meter those are being used.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) :** (i) Departmental testing of meters is carried out at various stages, viz. (a) Inspection of meters at manufacturer's factory location, and (b) Random Sample – Testing of sample meters drawn from of each lot of selected stores at Bhandup testing division. (ii) In addition to department testing, the third party testing of meters through accredited agencies / institutions, viz. ERDA, Vadodara and ERTL, Mumbai is carried out at various stages as under: (a) Out of 10 sample meters received along with the offer, 3 meters are sent to NABL accredited laboratory, M/s ERDA, Vadodara for testing. The offers of bidders whose sample meters are successfully passed in testing at ERDA are only considered for further evaluation and placement of order. (b) On receipt of meters of first lot at various stores, two sets of 3 sample meters each drawn from selected stores are sent to NABL accredited Laboratories, viz., M/s ERDA, Vadodara or M/s ERTL, Mumbai for type testing as per relevant IS & technical specification. The release orders for balance quantity are issued only if sample meters are successfully passed in type testing or otherwise in case of failure of meter in type testing, the order for balance quantity is cancelled. (c) Further, two sets of 3 sample meters each drawn from any one of the remaining lots as above are sent to NABL accredited laboratories, viz., M/s ERDA, Vadodara or M/s ERTL, Mumbai for testing.

		(iii) With third party testing of meters as above, the following improvements are experienced in metering practices. (a) Due to testing of the sample meters received along with the offers, only the meter manufacturers capable of manufacturing quality meters as per our technical specifications are considered for placement of order. (b) Due to testing of meters received from first lot and any one of the remaining lots, the consistency in supply of quality meters is ensured. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: Yes. All types of meters (1-phase, 3-phase, New, Old, Disputed etc.) are tested for accuracy. **The Tata Power Company Ltd.-Distribution (TPC-D)**: The testing of meters, both in lab and on site is carried out inhouse by Tata Power. Tata Power uses Standard Accucheck Meters calibrated by laboratories like Electronics Regional Test Laboratory (ERTL) / Institute of Design of Electrical Measuring Instruments (IDEMI) which are accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL). **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** No **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** No.
15.	MSERC	
16.	OERC	The Commission has framed the OERC Distribution (Conditions of Supply) Code, 2004, wherein it has been directed that the consumer can have the option to get the meter calibrated in any accredited test laboratory. According to said regulation the testing of the meters can also be carried out through NABL accredited mobile. **NESCO:-** M/s Yadav Measurements Pvt. Ltd. Jaipur (approved from Indian testing laboratory), Third party is now calibrating Meters, CTs and PTs of high value consumers under NESCO. Actions are also being taken on the consumers found discrepancy by the above work.
17.	PSERC	Presently no third party testing of meters through accredited agencies/institutions is being done in the State.
18.	RERC	The Commission has authorized under mentioned independent third party testing laboratories for testing of consumer meters in the State of Rajasthan in September, 2007: 1. M/s Rajasthan Electronics & Instruments limited, Jaipur 2. M/s Yadav Measurement Pvt. Ltd., Udaipur 3. M/s Secure Meters Ltd., Udaipur 4. M/s Electrical Research and Development Association, Badodara The feed back from Discoms / consumers is awaited.
19.	TNERC	Third party testing of meters has not been practiced in Tamil Nadu.

20.	TERC	No third party testing of meter has been practiced by the utilities. However the utility has its own testing bench & some portable testing KIT to undertake testing and calibration of meter on demand.
21.	UERC	As of now, testing of meters at site, through accredited agencies has not been performed. However, presently two nos. such agencies are being deployed for testing of meters of industrial and non-domestic consumers having contracted load of 25 kW/kVA and above and these are likely to start work shortly.
22.	UPERC	Though the third party testing of meters through accredited agencies / institutions have been made mandatory through the Electricity Supply Code, 2005, however, the Discoms have invited proposals from the NABL agencies and they have not yet submitted their present status or improvement in their metering practices. The licensee is reportedly in the process of contracting with 4 to 5 NABL accredited independent test labs, and this is expected to mitigate the number of meter related disputes compared over the previous years. **Noida Power Company Limited:** The option for third party testing of meters through accredited agencies / institutions has been made available to consumers. Till now consumers are satisfied with testing facility available with the company.
23.	WBERC	**WBSEDCL :** No **DPSC Ltd.:** No **CESC Ltd.:** No **DPL :** No

Q3. Whether reading of meters, especially those of high-end consumers is being done using remote control devices, giving details.

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	No.
4.	CSERC	The CSEB has just started the process of meter reading through remote control devices for high end consumers. The implementation will take time.
5.	DERC	**BSES Yamuna Power Limited :** As a company metering policy, we are installing LTCT Meter for all consumers having sanctioned load above 45 KW and HT Meter if load is above 100 KW. Most of these meters have GSM/CDMA MODEM for remote meter reading. (About 2500 consumer meters in BYPL are on AMR mode and progressively being expanded). **BSES Rajdhani Power Limited :** As a company metering policy, we are installing LTCT Meter for all consumers having sanctioned load above 45 KW and HT Meter if load is above 100 KW. Most of these meters have GSM/CDMA MODEM for remote meter reading. (About 6825 consumer meters in BRPL are on AMR mode and progressively being expanded).
6.	GERC	**UGVCL** • Total 1070 nos. of HT remote metering system had been purchased and installed. Reading of all these meters is taken by using remote control devices every month. **PGVCL:** • There is total 2139 nos. of High Tension Industrial Consumers. Out of which 1435 nos. are provided with Automatic Meter Reading facility. At present 1000 nos. of consumers are read through remote control device. • Similarly, experimental basis 29 nos. of LT Industrial consumers, seasonal by nature and having high consumption, are provided with Automatic Meter Reading facility. **MGVCL:** • Installed GSM based Automatic Meter Reading (AMR) system at each and every HT/EHT consumers of MGVCL. This AMR system enables MGVCL to keep close surveillance, retrieve the load survey data and billing data for preparation of real time, quick and actual consumption based remote billing system. **DGVCL:** • Total 1600 nos. of HT remote metering system had been purchased & installed. Reading of all these meters is taken by using remote control devices every month.

		TPL: • Meter reading of about 170 HT consumers is being done using remote control devices at Surat. They are in process of installing necessary hardware to implement remote meter reading facility at Ahmedabad.
7.	HERC	Meter reading of high end consumers is being taken through CMRI and the utilities are planning to implement AMR/AMI for high end consumers.
8.	HPERC	Yes, the reading of 434 consumers is being taken in the Operation Circle Solan of the industrial consumers through remote control devices.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** An attempt was made to install Real Time Remote Automatic Meter Reading (RRAMR) for all HT consumers and LT consumers with load above 40 HP with the assistance of M/s Yokogawa. The scheme proved to be unsuccessful due to technical reasons. For the present, the efforts are abandoned. **Hubli Electricity Supply Company Limited:** A pilot project for remote reading of ETV meters for 6 Nos. of HT-installations in Hubli city is already awarded to M/s L&T, Bangalore & pilot project is under progress. After successful completion of this project the HESCOM is proposed to extend this facility to all HT installations coming under HESCOM area. **Chamundeshwari Electricity Supply Corporation Limited:** In CESC, Mysore remote control devices are not being used to read the meters. **The Hukkeri Rural Electric Co-operative Society Ltd., ----------** **Gulbarga Electricity Supply Company Limted** ➢ ETV ABT feature meters are fixed to all EHT consumers. At present joint meter reading are taken by O&M division officers along with KPTCL officials and bills served at spot. All the EHT consumer's meters are fixed with RS-485 port and SCADA is being implemented in GESCOM to enable to avail real time data and meter readings. ➢ HT installations & LT installations (40HP and above) ETV meters fixed to all the installations and at present manual meter readings are taken. RAMR meters are proposed to be fixed in phased manner on selected towns under RAPDRP scheme. **Mangalore Electricity Supply Company Ltd.:** No, but data is downloaded.
12.	KSERC	Remote metering has not been tried in Kerala.

<table>
<tr><td>13.</td><td>MPERC</td><td>Following table depicts the present status:

<table><tr><th>S.No.</th><th>Discom</th><th>No. of HT connections</th><th>No. of HT connections provided with RMR</th></tr><tr><td>1</td><td>East Discom</td><td>720</td><td>720</td></tr><tr><td>2</td><td>Central Discom</td><td>643</td><td>643</td></tr><tr><td>3</td><td>West Discom</td><td>1478</td><td>1420</td></tr><tr><td colspan="2">Total</td><td>2841</td><td>2783</td></tr></table>
As may be seen, a majority of HT consumers have been provided with the facility of Remote Control Devices.</td></tr>
<tr><td>14.</td><td>MERC</td><td>Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) : MSEDCL has recently introduced reading of meters using remote control device (AMR:- Automatic Meter Reading) on Pilot Project basis in few select pockets of the State.

Reliance Infrastructure Ltd.-Distribution (RInfra-D): RInfra has 453 HT consumers and the total meters installed for those consumers are 532 out of which 496 nos. are having GSM modems. For 36 nos. of meters modems are not installed due to no network coverage or weak signals strength and for restricted area like BARC where there are no service providers for security measures.

The Tata Power Company Ltd.-Distribution (TPC-D): Currently, Tata Power is not using any remote control devices for reading meters of high end consumers. However, it is in the process of implementing Automatic Meter Reading Scheme for high end consumers and the same will get commissioned during this year.

Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST): No. Procurement is under process

Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS): No.</td></tr>
<tr><td>15.</td><td>MSERC</td><td></td></tr>
<tr><td>16.</td><td>OERC</td><td>During the performance review of the DISTCOMs undertaken by the Commission, it has been periodically stated by the DISTCOMs that they are using remote control devices in reading most of the high-end consumer meters.

CESU: At present CESU is taking meter reading through CMRI of 250 nos. of high end consumers out of 791. In other 90 cases, CESU is collecting dump report through Automatic meter reading system (AMR) for analysis purpose.

NESCO:- Automated Meter Reading (AMR) systems are being used for 97 nos. of high value consumers and further 740 nos. of AMRs has been received and 760 nos is awaited to cover all the three-phase high value consumers with AMR system. 100 nos. of</td></tr>
</table>

		Composite meter box with AMR have been installed. **SOUTHCO:_**SOUTHCO has installed 62 nos. of AMR meters out of which 57 nos. installed at consumer premises and 5 nos. at 33 KV & 11 KV feeders. 13 nos. of AMR is presently defunct due to Def/in modem / Consumer under DC. Usually during first week of every month the readings are taken through AMR but the reading of the AMR's are not consider for billing purpose. It is utilized only to check.
17.	PSERC	In case of all categories of consumers the meter readings are taken manually. However, for high-end consumers like LS category the readings are taken through CMRIs
18.	RERC	Nil
19.	TNERC	At present Remote metering system for 15 Nos. of LT CT Meter service connections is implemented on trial basis in Chennai Electricity Distribution Circle/South. It is planned to float tenders for implementation of on Line Real Time Automatic Reading System and Billing for 724 Nos. of HT service connections in Chennai/Distribution/North Region by TNEB. After observing the performance of above proposed system, remote Metering System shall be extended to all the HT & LT High end services across the State by TNEB.
20.	TERC	No remote control device used by the utility to read the meter of consumer.
21.	UERC	No such remote device is being used at present.
22.	UPERC	Metering of high end high tension consumers about 1300 in Numbers with automatic remote metering on the independent feeders has been done with 1053 in Noida and 240 in MVVNL alone. Double metering of HT/EHT consumers outside their premises is also underway. UPPCL records show that Double metering of 1049 consumers having connected load above 500 KVA, 4820 consumers having load between 100 and 500 KVA and 75000 other consumers below 100 KVA, have yielded fruitful results with a perceptible rise in such industrial and commercial consumer consumption. **Noida Power Company Limited:_**Consumers having load more than 25 hp/25 KW are covered under remote meter reading system. Total No. of Consumer – 1000 Remote Metering available for – 1000 % - 100
23.	WBERC	**WBSEDCL :** No. However, a test bed project for remote metering is in progress **DPSC Ltd.:** No **CESC Ltd.:** No **DPL :** No. At present all meters are being read through MRI

Q4. Extent to which billing is being done on actual consumption basis (category-wise).

<table>
<tr><th>S. No.</th><th>SERC</th><th>Reply</th></tr>
<tr><td>1.</td><td>APERC</td><td></td></tr>
<tr><td>2.</td><td>AERC</td><td></td></tr>
<tr><td>3.</td><td>BERC</td><td>Billing is being done on actual consumption in all categories of consumers except the meterless category of consumers.</td></tr>
<tr><td>4.</td><td>CSERC</td><td>Billing of all other consumers except agriculture pumps having load upto 5 HP and BPL consumers is being done on actual consumption basis. Billing of about 7034 pumps is being done on the basis of consumption recorded in the meter.</td></tr>
<tr><td>5.</td><td>DERC</td><td>BSES Yamuna Power Limited : Our company is using Meter Reading Instrument (MRI) for downloading the data of consumer meters. This is done not only for Three Phase consumers but even for Single Phase consumers. Presently, all Electronic Meters are read using MRI without any human intervention for consumption reading and recording so the billing of all down loaded meter is on actual consumption basis. The percentage of average/provisional (billing NOT based on actual consumption) in last billing cycle was 1.3%.

BSES Rajdhani Power Limited : Our company is using Meter Reading Instrument (MRI) for downloading the data of consumer meters. This is done not only for Three Phase consumers but even for Single Phase consumers. Presently, all Electronic Meters are read using MRI without any human intervention for consumption reading and recording so the billing of all down loaded meter is on actual consumption basis. The percentage of average/provisional (billing NOT based on actual consumption) in last billing cycle was 2.4%.</td></tr>
<tr><td>6.</td><td>GERC</td><td>UGVCL

<table>
<tr><th>Sr. No.</th><th>Consumer Category</th><th>Nos. of consumers</th><th>Billing is done on actual consumption basis</th></tr>
<tr><td>1</td><td>Residential</td><td>1723720</td><td>1723720</td></tr>
<tr><td>2</td><td>Commercial</td><td>211078</td><td>211078</td></tr>
<tr><td>3</td><td>Industrial LT</td><td>29279</td><td>29279</td></tr>
<tr><td>4</td><td>Public Lighting</td><td>6967</td><td>6967</td></tr>
<tr><td>5</td><td>Agriculture</td><td>213559</td><td>57593</td></tr>
<tr><td>6</td><td>Public Water Works</td><td>11020</td><td>11020</td></tr>
<tr><td>7</td><td>Industrial HT</td><td>1622</td><td>1622</td></tr>
<tr><td>8</td><td>Railway Traction</td><td>1</td><td>1</td></tr>
<tr><td></td><td>Grant Total</td><td>2197246</td><td>2041280</td></tr>
</table>

PGVCL

<table>
<tr><th>Sr. No.</th><th>Consumer Category</th><th>No. of consumers</th><th>Nos. of consumers being billed on actual basis</th><th>Nos. of consumers being not billed on actual basis</th><th>% of consumers not being billed on actual basis</th></tr>
</table>
</td></tr>
</table>

		1	Residential		2512850	2879174	100414	3.38
		2	Commercial		462244			
		3	Public Lighting		4494			
		4	LT Industrial		75797	86516	190	0.22
		5	Water Works		10909			
		6	High Tension Consumer		2139	2139	0	0
		7	Agriculture	Metered	134005	125592	8413	6.28
				Un-metered	259361			
			Grand Total		**3461799**	**3093421**	**109017**	**9.88%**

MGVCL:

All HT and EHT consumers are being billed on actual consumption basis with the help of GSM based AMR system

DGVCL:

Sr. No.	Consumer Category	Nos. of consumers	Billing is done on actual consumption basis
1	Residential	1442439	1442439
2	Commercial	207629	207629
3	Industrial LT	47301	47301
4	Public Lighting	3618	3618
5	Agriculture	81279	34516
6	Public Water Works	7318	7318
7	Industrial HT	1932	1932
8	Railway Traction	5	5
	Grant Total	**1791521**	**1744758**

TPL

100% billing is done on actual consumption basis except inaccessible/defective meters where billing for the particular month is being done on assessment basis in accordance with the provisions of the Supply Code.

7.	HERC	All billing is done on actual consumption basis except in respect of flat rate unmetered agriculture consumers and consumers having defective meters, percentage of which ranges between 5% - 10%
8.	HPERC	The billing of all the categories is being done on actual basis.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** Billing is done on actual consumption basis for all categories except for BJ/KJ and agricultural installations.

Sl. No.	Category	Consumption in MUs
1	BJ/KJ	97.42
2	Domestic	3304.10
3	Commercial	879.13
4	Agricultural Consumers	3612.60

5	LT Industrial	957.38
6	Water supply / street light	542.26
7	Temporary	125.24
8	HT	5415.42
TOTAL		**14933.55**

Hubli Electricity Supply Company Limited:

Sl. No.	Consumer Category	No. of live installations	No. of live installation to be read	No. of installations actually read	No, of installations not read (4-5)	Percentage of Billing Efficiency (5/4*100)
1	**2**	**3**	**4**	**5**	**6**	**7**
1	HT (Comprising HT-1, HT-2, HT-3 & HT-4 tariffs)	1169	1169	1169	0	100
2	LT-1	641837	2723007	2315555	407452	85.04
3	LT-2	1746705				
4	LT-3	229812				
5	LT-4	63371				
6	LT-6	33556				
7	LT-7	7726				

Chamundeshwari Electricity Supply Corporation Limited:

Category Wise	Energy Received in MU	Billed Energy in MU	%
LT-1	3742.85	44.00	76.17
LT-2		534.26	
LT-3		119.85	
LT-4		1402.03	
LT-5		118.00	
LT-6 w/s		114.04	
LT-6 street light		66.58	
LT-7		8.98	
HT		443.26	
EHT	349.53	315.99	90.40%
Total	**4092.38**	**3166.99**	**77.38**

The Hukkeri Rural Electric Co-operative Society Ltd.: Billing is being done of all category excluding IP-sets on actual consumption basis.

Gulbarga Electricity Supply Company Limited:

% billing is being done in the category wise listed below:-
1) LT-2 (Domestic lighting) = 93.73%
2) LT-3 (Commercial) = 99.54%
3) LT-5 (LT motive power) = 100%
4) HT (High Tension Consumer) = 100%
5) Water supply and street light = 79.38%

<table>
<tr><td></td><td></td><td>Mangalore Electricity Supply Company Ltd.: All installations are billed on actual consumption basis for the installations for which meters have been fixed.</td></tr>
<tr><td>12.</td><td>KSERC</td><td>100% Billing is done based on readings taken bimonthly and monthly.</td></tr>
<tr><td>13.</td><td>MPERC</td><td>East Discom
<table>
<tr><th>S.No.</th><th>Consumer Category</th><th>No. of Consumers</th><th>No of consumers billed on actual consumption basis</th></tr>
<tr><td>1</td><td>HT Consumers</td><td>720</td><td>720</td></tr>
<tr><td>2</td><td>LT Consumers</td><td></td><td></td></tr>
<tr><td>i.</td><td>Domestic</td><td>1724716</td><td>1382908</td></tr>
<tr><td>ii.</td><td>Non-domestic</td><td>200376</td><td>200376</td></tr>
<tr><td>iii.</td><td>Agricultural</td><td>780326</td><td>231739</td></tr>
<tr><td>iv.</td><td>Industrial</td><td>28789</td><td>28789</td></tr>
<tr><td>v.</td><td>Others</td><td>11573</td><td>11573</td></tr>
<tr><td colspan="2">Total</td><td>2745780</td><td>1855385</td></tr>
</table>
Central Discom
<table>
<tr><th>S.No.</th><th>Consumer Category</th><th>No. of Consumers</th><th>No of consumers billed on actual consumption basis</th></tr>
<tr><td>1</td><td>HT Consumers</td><td>953</td><td>953</td></tr>
<tr><td>2</td><td>LT Consumers</td><td></td><td></td></tr>
<tr><td>i.</td><td>Domestic</td><td>1437315</td><td>1264127</td></tr>
<tr><td>ii.</td><td>Non-domestic</td><td>181530</td><td>181530</td></tr>
<tr><td>iii.</td><td>Agricultural</td><td>289807</td><td>107031</td></tr>
<tr><td>iv.</td><td>Industrial</td><td>22277</td><td>22277</td></tr>
<tr><td>v.</td><td>Others</td><td>12556</td><td>12556</td></tr>
<tr><td colspan="2">Total</td><td>1943485</td><td>1587521</td></tr>
</table>
West Discom
<table>
<tr><th>S.No.</th><th>Consumer Category</th><th>No. of Consumers</th><th>No of consumers billed on actual consumption basis</th></tr>
<tr><td>1</td><td>HT Consumers</td><td>1464</td><td>1464</td></tr>
<tr><td>2</td><td>LT Consumers</td><td></td><td></td></tr>
<tr><td>i.</td><td>Domestic</td><td>1942063</td><td>1774928</td></tr>
<tr><td>ii.</td><td>Non-domestic</td><td>241799</td><td>241799</td></tr>
<tr><td>iii.</td><td>Agricultural</td><td>460615</td><td>10671</td></tr>
<tr><td>iv.</td><td>Industrial</td><td>34103</td><td>34103</td></tr>
<tr><td>v.</td><td>Others</td><td>14784</td><td>14784</td></tr>
<tr><td colspan="2">Total</td><td>2693364</td><td>2076285</td></tr>
</table></td></tr>
<tr><td>14.</td><td>MERC</td><td>Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) :Except unmetered agricultural consumers, other consumers of MSEDCL have been provided with suitable meters to record their consumption. Efforts are always made to ensure that the consumers are billed on actual consumption basis based on meter reading of respective consumers. However, due to some practical / administrative reasons and so also under some specific circumstances, some time it happens that the consumer's energy meter is either faulty or not accessible. In such cases, the respective consumer needs to be billed</td></tr>
</table>

		on average basis. The number of consumers billed on average basis varies from month to month for obvious reasons. In the month of November 2008 out of total metered consumers around 81.64% of consumers were billed on the basis of actual consumption. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: Bills for all consumers of RInfra are on actual metered consumption only. **The Tata Power Company Ltd.-Distribution (TPC-D)**: The entire billing of all categories of Tata Power Consumers is done on actual consumption basis. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** 100% in all consumer categories. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** As per data enclosed.
15.	MSERC	
16.	OERC	**CESU:-** 100% billing is being done on actual consumption basis in case of HT & EHT category. In case of LT billing, 87% cases meter reading is being done on actual consumption basis. Over all the billing is being done on actual consumption basis in 87% cases. **NESCO:-** Category wise consumers with OK meters are being billed on actual consumption basis (enclosed) (65.1%) **WESCO:-** Consumers billed on actual basis is as below:-

Category of consumer	Consumers as on 31.03.2008	Billed on Actual	Balance on Avg./Load Factor
Domestic	430397	324077	106320
Kutir Jyoti	5947	5527	420
Others	0	0	0
Total Domestic	**436344**	**329604**	**106740**
Gen. Purpose <100 kva	42351	36940	5411
Irrigation, Pumping & Agriculture	10502	3143	7359
Public Light	334	330	4
LT Ind. (S) Supply	4238	4183	55
Lt Ind. (M) Supply	1002	1002	0
Specified Public Purpose	3124	3121	3
Public Water Work & Sewerage Pumping	0	0	0
<= 100 kva	828	828	0
=> 110 kva	10	10	0
Total Public Water Works	838	838	0
General Purpose >= 100 kva	2	2	0
Large Industry	3	3	0
Total LT	**498738**	**379166**	**119572**
Bulk Supply Domestic	15	15	0
Irrigation	0	0	0
Specified Public Purpose	12	12	0
Gen. Purpose<110 kva	0	0	0
HT Industrial (M) Supply	0	0	0
General Purpose<110 kva	47	47	0
Public Water Work &	10	10	0

Sewerage Pumping			
Large Industry	430	430	0
Power Intensive Industry	8	8	0
Mini Steel Plant	9	9	0
Railway Traction	1	1	0
Colony Consumption	0	0	0
Total HT	**532**	**532**	**0**
General Purpose	0	0	0
Large Industry	7	7	0
Railway Traction	6	6	0
Heavy Industry	3	3	0
Power Intensive Industry	3	3	0
Mini Steel Plant	2	2	0
Energy Supply to CPP	0	0	0
Colony Consumption	0	0	0
Total EHT	**21**	**21**	**0**
Grand Total	**499291**	**379717**	**119572**

SOUTHCO:- Billing is done on actual consumption basis as on 31st March, 2008 as below:-

Sl. No.	**Consumer Category**	**Billing done on actual consumption**
	LT Category	
1 (i)	Domestic	432583
(ii)	Kutir Jyoti< 30kwh/month	1003
(iii)	Others	
	Total Domestic	**433586**
2	LT General (Commercial)	41996
3	Irrigation	2312
4	Public Lighting (Street Light)	620
5	LT Industrial (Small Industry)	2637
6	LT Industrial (M) (Medium Industry)	925
7	Specified Public Prupose (Pub, Instn.)	4223
8	Public Water Works	1033
9	General Purpose	0
10	Large Industry	0
	Total LT	**487332**
	HT Category	
11	Bulk Supply – Domestic	8
12	Irrigation	0
13	Specified Public Purpose (Pub. Institution)	23
14	LT General (Commercial)	0
15	HT Industrial (M) (Medium Industry)	0
16	General Purpose	35
17	Public Water Works	13
18	Large Indsutry	72
19	Power Intensive Industry	1
20	Mini Steel Plant	0

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>21</td><td>Railway Traction</td><td>0</td></tr>
<tr><td>22</td><td>Colony Consuption</td><td>0</td></tr>
<tr><td></td><td>Total HT</td><td>152</td></tr>
<tr><td></td><td>EHT Category</td><td></td></tr>
<tr><td>23</td><td>General Purpose</td><td>0</td></tr>
<tr><td>24</td><td>Large Industry</td><td>3</td></tr>
<tr><td>25</td><td>Railway Traction</td><td>8</td></tr>
<tr><td>26</td><td>Heavy Industry</td><td>0</td></tr>
<tr><td>27</td><td>Power intensive industry</td><td>0</td></tr>
<tr><td>28</td><td>Mini Steel Plant</td><td>0</td></tr>
<tr><td>29</td><td>Emergency Supply to CPP</td><td>0</td></tr>
<tr><td>30</td><td>Colony Consumption</td><td>0</td></tr>
<tr><td>31</td><td>VBC (Special Tariff)</td><td>0</td></tr>
<tr><td></td><td>Total EHT</td><td>11</td></tr>
<tr><td></td><td>Grand Total</td><td>487495</td></tr>
</table>
</td></tr>
<tr><td>17.</td><td>PSERC</td><td>All categories of consumers except AP have been given supply through meters and billed on the basis of actual consumption recorded by meters.</td></tr>
<tr><td>18.</td><td>RERC</td><td>The billing of all category of consumers is being done on actual consumption basis except flat rate category of agriculture consumers.</td></tr>
<tr><td>19.</td><td>TNERC</td><td>Assessment is being made on actual consumption basis in all services except in Agriculture (18,39,241 nos.) and Hut (11,40,695 nos.) services.</td></tr>
<tr><td>20.</td><td>TERC</td><td>Due to implementation of Computerized Energy Billing system in the State, it is assessed that about 95% of billing is being done on actual consumption basis.</td></tr>
<tr><td>21.</td><td>UERC</td><td>Position on basis of report of ending 3/08 is given as below:-
<table>
<tr><th>Sl. No.</th><th>Category</th><th>Bills issued on basis of reading</th><th>%age of bills issued on basis of NA/NR/IDF/ADF/RDF</th></tr>
<tr><td>1</td><td>Domestic</td><td>75%</td><td>25%</td></tr>
<tr><td>2</td><td>Industrial</td><td>95%</td><td>5%</td></tr>
<tr><td>3</td><td>Commercial</td><td>80%</td><td>20%</td></tr>
<tr><td>4</td><td>PTW</td><td>30%</td><td>70%</td></tr>
</table>
It may also be seen that about 70% consumers are billed as per metered units while rest of consumers are billed on basis of NA/NR/IDF etc. as per the norms laid down by the Commission in its tariffs orders from time to time. The licensee has initiated corrective measures on time bound basis to streamline its metering and billing system on sound principles and has submitted an action plan to the Commission laying down the milestone for efficiency improvement in each of the above areas. The Commission has directed the licensee to also put in place an adequate monitoring mechanism for implementation of proposed action plan at higher echelon of its management. Further, periodical reports-quarterly basis, on its implementation both quantitatively, are also required to be submitted by the licensee.</td></tr>
<tr><td>22.</td><td>UPERC</td><td>Data has been asked from the discoms.</td></tr>
</table>

Noida Power Company Limited:

Category	Total No. of Consumers	No of consumers of which billing is done on actual Consumption basis	No. of unmetsred consumers	No. of consumers with defective meteres	No. of consumers whose meters are not read
Domestic	35162	29338	5824	533	486
Industrial	1114	1109	0	2	3
Commercial	1403	1374	0	6	23
Agriculture	1220	190	1063	11	22
Railway	NA	NA	NA	NA	NA
Public Lighting	3	2	1	0	0
Public Works	32	32	0	0	0
Others	2248	2216	0	14	18

23. WBERC

WBSEDCL : Status as on 30.09.08

1) Domestic, commercial, industrial & other 100% (Metered)
2) Lokedeep / KutirJyoti 75.08%
3) Agricultural (STW) 83% (Metered)

DPSC Ltd.: All billings in respect of all categories are done on actual consumption basis

CESC Ltd.: Meters are read every month and billing is done on actual consumption basis

DPL : Billing of 100% consumers is being done against actual meter reading except those premises which remains locked during taking meter reading.

Q5. Reasons for not billing on actual consumption basis even where meters have been installed.

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Billing is being done on actual consumption only.
4.	CSERC	As stated in para 4, the billing of agriculture pumps having load upto 5 HP is done on flat rate basis in accordance with the tariff order passed by the State Regulatory Commission. Similarly for BPL consumers billing upto 30 units is done, which is fully paid by the State Govt.
5.	DERC	**BSES Yamuna Power Limited :** The main reasons for billing "NOT" on actual consumption basis are defect in meters and premises locked. Additionally a small percentage of consumers are still without meter (JJ and Plot base cases). **BSES Rajdhani Power Limited :** The main reasons for billing "NOT" on actual consumption basis are defect in meters and premises locked. Additionally a small percentage of consumers are still without meter (JJ and Plot base cases).
6.	GERC	**UGVCL** In case of faulty meter & premises of consumer found lock, billing is done on average basis even where meters have been installed as per the provision of regulations. **PGVCL** In majority of the case non-working of the meter is the main reason for non billing of the consumer, even meters are installed. While in case of 29130 nos. of consumers, the bills were not prepared on actual consumption recorded. The main reason would be, consumption recorded for that billing period might not commensurate with the previous average consumption of the consumer and seemingly low consumption recorded in the meter either due to water and tear of meter or meter got faculty during the billing period. **MGVCL** There is no category of consumer existing in MGVCL without metering, except some Ag. Consumers, wherein no tariff meters have been provided. Out of total Ag. Consumers who had opted for flat tariff, more than 54% of consumers have been subsequently provided with suitable tariff meters. Thus, only about 45% of Ag. Consumers are left without meters. **DGVCL** In case of faulty meters & also when premises of consumer found locked, billing is done on average basis even where meters have been installed as per the provisions of regulations. **TPL** Not applicable.

7.	HERC	Replacement of defective meters is a continuous process as such billing of such consumers has to be done on average consumption basis. In addition the billing in respect of locked premises is also done on average consumption basis.
8.	HPERC	Not applicable
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** Billing is done on actual consumption basis only. **Hubli Electricity Supply Company Limited:** Whenever the installed meters become MNR during billing period, such installations are billed on average consumption based on previous months. 100% of billing during billing period is usually not achieved due to door lock installations etc. in all such cases also billing is invariably done based on previous months consumption. **Chamundeshwari Electricity Supply Corporation Limited:** Billing is done on actual consumption basis for all metered installations. If energy meters of installations are found to be MNR / faulty at such time billing is made on average basis and action will be taken to replace the Energy meters. **The Hukkeri Rural Electric Co-operative Society Ltd. : ----------** **Gulbarga Electricity Supply Company Limited:** All the metered installations are billed as per actual consumption. However, the installations where meters are defective and installation are under door lock, bills for such installations are issued on previous months average consumption basis. **Mangalore Electricity Supply Company Ltd.:** ----------
12.	KSERC	100% Billing is done based on readings taken bimonthly and monthly
13.	MPERC	There are no reports of not billing on actual consumption basis even where meters have been installed. However, in cases where meters are found stopped/defective, the billing on assessment basis is being done.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** Except unmetered agricultural consumers, other consumers of MSEDCL have been provided with suitable meters to record their consumption. Efforts are always made to ensure that the consumers are billed on actual consumption basis based on meter reading of respective consumers. However, dur to some practical / administrative reasons and so also under some specific circumstances, some time it happens that the consumer's energy meter is either faulty or not accessible. In such cases, the respective consumer needs to be billed on average basis. The

		number of consumers billed on average basis varies from month to month for obvious reasons. In the month of November 2008 out of total metered consumers around 81.64% of consumers were billed on the basis of actual consumption. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: Not applicable in view of above **The Tata Power Company Ltd.-Distribution (TPC-D)**: Not applicable in view of above **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Not applicable in view of above. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** After completion of 100% metering to Agricultural connections, billing will be done.
15.	MSERC	
16.	OERC	**CESU:-** In case of defective meter & house lock cases billing is not done actual consumption basis. **NESCO:-** Due to premises locking / calamity like food, cyclone where power supply is disrupted, average consumption billing is made. **WESCO:-** Reasons: (a) Premises locked. (b) Meter Placed in top, unable to take reading **SOUTHCO:-** Due to following reasons SOUTHCO bills on average reading: (a) House lock (b) Abnormal meter advance due to various reason like mechanism defects / three digit meters / Non incorporation of meter details to billing agency (c) In absence of Male / adult members at home.
17.	PSERC	Not applicable.
18.	RERC	Only consumers where the meters stop or becomes defective, the billing is done on average basis till the defective / stopped meter is replaced.
19.	TNERC	Except Hut and Agricultural services all other services are being billed on actual consumption basis since the work involves huge expenditure and stiff resistance from the consumers.
20.	TERC	The reasons for not billing on an actual consumption basis on rest 5% is due to defective meter and door closed at consumer premises.

21.	UERC	Main reasons for not billing on actual consumption basis, as often cited by the licensee is due to shortage of staff. The distribution licensee has also submitted that almost all meters readers working in the utility have retired and the work of meter reading is now being done mainly by outside agency/self help groups and franchise etc. and the effective control of these outside agencies is difficult. Therefore, action is being taken by the licensee for arranging departmental meter reading staff. The proposed structure is in process of finalization by the licensee and the additional staff is likely to be arranged.
22.	UPERC	Assessed units are taken due to (i) defective meters (IDF/ADF/RDF), or burnt or not recording consumption (ii) where meter readings not taken (NA/NR), (iii) suspected high/low consumption cases. **Noida Power Company Limited:** Reasons for not billing on actual consumption basis even where meters have been installed: (A) Consumers with defective meters. (B) Consumers whose meters are not read (Premises Locked)
23.	WBERC	**WBSEDCL :** Average bill is raised for the period the meter is declared defective. **DPSC Ltd.:** Defective meter or premises locked. **CESC Ltd.:** Not applicable **DPL :** Particularly when the premises are locked, bills are prepared on average consumption.

Q6. Are the utilities in the State installing load limiter devices – categories of such consumers and usefulness of such devices experienced?

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Load limiter devices have not been installed in Bihar State Electricity Board (BSEB) system till now.
4.	CSERC	The load limiter device has not so far been installed.
5.	DERC	
6.	GERC	**UGVCL, PGVCL, MGVCL, DGVCL & TPL** No such load limited devices are installed at nay of the distribution licensees. However, MGVCL reported that they are practicing of providing Special Design Transformer (SDT) at Substation level for all Agricultural Dominant feeders. These SDTs are equipped with suitable over current relay the setting of which as per the total single phase load on that feeder, which automatically isolates the feeder if more than specified / set current is drawn from the feeder. MGVCL is also in process of implementation of HVDS eliminating maximum possible LT network. Accordingly, 5 KVA single phase and 10 KVA & 16 KVA 3 phase transformers being procured are provided with suitable MCCB which automatically operates if more than specified current is drawn.
7.	HERC	Load limiter devices have not been installed in any category of consumers. However, high end consumers have been provided MDI meters.
8.	HPERC	Not Applicable.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** BESCOM is installing load limiter devices to various categories of consumers depending on the sanctioned load. This will help the utility in controlling the consumer load within the sanctioned load. **Hubli Electricity Supply Company Limited:** In HESCOM installing of load limiter devices for new installations except domestic non AEH, IP-sets & BJ / KJ installations is mandatory & about 75% of all installations of above categories have load limiters. Our experience in HESCOM is that most of the field officers have reported in tripping of these devices under fault conditions of internal wiring etc. **Chamundeshwari Electricity Supply Corporation Limited:** Load Limiter devices are being installed to newly serviced installations under LT-2, LT-3 tariff, LT-5 and Temporary categories. Such devices are helpful in case of overload or short circuit as the load limiting device trips.

		The Hukkeri Rural Electric Co-operative Society Ltd.: --------- **Gulbarga Electricity Supply Company Limited:** Load limiters are being insisted in following category of consumers. 1) LT-2, 2) LT-3 Regarding usefulness of load limiter no analysis is being carried out. **Mangalore Electricity Supply Company Ltd.:** In LT2, LT3, LT5, LT6 and LT7 load limiter devices are installed. Helps in avoiding overloading and unauthorized use of additional load.
12.	KSERC	Load limited devices are not installed. But a few small Licensees have installed prepaid meters.
13.	MPERC	No load limiter devices have been reported to be installed.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** So far MSEDCL has not initiated any process of installation of load limiter device, therefore no comments are offered on this issue **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: There are no load limiting devices installed in RInfra area of supply **The Tata Power Company Ltd.-Distribution (TPC-D)**: Tata Power has not installed load limiter devices for any category of its consumers, hence, not be able to comment on usefulness of these devices. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Such meters are not installed. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** No.
15.	MSERC	
16.	OERC	**CESU:-** At present CESU has not installed Load Limiter Devices. **NESCO:**- Composite meters with MCCB facility are being installed as load limiter devices. **SOUTHCO:-** No load limiter devices installed in the area of SOUTHCO either by consumer / SOUTHCO.
17.	PSERC	In PSEB no such devices are used.
18.	RERC	No. However there is provision to charge extra tariff for exceeding sanctioned load / demand.
19.	TNERC	At present load limiter devices are not installed in any category of services.

20.	TERC	No load limiter devices so far introduced in the State.
21.	UERC	No.
22.	UPERC	Load limiter devices – had been experimented in domestic and commercial categories of consumers only in the past and data is being obtained. **Noida Power Company Limited:** MCBs have been provided at the point of commencement of supply at all LT consumers' installation. However it has been observed that approx 15% consumers bypass the MCBs. Provision of load limiter devices are being explored
23.	WBERC	**WBSEDCL :** Yes to the consumers with supply of power up to 11 kV system and for L & MV to the STW consumers. It is useful for the consumer to get tariff benefit, extended by the SERC during off peak hours. **DPSC Ltd.:** No **CESC Ltd.:** No **DPL :** Load Limiter Devices is used by DPL only in a few cases where supply is given be dedicated feeders with the help of over load relays.

Q7. Replacement of defective meters – Status and if the same is carried out within the time frame laid down in the ERC's Regulations.

<table>
<tr><th>S. No.</th><th>SERC</th><th>Reply</th></tr>
<tr><td>1.</td><td>APERC</td><td></td></tr>
<tr><td>2.</td><td>AERC</td><td></td></tr>
<tr><td>3.</td><td>BERC</td><td>The BSEB is trying to arrange fund for the replacement of defective meters. The progress in this regard is not encouraging. Meters provided by consumers are also being used for the replacement of defective meters.</td></tr>
<tr><td>4.</td><td>CSERC</td><td>The Board has been trying its best to carry out the replacement of stopped and defective meters within the time frame laid down by the Commission.</td></tr>
<tr><td>5.</td><td>DERC</td><td></td></tr>
<tr><td>6.</td><td>GERC</td><td>UGVCL
The status of defective meters as on 31.03.08 i.e. last billing cycles of FY 2007-08 is as under
Single Phase meters – 16701
Three Phase meters – 563
Further they submit that normally defective meters are replaced within specified time limit laid down in the regulation. During last year (2007-08) total following mentioned quantity of meters were replaced:
Single Phase meters – 162428
Three Phase meters – 18684

PGVCL
In the last three years Company has replaced following nos. of meters.
<table>
<tr><td>Category</td><td>2005-06</td><td>2006-07</td><td>2007-08</td><td>2008-09 up to Oct.08</td></tr>
<tr><td>Single Phase</td><td>250657</td><td>291038</td><td>249104</td><td>133195</td></tr>
<tr><td>Three Phase</td><td>22060</td><td>22006</td><td>19663</td><td>9854</td></tr>
</table>
Large nos. of connections under single phase category are old and having old electromechanical meters. Secondly, every year more than 1 Lacs Consumers are added in the system. Thus, more than 4 Lacs meters are required every year. Availability of single phase meters in the market complying to CEA regulations is comparatively low. Therefore, we have to resort to purchase, at least partly, electro mechanical meters to meet with out total requirements. At the same time, since large nos. of connections are very old, it is difficult to match the rate of replacement of meter to rate of failure. Thus, even with all out efforts regulations in this regard are very difficult to follow. Similar is the situation in the Agricultural Category.

MGVCL
Status of replacement of defective meters:-
Single Phase defective meters replaced – 70061 nos.
Single phase old Electro-mech. meters replaced – 64919 nos.
3 Phase defective meters replaced – 7766 nos.
3 Phase Electro-Mech. meters replaced – 11199 nos.
Balance 1 ph. meters to be replaced – 33370 nos.
Balance 3 ph. meters to be replaced – 07 nos.</td></tr>
</table>

<table>
<tr><td></td><td></td><td>DGVCL
Status of defective meters as on 31.03.2008 i.e. last billing cycles of FY: 2007-08:
Single phase meters – 23610 Nos.
Three phase meters – 1263 nos.
Normally defective meters are replaced within specified time limit laid down in the GERC Regulations. During last year (i.e. 2007-08), total quantity of meters replaced was as under:
Single phase meters – 301095 nos.
Three phase meters – 14984 nos.

TPL
Defective meters are replaced as and when they are identified. The replacement is carried out within the time frame laid down in regulations.</td></tr>
<tr><td>7.</td><td>HERC</td><td>Replacement of meters is being done promptly.</td></tr>
<tr><td>8.</td><td>HPERC</td><td>The Defective / damaged meters are regularly replaced and compliance of which is regularly reported to the HPERC. The status is enclosed* on the Format.</td></tr>
<tr><td>9.</td><td>JSERC</td><td></td></tr>
<tr><td>10.</td><td>J&KSERC</td><td></td></tr>
<tr><td>11.</td><td>KERC</td><td>Bangalore Electricity Supply Company Limited: Defective meters are replaced within the time frame laid down as per KERC regulations.

Hubli Electricity Supply Company Limited: During the month of Nov.2008 37.93% of meters have become MNR in HESCOM & 29.15% of meters have been replaced. The delay in replacement of faulty meters is due to non-supply of energy meters by suppliers in prescribed time as per purchase order conditions. However all efforts are being made to replace the faulty meters within time frame fixed by KERC.

Chamundeshwari Electricity Supply Corporation Limited:
Yes, defective energy meters are being replaced as per KERC regulations.

The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri : Defective meters are being replaced immediately within the time frame laid down by the KERC regulation.

Gulbarga Electricity Supply Company Limited: Replacement of defective meters in GESCOM is taken up on priority. MNR meters in urban area are targeted to be made nil every month. In rural area replacement of MNR meters is taken up in phased manner. All the Executive Engineers (Ele.), O&M Divisions are given Rs. Ten lakhs revolving fund exclusively for purchasing meters for replacement of MNR meters only. The progress achieved since 2002-03 up to date is as shown below:

<table>
<tr><th>Year</th><th>2002-03</th><th>2003-04</th><th>2004-05</th><th>2005-06</th><th>2006-07</th><th>2007-08</th><th>2008-09 upto Nov.</th></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
<table>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>‘08</td></tr>
<tr><td>MNR Meters replaced</td><td>38698</td><td>43580</td><td>10895</td><td>62485</td><td>45080</td><td>29367</td><td>51403</td></tr>
<tr><td>DC, Meters fixed</td><td>24548</td><td>22606</td><td>1073</td><td>21360</td><td>13357</td><td>2224</td><td>5468</td></tr>
</table>

Mangalore Electricity Supply Company Ltd.: The replacement of defective meters are carried out within the timeframe laid in the REC Regulations.</td></tr>
<tr><td>12.</td><td>KSERC</td><td>Status of faulty meter replacement: A large number of meters are reported faulty. Commission has issued directions to replace all faulty meters before October 30, 2008.</td></tr>
<tr><td>13.</td><td>MPERC</td><td>1. The Status of defective meters as at the end of September, 2008 is as given below:-

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Discom</th><th colspan="2">% of Defective Meters</th></tr>
<tr><td>Single Phase</td><td>Three Phase</td></tr>
<tr><td>1</td><td>East Discom</td><td>2.68</td><td>2.31</td></tr>
<tr><td>2</td><td>Central Discom</td><td>2.92</td><td>1.29</td></tr>
<tr><td>3</td><td>West Discom</td><td>2.06</td><td>0.74</td></tr>
</table>

The Discoms have been directed to keep the overall percentage of defective meters within 3%.

2. (A). The standards of performance achieved with regard to replacement of defective meters during 07-08 were as given below:-

<table>
<tr><th>S.No.</th><th>Discom</th><th>% achievement in case of replacement of meters in urban area</th><th>% achievement in case of replacement of meters in rural area</th></tr>
<tr><td>1</td><td>East Discom</td><td>96.73%</td><td>97.93%</td></tr>
<tr><td>2</td><td>Central Discom</td><td>99.84%</td><td>97.36%</td></tr>
<tr><td>3</td><td>West Discom</td><td>98.73%</td><td>97.46%</td></tr>
</table>

(B). The Standards of Performance regulation stipulates that the stopped/defective meters should be replaced in urban areas within 15 days and in rural areas within 30 days. The actual achievement in terms of percentage where the meters have been replaced with in time limit is given in the table of previous paragraph</td></tr>
<tr><td>14.</td><td>MERC</td><td>Maharashtra State Electricity Distribution Company Ltd. (MSEDCL): Most of the time it is generally ensured that faulty energy meters are replaced as early as possible and within the time frame prescribed under the MERC (Standards of Performance of Distribution Licensees, Period for Giving Supply and Determination of Compensation) Regulations, 2005.

Reliance Infrastructure Ltd.-Distribution (RInfra-D): RInfra carries out the</td></tr>
</table>

		replacements defective meters as per the guidelines framed by MERC **The Tata Power Company Ltd.-Distribution (TPC-D)**: Tata Power is monitoring the defective meters complaint and ensuring replacement within the time frame laid down under Regulation 7.1 of MERC (Standards of Performance of Distribution Licensees, Period for Giving Supply and Determination of Compensation) Regulations, 2005. The Status report for FY 2007-08 is enclosed (in file). **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Less than1% of meters are not replaced in time due to non-availability of meters. Now meters are received and replacement is in process. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Yes
15.	MSERC	
16.	OERC	As per information in OERC, in the FY ending March, 2008, DISTCOMs have replaced defective meters in the following manner:- **CESU** : 7071 **NESCO** : 11044 **WESCO** : 1992 As submitted through affidavit by the DISTCOMs, in their annual performance achievement for 2007-08, all of them have replaced the defective meters within the time frame laid down in the OERC Regulations except SOUTHCO, which could not replace 1237 meters in time. However, the following DISTCOMs have submitted their respective information on the matter. **NESCO:-** Yes, meters changed from April '08 to December '08 : 37500 **SOUTHCO:-** In the FY 2007-08 SOUTHCO installed 16535 of meters against defective meter of 29054 nos. as on 31st March, 2008. And action is being taken to replace the balance defective meters.
17.	PSERC	All defective meters are being replaced immediately on availability of meters.
18.	RERC	Status of replacement of defective meters by the licensee is enclosed. **(there is no enclosure attached)**
19.	TNERC	Replacements of defective meters are carried out as per the time frame stipulated in ERC Regulation. TNEB reports that against the target of 95% fixed by the ERC, they have achieved 97.9% for the quarterly period ending on 30.03.2008.
20.	TERC	17101 Nos of defective meters were changed during 2007-08 and all out effort was taken to replace the above meter within the time frame allowed under ERC regulation in force.
21.	UERC	Replacement of IDF meters is carried out as per the Commission's Regulations which specify that meter is to be replaced within one month of complaint received. However, there have been few complaints regarding delayed replacements. Action has been taken by the licensee to streamline the replacement and replace all IDF meters within scheduled / fixed time with the

		help of additional manpower deployed for this purpose.
22.	UPERC	Replacement of meter found not recording has to be done within 15 days of test conducted. The Data for actual average replacement period has been asked from the discoms. **Noida Power Company Limited:** Status of replacement of defective meter for the Period (01.04.07 to 31.03.08) Total No. of meter to be replaced – 650 Total No. of meter replaced – 650 All meters have been replaced within the time frame stipulated by UPERC
23.	WBERC	**WBSEDCL :** Action is being taken to replace the meter immediately after detection of defect but it depends upon availability of the meter. **DPSC Ltd.:** Replacement of defective meters is generally done within the time frame laid down in Regulations. **CESC Ltd.:** Majority of the meters in CESC system are of superior quality and, therefore, the percentage of defective meters in the system is very low- of the order of 0.3% only. The defective meters are replaced within the time frame set in the West Bengal Electricity Regulatory Commission (Standards of Performance of Distribution Licensees Relating to Consumer Services) Regulations, 2005 **DPL :** DPL has procured Static Meters with memory for all category of consumers and replacement of all old conventional meters and meters with technologies not updated are in the process of replacement by new meters. Approximately 70% meters have been replaced.

HPERC

STATEMENT SHOWING POSITION OF THE DEAD STOP/DEFECTIVE METER ENDING 31.08.08

Sr. No.	NAME OF CIRCLE	DEAD STOP/DEFECTIVE METERS ENDING 31.03.08			ADDITIONAL DURING 1-4-08 TO 31-8-08			REPLACEMENT DURING 1-4-08 TO 31-8-08			DEAD STIO/DEFECTIVE METERS ENDING 31-8-08		
		1 - ø	3 - ø	TOTAL	1 - ø	3 - ø	TOTAL	1 - ø	3 - ø	TOTAL	1 - ø	3 - ø	TOTAL
A	**CHIEF ENGINEER (OP) SOUTH**												
1	Shimla	1104	3	1107	2569	19	2588	2108	19	2127	1565	3	1568
2	Rampur	648	0	648	2338	16	2354	1854	15	1869	1132	1	1133
3	Rahroo	1087	4	1091	1536	4	1540	1263	3	1266	1360	5	1365
4	Solan	2111	47	2158	3452	177	3629	3605	143	3748	1958	81	2039
5	Nahan	1050	27	1077	516	21	537	605	38	643	961	10	971
	Sub Total	**6000**	**81**	**6081**	**10411**	**237**	**10648**	**9435**	**218**	**9653**	**6976**	**100**	**7076**
B	**CHIEF ENGINEER (OP) NORTH**												
1	Una	981	73	1054	3354	165	3519	3282	157	3439	1053	81	1134
2	Kangra	3220	63	3283	5217	56	5273	4998	37	5035	3439	82	3521
3	Dalhousie	2330	18	2348	4509	86	4595	4990	66	5056	1849	38	1887
	Sub Total	**6531**	**154**	**6685**	**13080**	**307**	**13387**	**13270**	**260**	**13530**	**6341**	**201**	**6542**

C	ZONE												
1	Bilaspur	1402	39	1441	3606	78	3684	3744	89	3833	1264	28	1292
2	Mandi	507	13	520	3789	19	3808	2463	15	2478	1833	17	1850
3	Kullu	736	11	747	2010	19	2029	1921	12	1933	825	18	843
4	Hamirpur	884	12	896	2587	95	2682	2505	84	2589	966	23	989
	Sub Total	**3529**	**75**	**3604**	**11992**	**211**	**12203**	**10633**	**200**	**10833**	**4888**	**86**	**4974**
	G. Total	**16060**	**310**	**16370**	**35483**	**755**	**36238**	**33338**	**678**	**34016**	**18205**	**387**	**18592**

Q8. **Status of compliance of directions issued by ERC on metering of all consumers and consequently steps taken to enforce 100% metering of consumers.**

<table>
<tr><th>S. No.</th><th>SERC</th><th>Reply</th></tr>
<tr><td>1.</td><td>APERC</td><td></td></tr>
<tr><td>2.</td><td>AERC</td><td></td></tr>
<tr><td>3.</td><td>BERC</td><td>There are 9.6 lacs unmetered connections. It requires about 100 crores to undertake the work. BSEB is trying to get fund from the Government.</td></tr>
<tr><td>4.</td><td>CSERC</td><td>The Commission has set the target for providing meters to all the connections by March ’09. The action plan for cent percent meterisation has been prepared and efforts are being made by CSEB to achieve the targets.</td></tr>
<tr><td>5.</td><td>DERC</td><td></td></tr>
<tr><td>6.</td><td>GERC</td><td>
UGVCL
Except Agriculture consumer 100% metering is done. Progress of providing meters on Agriculture consumers is as under:
<table>
<tr><th>Sr. No.</th><th>As on</th><th>Nos of Ag. Consumers</th><th>Nos. of metered consumers</th><th>% of metered consumers</th></tr>
<tr><td>1</td><td>31.03.06</td><td>205289</td><td>50547</td><td>24.62%</td></tr>
<tr><td>2</td><td>31.03.07</td><td>207577</td><td>54778</td><td>26.29%</td></tr>
<tr><td>3</td><td>31.03.08</td><td>213599</td><td>57593</td><td>26.96%</td></tr>
<tr><td>4</td><td>Jyly-08</td><td>214815</td><td>58792</td><td>27.36%</td></tr>
</table>
PGVCL
No connection is released without meter. At present about 92.5% of the connection are metered.
Installation of meters at agriculture consumer’s end (released prior to 10.10.2000) has been resisted by consumers and this remains a significant challenge for the company in implementing 100% metering target.
The Company is endeavoring to achieve in first phase metering at the DTC level and has made progress in the recent past.
Company has a very ambitious plan in releasing the Pending Agriculture Applications.

MGVCL
MGVCL is scrupulously following all directives issued by GERC to ensure 100% metering of consumers and action plan is also prepared to install tariff meters to 47% of Ag. Consumers left without meters, for which we shall complete the installation work during the year 2009.10.

DGVCL
Except Agriculture consumers, 100% metering is done. Progress of providing meters on Agriculture consumers is as under:
<table>
<tr><th>Sr. No.</th><th>As on</th><th>Nos of Ag. Consumers</th><th>Nos. of metered consumers</th><th>% of metered consumers</th></tr>
<tr><td>1</td><td>31.03.06</td><td>77184</td><td>29071</td><td>37.66</td></tr>
<tr><td>2</td><td>31.03.07</td><td>79101</td><td>31764</td><td>40.16</td></tr>
<tr><td>3</td><td>31.03.08</td><td>81279</td><td>34516</td><td>42.47</td></tr>
<tr><td>4</td><td>Jyly-08</td><td>82240</td><td>35630</td><td>43.32</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td></td><td>To provide meter at un-metered Ag. Consumers it is very difficult and challenging task for the company. Company endeavors very hard in this direction but due to resistance from consumers, it could not be completed However at present no connection is released without meter.

TPL
Not applicable (100% metering)</td></tr>
<tr><td>7.</td><td>HERC</td><td>Compliance is done in letter and spirit. Except unmetered agriculture consumers all other consumers are metered. All new agriculture pump set connections are released on meters only.</td></tr>
<tr><td>8.</td><td>HPERC</td><td>The board is implementing the directions of the Hon'ble commission on metering of all the consumers on monthly, bimonthly and trimonthly basis. There is however 100% metering in the State.</td></tr>
<tr><td>9.</td><td>JSERC</td><td></td></tr>
<tr><td>10.</td><td>J&KSERC</td><td></td></tr>
<tr><td>11.</td><td>KERC</td><td>Bangalore Electricity Supply Company Limited:
As on Mar. 2008
<table>
<tr><th rowspan="2">Category</th><th colspan="2">No. of Installations</th><th rowspan="2">%age metered</th></tr>
<tr><th>Existing</th><th>Metered</th></tr>
<tr><td>BJ / KJ</td><td>610409</td><td>346460</td><td>57</td></tr>
<tr><td>Street Light</td><td>35834</td><td>33919</td><td>95</td></tr>
<tr><td>IP set</td><td>616733</td><td>46392</td><td>7.52</td></tr>
</table>
As on Nov. 2008
<table>
<tr><th rowspan="2">Category</th><th colspan="2">No. of Installations</th><th rowspan="2">%age metered</th></tr>
<tr><th>Existing</th><th>Metered</th></tr>
<tr><td>BJ / KJ</td><td>628679</td><td>508455</td><td>81</td></tr>
<tr><td>Street Light</td><td>40570</td><td>40200</td><td>99</td></tr>
<tr><td>IP set</td><td>612207</td><td>59492</td><td>10</td></tr>
</table>
Hubli Electricity Supply Company Limited:

<u>Status of metering of all consumers for the month of Nov. 2008</u>
The metering status of HT & LT categories of installations comprising HT, LT-1, LT-2, LT-3, LT-4, LT-5, LT-6 & LT-7 are shown above (Ques. No.4). Under LT-1 category pertaining to BJ / KJ installations, 100% metering is yet to be achieved in HESCOM & due to agitation by farmers for fixing meters to IP-set installations and removal of existing meters of IP-sets by farmers, 100% metering of this category is not achieved, however metering status as on 30.11.2008 of these two categories is furnished as under:

Action taken to achieve 100% metering of IP-sets & BJ / KJ installations. HESCOM has already finalized tender for supply and fixing of energy meters to 100000 Nos. of meters to BJ / KJ installations & tender is under process. After finalization of tender & purchased order will be replaced to successful tenderer:
<table>
<tr><th rowspan="2">Sl. No.</th><th rowspan="2">Consumer Category</th><th rowspan="2">No. of consumers</th><th colspan="4">No. of metered Consumers</th><th rowspan="2">Percentage metering</th></tr>
<tr><th>No. of electro-mechanical meters</th><th>No. of Electronic meters</th><th>No.of ToD meters</th><th>Total</th></tr>
<tr><td>1</td><td>LT-1</td><td>641837</td><td>484913</td><td>0</td><td>Nil</td><td>484913</td><td>75.55</td></tr>
<tr><td>2</td><td>LT-4</td><td>475066</td><td>142723</td><td>0</td><td>Nil</td><td>142723</td><td>30.04</td></tr>
</table></td></tr>
</table>

		<u>Chamundeshwari Electricity Supply Corporation Limited</u>: Action being taken to provide energy meters to all consumers. All BJ / KJ installations are street light installations are metered. Instructions from GoK/KPTCL will be followed for metering of remaining 76% of IP-sets in rural areas scheduled to be completed before March 2010. Action is being initiated to provide energy meters to transformer centers. All newly serviced installations are being serviced with meters only. **The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri :** As per the directions issued by KERC 100% metering is provided to all categories of consumers except IP-set installations. Action has been taken to provide 100% metering to IP-set installations step by step. **Gulbarga Electricity Supply Company Limited:** 100% Metering of installations in all the categories except BJ/KJ and IP sets is done. In case of BJ/KJ 2,59,227 Nos. are metered and balance 1,84,183 Nos. are being metered in phased manner. In case of IP sets meter fixing is not being taken up due to protest of farmers. As free power supply to IP sets is being announced by GOK w.e.f. 01.08.08. It is proposed to fix meters to IP sets in persuasion with the farmers. **Mangalore Electricity Supply Company Ltd.:** Yes. In Mangalore Circle, 100% installations are metered. In Shimoga Circle, all categories except LT4 are metered. Metering of LT4 category is under progress.
12.	KSERC	All connections are metered.
13.	MPERC	The Commission has taken up the issue of enforcing 100% metering of connections with the Discoms. Earlier a petition was instituted by the Commission and after due deliberations with the senior management of the Discoms a consultative approach was adopted. Following directives have been given to the Discom:- (i) All un-metered domestic urban connection will be provided with meters by March, 2009 in all the three Distribution Companies. (ii) Agriculture Distribution Transformer to be provided with meters as below:- (a) East Discom : by March-2010 (b) Central Discom : by March-2011 (c) West Discom : by March-2011
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** Out of the total number of consumers of MSEDCL, only 14,57,521 agricultural consumers are un-metered (as on December 1, 2008). MSEDCL is installing meters to all these consumers in phased manner. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: The meters installed by RInfra are as per the specifications and technical standards of the metering guidelines notified by CEA and are checked for accuracy before installation. All steps are taken to comply with this metering Regulation. All the consumers of RInfra are metered **The Tata Power Company Ltd.-Distribution (TPC-D)**: Tata Power has enforced 100% metering of all its consumers. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Already 100% metering is ensured.

		Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS): Information will be provided to the Commission under MYT Petition (yet to be submitted)
15.	MSERC	
16.	OERC	The status of consumer metering is being regularly monitored in every quarter as well as annual basis **CESU:-** CESU is replacing the defective meters and accordingly it has procured 60,000 meters during the FY 2008-09. CESU is aiming to replace all defective meters. **NESCO:-** Steps are being taken to complete 100% metering. **WESCO:-** Out of 4.99 Lacs of consumer 4.79 Lacs are metered, further 20,000 meters have been procured in 2007-08 and another 20,000 meters are in pipeline. Efforts are on to accomplish 100% metering. **SOUTHCO:-** As against 100% metering, 93% of meter are in working condition.
17.	PSERC	The utility is being impressed upon by the ERC to comply with section 55 of the Act for 100% metering of consumers.
18.	RERC	All categories of consumers except agriculture flat rate consumers are metered. For flat rate consumers the Commission has allowed Discoms to convert them to metered category by June 2009
19.	TNERC	At present all categories of services except agricultural and hut services are provided with meters. In respect of agriculture and hut services TNERC has given time extension upto 31.03.2009. In this regard Government of Tamil Nadu has been addressed by TNEB to exempt agricultural and hut services for providing meters since the work involves huge expenditure and stiff resistance from the consumers.
20.	TERC	The **Kutirjyoti** beneficiaries who were earlier provided with un-metered supply are not being provided with Electronics meter gradually as per direction of ERC. TSECL being the license had procured 4.00 lacs of static energy meter under APDRP during last four years.
21.	UERC	The Commission had issued an Order dated 11.08.2005 directing the licensee to convert un-metered connections into metered connections for all existing Domestic and Commercial consumers in rural areas and for all connections given to private tubewells latest by 31.03.2006. For other consumer categories the Commission had directed the licensee to comply with the requirements of section 55 of the Electricity Act, 2003 and because of licensee's failure to do so had imposed a penalty on the licensee. Because of the penalty, the licensee has geared up to convert all the unmetered connections into metered connection. The licensee has reported that unmetered connections are existing only in domestic rural category and PTW. There are about 1.5% unmetered connections left due to stiff resistance from rural consumers. Efforts will be made to get these consumers metered shortly. **(Status has been enclosed) (there is no enclosure)**
22.	UPERC	Data has been asked from the Discoms. From the reports submitted upto 2007-08, the percentage metering status was Domestic (56%), Industrial (LT&HT-100%), Commercial (94.5%), Agricultural LT (Less than 4%) **Noida Power Company Limited:** All new connections are provided by a metered connection of Conversion of pending unmetered consumer to metered are being persuaded by the Company. However due to social/environment problem, the conversion of supply from unmetered to metered could not be taken on fast track. The time limit for converting all consumers to metered supply is March '10

23.	WBERC	**WBSEDCL :** Status as on 30.09.08 1) Domestic, commercial, industrial & other 100% (Metered) 2) Lokedeep / KutirJyoti 75.08% 3) Agricultural (STW) 83% (Metered) **DPSC Ltd.:** Cent percent consumers are metered **CESC Ltd.:** The West Bengal Electricity Regulatory Commission has issued direction on metering of all consumers by 31st March, 2009. CESC has provided 100% metering for all categories of consumers except a very small section of municipal street lighting consumers (miniscule in proportion), where existing agreements stand in the way of providing metered suppliers. After prolonged negotiations and persuasion, CESC Limited was able to carry out joint inspection for pilot project for providing metered street lighting supplies with remote meter reading facilities and overload protection in different locations. **DPL :** Direction of ERC has been complied with

Q**9. Methodology adopted in the ERC to assess realistically the consumption of electricity supply in respect of un-metered consumers (category-wise).**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	The Commission has issued directive for this purpose and the action taken by the BSEB is being reviewed.
4.	CSERC	Consumption of un-metered pump connections is worked out on the basis of 18% load factor and for BPL consumers 30 units per month as per the directions of the Commission.
5.	DERC	
6.	GERC	At present assessment of un-metered Ag. Consumer is done considering 1700 units per HP per Annum. GERC has directed the Discom to submit comprehensive report on consumption of un-metered agricultural services based on feeder metering and sample meter services. Moreover, directives on installation of meters on Distribution Transformers of Agriculture dominated feeder for energy accounting and monitoring of 11 KV agricultural dominated feeder level helps in adopting realistic assessment of the consumption of electricity.
7.	HERC	The electricity consumption in respect of unmetered agriculture consumers is assessed on the basis of connected load of metered agriculture consumers.
8.	HPERC	Not applicable.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** As per the Commission's directives, meters have been provided to DTCs predominantly feeding IP sets to determine the monthly consumption of IP sets. Meters have been fixed to two to four such pilot DTCs in each O&M section, average consumption of each IP set in each O&M section is determined and the total assessment of consumption is made extrapolating to sub division. Division and then to BESCOM as a whole. BESCOM is regularly furnishing the IP set readings and the assessed consumption of IP sets to the Commission on monthly basis. As on March 2008 there are 684 No. of DTCs, which are predominantly feeding IP sets. As per the directives of the Commission, the unmetered BJ/KJ installations consumption is assessed at 18 units/installation/month. **Hubli Electricity Supply Company Limited:** In HESCOM for metered & unmetered consumers of BJ / KJ installations having 1 bulb of 40 watts are being billed at 18 units per installation under LT-1 tariff. Whenever the consumption exceeds 18 units in metered categories such excess units are billed under LT-2(a) tariff. In all other cases except IP-sets, meters are available and installations are billed as per metered consumption. **Chamundeshwari Electricity Supply Corporation Limited:** In CESC, Mysore for rural IP sets for assessment of consumption

		energy meter readings of Transformer Centres having predominant IP-set readings are taken and made use of, to assess consumption of electricity supply. **The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri :** There are un-metered consumers in IP-set category only. The assessment of consumption of these un-metered IP-sets are made by monitoring at 249 sample meters fixed to IP-sets of various mode of use 9.e. well, bore well & River bed IP-sets. **Gulbarga Electricity Supply Company Limited:** a) **IP Sets:-** 5 Nos. of predominately IP feeding transformers in each sub-division are fixed with meters. On the basis of consumption recorded in the meters, no. of IP sets connected on such transformers and total HP of the IP sets, consumption per HP is arrived and all the installation in that sub-divisions are billed as per the assessed energy. b) **BJ/KJ installations:-** Unmetered / defective meter installations are billed on average of 18 units/installation/month. **Mangalore Electricity Supply Company Ltd.:** Statement enclosed
12.	KSERC	All connections are metered.
13.	MPERC	MPERC recognized that metering of a huge number of un-metered connectors is a challenging job, which could be addressed only gradually. MPERC has taken up the issue of providing meters on un-metered connections with the Distribution Companies. Based on the submissions of the Distribution Licensees with regard to proposed consumption of un-metered consumers in domestic as well as agricultural category, MPERC has fixed the following units in respect of the domestic and agriculture categories since there is no un-metered connections in any other category:- a) Un-metered consumers in domestic category shall be billed on the basis of 77 units per consumer per month in urban areas, and 30 units per consumer per month in rural areas. b) Un-metered agriculture consumers in rural areas as notified by GoMP under the Electricity Act, 2003 shall be billed on the basis of 100 units per HP of sanctioned load per month for permanent connections and 130 units per HP of sanctioned load per month for temporary connections. c) Un-metered agriculture consumers in urban areas shall be billed on the basis of 130 units per HP of sanctioned load per month for permanent connections and 150 units per HP of sanctioned load per month for temporary connections.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: **The Tata Power Company Ltd.-Distribution (TPC-D)**: **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Only MSEDCL

		has unmetered LT Agricultural consumers/connections in its area of supply. The Commission has adopted different methods to assess realistic consumption of electricity supply in respect of un-metered consumers, viz., (i) recorded consumption of metered consumers to form the basis of agricultural consumption (un-metered consumption), (ii) based on the complete DTC metering, Methodology adopted by MSEDCL for consumption of un-metered agricultural consumption for FY 2006-07 is specified under the Commission's Tariff Order dated November 20,2008.
15.	MSERC	
16.	OERC	In case of no meter/defective meter load factor billing has been abolished since 01.04.2004 and energy audit is being insisted upon to assess the realistic.
17.	PSERC	In PSEB, AP consumers are provided electricity for tube wells on flat rate basis i.e. un-metered supply. The methodology and cost effective methods adopted to assess the realistic consumption of these un-metered AP consumers is on the basis of average consumption per KW as per data of sample study meters which are installed in various operation Divisions. These sample study meters are installed in adequate number which is 5% of the total tube well connections as per agro-climate and hydrological factor. Other local variations are also kept in mind in various areas. The consumption of these sample study meters is aggregated on Divisional basis and average consumption is calculated per KW with respect to sanctioned load. On the basis of this average AP factor whole month consumption in agriculture tube wells is calculated in each Division and summed up to assess the total AP consumption for obtaining subsidy, as free power is being given to AP tube well consumers as per directions of Punjab Government. PSEB is in the process to raise the quantity of sample meters from 5% to 10% of the total tube well connections. The AP factor process is performed each and every month.
18.	RERC	Based on supply made available to Agriculture consumers by Discoms the Commission has assessed the Energy consumption by un-metered Agriculture consumers (Flat rate) as 1945 kWh/per kW connected load.
19.	TNERC	At present 3% agricultural services are metered to calculate computed consumption by TNEB, TNERC has directed TNEB vide order No. T.O. 1-97 dated 03.11.2006 that critical sample studies with the help of experts may be conducted in different areas to arrive at more accurate consumption of agricultural and hut services.
20.	TERC	As per Regulations of TERC, no installation, other than those, which are specifically exempted, shall be serviced without a meter. The consumers under BPL category were previously provided with **Kutirjyoti** connection without any meter covered under the scheme of State Government or Central Government. Load max^m 120 Watt (60W X2 points) and monthly consumption limited to 15 units. However, these un-metered consumers are now being provided with energy meters and 47.68% of un-metered **Kutirjyoti** consumers have already been provided with meters in the State of Tripura.
21.	UERC	a) In case of unmetered PTW connections, the Commission has adopted the norm of specific consumption of 68.38 units per BHP per month based on proper study done by Tyagi Committee.

<table>
<tr><td></td><td></td><td>The norm has not been revised as no other study has been carried out.
b) For unmeterd domestic, the Commission has adopted the same load factor as that of the metered category for estimating their consumption, since both are receiving 24 hours supply. Further, this is proposed by the licensee to be corroborated by detailed study/energy accounting of feeders where such connections are existing (such as some feeders of Rural Roorkee) is to be done which would give an idea of consumption of such consumers. Since, meters are existing on 11 KV feeders and energy of unmetered connections can be calculated after deducting metered connection's units.</td></tr>
<tr><td></td><td>UPERC</td><td>The Commission has considered for this tariff order the licensee statement that stated that "FY 2005-06 consolidated CS3 reports and detailed divisional CS3 reports are reconciled and "normalized" as per the following consumption norms established in UPPCL order No. 2649-CUR/L, dated 20.07.2001.
Consumption Norms for Un-metered Categories (Tariff Order 2008-09)

<table>
<tr><th>Sr. No.</th><th>Category of Un0metered Consumer</th><th>Consumption of Energy per month</th></tr>
<tr><td>1</td><td>Private Tube Well</td><td>68.38 kWh/BHP or
91.66 kWh/KW</td></tr>
<tr><td>2</td><td>Domestic Rural Consumers</td><td>72 kWh/KW</td></tr>
<tr><td>3</td><td>Rural Commercial Consumers</td><td>72 kWh/KW</td></tr>
<tr><td>4</td><td>Rural State Tube Well</td><td>3562.35/kWh/Pump</td></tr>
<tr><td rowspan="2">5</td><td>Street Light – Rural Area</td><td>300 kWh/KW/Month</td></tr>
<tr><td>Street Light – Urban Area</td><td>360 kWh/KW/Month</td></tr>
</table>

The "normalization" is done in order to:-
• Ensure that year end number of customers, connected load and energy sales in MU are consistent with the reported consolidated CS3 sales by major tariff category level;
• Adjust the number of customer and connected load to represent annual averages in order to estimate the expected annual tariff revenues;
• Adjust the consumption of un-metered consumer categories in accordance with the adopted norms".

However, the Commission in its previous tariff orders have issued directions to the licensee to revise these norms on the basis of realistic consumptions arrived on the basis of studies.

Noida Power Company Limited: Normative consumption for unmetered rural domestic/agriculture consumer is based on historical data provided by erstwhile UPSEB/UPPCL since commencement of the Company's operation. Normative consumption of unmetered street light is basedo n UPERC tariff order.</td></tr>
<tr><td>23.</td><td>WBERC</td><td>WBSEDCL : Consumption of electricity by the un-metered</td></tr>
</table>

		consumers are assessed on the basis of their connected load, load factor and hours of drawal of power by different categories of consumers. **DPSC Ltd.:** Does not arise since there are no unmetered consumers. **CESC Ltd.:** Not applicable for CESC **DPL :** Not applicable

Mangalore Electricity Supply Company Limited

The procedure to arrive at the un-metered consumption is as follows:-

(a) BJ/KJ : 18 units/installation/month for the no. of un-metered installations.

(b) Street Light : 360 units/KW/month for the total connected load in un-metered street light installations. 100% metering is achieved in this category of consumers.

(c) IP Sets : There are at least 2 nos. of High Precisions meters fixed to predominantly feding IP Set DTC's in each Section. These meters are regularly read every month. These meters are regularly calibrated by MT wing of MESCOM and kept in good condition for accurate recording.

The consumption recorded in each DTC meter includes consumption of IP sets, consumption of other loads connected to DTC and LT line Losses.

The other loads consumption of these DTC's are obtained as per meter reading every month. On sample study the LT line losses in predominantly feeding IP set DTC's arrived as around 7.5% of the total consumption of the DTC. The difference of the total energy recorded in DTC and other load consumption and 7.5% of line loss will give the IP Set consumption connected to this DTC. The average of each IP sets consumption is calculated by dividing the IP Set consumption in the DTC by the no. of IP sets connected to the DTC

The average of per IP set consumption of all such metered DTCs in each section is arrived. The average per IP set consumption multiplied to the no. of IP sets in the section will give the total assessed IP consumption of the section. This section wise assessed IP consumption is added together to arrive at assessed consumption of IP sets in the Division.

This total assessed consumption of IP sets is considered to be the realistic IP consumption of the Division.

There are divisions in MESCOM in which 100% of IP sets are metered and read once in two months and also certain Division where some percentage of IP sets are yet to be metered.

Where 100% metering has been achieved, reading of IP sets are are reflected in DCB of every month. Since these meters are of class-II type electromechanical meter and are not being regularly calibrated this may not reflect the exact IP consumption of the Division. Hence the difference of assessed IP consumption and the metered energy as per DCB in the Division is accounted as unaccounted / un-read IP consumption.

In the Division where partial metering has been achieved, un-metered IP set consumption is arrived from DTC pilot meters and energy has to be raised in the ledger every month as per connected load of IP sets on the basis of average per HP consumption arrived in the section. Demanded energy has to be accounted in DCB every month for al un-metered IP sets to reflect the

exact IP consumption of the Division. The regular metered consumption as per regular reading of metered IP sets has to be considered in metered category consumption.

The total un-metered / un-read IP consumption for such divisions will be total assessed consumption (Demand consumption in ledger for un-metered IP sets. Billed every of metered IP sets of each month).

Q10. Tariff intervention made by ERC to induce consumers to prefer metered supply of electricity, with details consumer category-wise.

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Commission has taken care to induce consumer to prefer metered supply as the rates of unmetered supply have kept higher than metered supply. Details enclosed*. Further Commission in the Tariff Order of 2006-07 has given directive not to give supply to new consumer without a meter.
4.	CSERC	The Commission has set the target for cent percent meterisation upto March '09. The Commission has set tariff of Rs.50 per connection per month for unmetered BPL connection (upto 30 units only), while the rate with meter is Rs.1.50 per unit, which is the cheapest rate. The tariff for first domestic light and fan slab (0-200 units) is:- Fixed charge – Rs.30 per month (single phase connection) Rs.100 per month (three phase connection) Energy Charges – Rs.1.60 per unit. Similarly for agriculture consumers differentiation in the flat and metered tariff are as follows:- • Metered supply – Fixed charge Rs.20 per HP per month Energy charge – Rs.1 per unit • Flat rate supply upto 5 HP - Rs.65 per HP per month
5.	DERC	
6.	GERC	Except agriculture category all other categories are supplied through meter. Even in the agricultural category no connection is presently released without meter. Metered Tariff for Agricultural consumer is the lowest among all the categories having Rs.10/HP/month fixed charge and Rs. 0.50 per unit as energy charge.
7.	HERC	Tariff of metered agriculture consumers is on Rs.___/ kWh basis whereas the same in respect of unmetered agriculture consumers is on Rs.__/BHP/month basis which is higher than metered consumers. However, since the agriculture tariff is almost wholly subsidized by the Govt. the higher tariff for unmetered consumer does not induce them to prefer metered supply.
8.	HPERC	Not applicable.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited: ----------** **Hubli Electricity Supply Company Limited: ----------** **Chamundeshwari Electricity Supply Corporation Limited: -------** **The Hukkeri Rural Electric Co-operative Society Ltd., ----------** **Gulbarga Electricity Supply Company Limited: ----------** **Mangalore Electricity Supply Company Ltd.:** NIL

<table>
<tr><td>12.</td><td>KSERC</td><td>All connections are metered</td></tr>
<tr><td>13.</td><td>MPERC</td><td>(a) Domestic Category: MPERC has provided a lower tariff with energy charges @ Rs.2.45 per unit for only those consumers residing in clusters of juggi-jhopadis whose supply is catered through metered DTR till individual metering is provided. There are no fixed charges for these DTR metered cluster of consumer.

(b) Agricultural Category: MPERC has provided various incentives to the metered consumers only adopting demand side management practices as given below:-

<table>
<tr><td>S. No.</td><td>Particulars of Energy Saving Devices</td><td>Rate of rebate in tariff</td></tr>
<tr><td>1</td><td>For installation of ISI motors for pump sets</td><td>15 paise per unit</td></tr>
<tr><td>2</td><td>For installation of ISI motors for pump sets and use of frictionless PVC pipes and foot valve</td><td>30 paise per unit</td></tr>
<tr><td>3</td><td>For installation of ISI motors for pump sets and use of frictionless PVC pipes and foot valves along with installation of shunt capacitor of appropriate rating</td><td>45 paise per unit</td></tr>
</table>

The above incentive is allowed on the consumer’s contribution part of the normal tariff (full tariff minus amount of Govt. subsidy per unit, if any) for installation of energy saving devices under demand side management..</td></tr>
<tr><td>14.</td><td>MERC</td><td>Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):
Reliance Infrastructure Ltd.-Distribution (RInfra-D):
The Tata Power Company Ltd.-Distribution (TPC-D):
Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):
Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS): The Commission vide its first tariff Order dated May 5, 2000 (Case No.1 of 1999) applicable to erstwhile Maharashtra State Electricity Board (MSEB), adopted the tariff philosophy under which the flat rate tariffs (Rs./HP/month) are set such that the consumers have an incentive for opting for metered tariff.</td></tr>
<tr><td>15.</td><td>MSERC</td><td></td></tr>
<tr><td>16.</td><td>OERC</td><td>As per OERC Regulation no supply to any consumer will be given without a correct meter</td></tr>
<tr><td>17.</td><td>PSERC</td><td>All categories of consumers’ except AP are being given supply through meters and billed on the basis of actual consumption recorded by meters and tariff is fixed by PSERC on the basis of consumption.</td></tr>
<tr><td>18.</td><td>RERC</td><td>While determining the retail tariff by the Commission vide tariff order dt. 17.12.2004, the tariff for metered category of Agriculture consumers were designed to make it more lucrative as compared to</td></tr>
</table>

		those applicable for flat rate consumers.
19.	TNERC	NIL
20.	TERC	With the change in tariff structure from “contracted load basis” to “consumption basis”, there is growing consciousness among the consumers for energy efficient practices / devices such as CFLs and thus the consumers become interested for metered supply of electricity.
21.	UERC	In its Tariff Orders the Commission had, in the light of the provision of law that no unmetered supply is to be made or recognized after June 2005, had introduced prohibitive tariffs for unmetered consumers through which the fixed charges for unmetered consumers have been gradually and steadily increased. The Commission had approved fixed charges for the unmetered connections in all the categories in the rural areas to be increased by 25% after every six months. The same holds good for such connections in urban areas also except that the increase in fixed charges in this case was 20% higher than the said rate of 25%. Further, for private tubewells the Commission has not increased energy charges, which has been fixed at Rs.0.70/kW.
22.	UPERC	To reduce the number of defective meters, provision has been made in tariff order for incentive / disincentive to staff as well as consumers connected to a particular distribution transformer through proper metering to ensure reduction of commercial losses. Commission had addressed the problem of very high meter exception on account of large number of bills being issued under Not Accessible / Not Read (NA/NR) under the LMV-1 category by providing an incentive of Rs. 1/kW/ billing cycle to a distribution division on the basis of total contracted load of LMV-1 consumers in the division for that billing cycle, if NA/NR in the division was less than 5% of LMV-1 consumer base in the billing cycle. **Noida Power Company Limited:** As per UPERC tariff order differential tariff is extent for extent of metered and unmetered consumers of same category. The tariff of unmetered consumer is higher than the metered cases.
23.	WBERC	**WBSEDCL :** The Commission directed the licensee to bring the consumers receiving un-metered supply under the fold of metered supply. The Commission further directed to assign priority to irrigation consumers followed by the street lighting. Commission also gave direction to WBSEDCL to intimate the Commission through quarterly reports about the progress of metering and billing on the basis of readings of such meters for the consumers under irrigation, Lokdeep / Kutirjyoti and street lighting categories. **DPSC Ltd.:** Does not arise as all consumers are metered. **CESC Ltd.:** Not applicable for CESC **DPL :** Not applicable since 100% metering has been achieved.

*<u>BERC</u>
Tariff Rates

1.0

	Category of consumer	Fixed charge (Rs.)	Energy Charge (Ps/Unit)
	DOMESTIC SERVICE		
1.1	**Kutir Jyoti – BPL Consumers**		
	K.J. (Rural) upto 60 watt. (Consumption upto 30 units per month) i. **Unmetered** **ii. Metered**	Rs.35/ connection / PM X	X 120 Ps/unit subject to Monthly Minimum Charge of Rs.25/- per month per connection
	K.J. (Urban) upto 100 watt. (consumption upto 30 units per month) **Metered only**	X	150 Ps/unit subject to Monthly Minimum charge of Rs.35/- per connection per month

	Category of consumer	**Fixed charge (Rs.)**	**Energy Charges**	
1.2	**DS-I** Connected load upto 2 kW		**Consumption in a month (Units)**	**Rate P/unit**
	<u>Unmetered</u> Connected load upto 1 kW Connected load above 1 kW upto 2 KW	Rs.80/connection/per month Rs.120/connection/per month	X	X
	<u>Metered</u>	X	First 50 units	130
		X	51-100 units	155
			Above 100 units	175
		X	Subject to monthly minimum charge of 1st kW – 40 units per month 2nd kW – 20 units per month	

Boarding/lodging houses, libraries, railway stations, fuel – oil stations. All India Radio / TV installations printing presses commercial trust societies, banks, theatres, circus, coaching institutes, common facilities in multistoried commercial office / buildings Government and Semi-Government offices. Public Museums and other installations not covered under any other tariff schedule.

Government educational institutions, their hostels and libraries, Govt. hospitals and Govt. research institutions and non-profitable Govt. aided educational institutions their hostels and libraries.

Non-profitable recognized charitable cum public institutions.

Places of worship like temples, mosques, gurudwaras, churches etc. and burial / crematorium grounds.

2.1 Non-Domestic Service (NDS-I)

Application to loads upto 2 KW in rural areas not covered by Areas indicated under NDS-II and not being fed from urban/town feeders.

Tariff Rates – NDS – I

	Category of Consumer	Fixed charge (Rs.)	Energy Charges	
	Unmetered			
	Connected Load upto 500 W (0.5kW)	Rs.105/connection/per month	X	X
	Above 0.5 kW upto 1 kW	Rs.125/connection/per month	X	X
	Above 1 kW upto 2 kW	Rs.160/connection/per month	X	X
	Metered	X	1-100 units	140
		X	101-200 units	160
		X	Above 200 units	200
		X	Subject to monthly minimum charge for Load upto 500 watts – 30 units Above 0.5 kW and upto 1 kW – 50 units Above 1 kW – 70 units	

FPPCA charges as applicable will be charged extra

3.0 IRRIGATION & AGRICULTURAL SERVICE (IAS)

Applicability

Applicable for supply of electrical energy for bonafide use for Agricultural purposes including Processing of Agricultural Produce, confined to Chaff-Cutter, Thrasher Cane crusher and Rice Hauler when operated by the agriculturist in the field or farm and does

not include rice mills, flour mills, oil mills, dal mills or expellers. This is also applicable to hatcheries, poultries with more than 1000 birds and fisheries (Fish pounds)

3.1 IAS-I

Applicable for all purposed indicated above including Private Tubewells

Tariff Rated

Unmetered Supply

Rural Feeder – Rs.100/HP per month

Urban Feeder – Rs.120/ HP per month

Hatcheries, poultries and fisheries are not covered under unmetered supply

Metered Supply

All units

Rural Feeder – 80 Ps/unit

Urban feeder – 130 Ps/unit

Subject to monthly minimum energy charges of :-

Rural feeder – Rs.75/HP per month

Urban feeder – Rs.120/HP per month

3.2 IAS-II

Applicable to State Tube Wells / State lift irrigation pumps / State Irrigation pumps upto 100 HP

Unmetered Supply

Rural feeders – Rs.420/HP per month

Urban feeders – Rs.450/HP per month

Metered Supply

Rural feeder – 150 Ps/unit

Urban feeder – 200 Ps/unit

Subject to monthly minimum energy charge of 225 units / per month congratulations.

FPPCA charges as applicable will be charged extra.

Consumers with a connected load ablve 79 HP and upto 99 HP have option to avail power under PWS / HTS category

4.0 STREET LIGHT SERVICES

Applicability

Applicable for supply of electricity for street light system, including signal system in Corporation, Municipality, Notified area, Committees, Panchayats etc. and also in areas not covered by Municipality and Notified Area Committee provided the number of lamps

from a point of supply is not less than five. Also applicable for Traffic Lights, Mast Lights / Blinkers lights.

4.1 SS-I Metered Supply

Tariff Rates

All units – 340 Ps/unit

Subject to monthly minimum charge of :-

(i) Gram Panchayats – 160 units / kW or part thereof

(ii) For Nagar PAlika / NAC / Municipality – 220 units / kW or part thereof

(iii) For Municipal Corporations – 280 units / kW or part thereof

4.2 SS-II Unmetered Supply

Tariff Rates

Fixed Charges

Sl. No.	Light Point Wattage	Gram Panchayat	Nagar Palika/ NAC / Municipality	Municipal Corporation
1	Upto 100 W	Rs.60/month	Rs.80/month	Rs.90/month
2	Upto 101-250 W	Rs.150/month	Rs.170/month	Rs. 200/month
3	251-500 W	Rs.300/month	Rs.330/month	Rs.370/month
	Monthly Minimum Charges per Mast	Rs.1500/month	Rs.1700/month	Rs.1800/month

Above 500 watts the rates shall be pro-rata basis.

FPPCA as applicable will be charged extra

Q**11. Nature and type of monitoring mechanism in place in the utilities in the State to ensure that meters installed are of standards and specifications conforming to CEA's guidelines and regulations on installation and operation of meters.**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Taking regular information from BSEB. They have confirmed that they are purchasing meters as per CEA and ISI specification only. The Commission has incorporated in Electricity Supply Code to install meters in conformity to CEA regulation on installation & operation of meters.
4.	CSERC	The CSEB has been following standard and specification in respect of purchase of meters in conformity to CEA's guidelines and regulations. There is no monitoring mechanism presently.
5.	DERC	
6.	GERC	**UGVCL** Procurement is done as per the procedure confirming to CEA's guidelines and regulations. Sample tests are carried out at ERDA. Existing electromechanical meters are being replaced by Electro static meters. **PGVCL** There is no mechanism in place to check that old meters installed, are of standards and specifications conforming to CEA's guidelines and regulations on installation and operation of meters. However, large nos. of old consumer's is being replaced by new ones with improved specification. As such efforts are put forth to replace the meters particularly, high end consumers, both HT and LT, so as to enable us to comply with the regulations notified by the Hon'ble Commission. **MGVCL** MGVCL reports that they follow CEA guidelines and regulations issued. All the three phase meters are installed with static meters and for installing static meters on single phase are being considered. There is no separate monitoring mechanism established to ensure compliance of CEA's regulations. **DGVCL** Meters are procured as per I.S. specifications. The sample submitted with tenders are tested in the Govt. approved lab i.e. ERDA. Only those meters are procured which are qualified by this Lab. The meters installed found working satisfactorily. **TPL** TPL reports that they procure meters of standards and specifications conforming to CEA regulation. Various checks / tests are carried out on sample meters selected from the lot. The installation of meters is also done as per relevant CEA regulations.
7.	HERC	While designing the specifications of the meters, the guidelines of the CEA are kept in mind and it is ensured that the specifications of

		the Nigam incorporate all these specifications/standards, The meters being procured by the utility are strictly in compliance to the standards set by ISS/IES/CBIP. So the consumer meters used by the Nigam are inherently conforming to the standards and specifications set by the CEA.
8.	HPERC	Chief Engineer (Material Management) of the board has been assigned the task for procurement of meters in accordance with the CEA's Guidelines.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** a) All interface points and EHT installations are provided with ETV (static) meters of 0.2 accuracy. b) All the HT installations are provided with electronic (static) meters of 0.5 accuracy. c) All installations with 40 HP and above are provided with LT CT tri-vector meter with class of accuracy 0.5. d) All LT3, LT4 above 10 HP, LT5 are provided with ETV (static) meters. e) The consumer meters for domestic and less than 40 HP are of electromechanical High Precision / whole current meters. **Hubli Electricity Supply Company Limited:** In HESCOM energy meters are purchased by placing purchase orders and in all purchase orders conditions of CEA guidelines and IS specifications are mentioned to supply meters of these standards only. The above specifications are tested by HESCOM staff before dispatching of the meters at factory premises & test for accuracy class and calibration of correctness etc. of all the meters is also being done after receipt of the meters at the HESCOM laboratories maintained by MRT-Division. **Chamundeshwari Electricity Supply Corporation Limited:** The standard / reputed made energy meters which are tested by CPRI, Bangalore are procured through firms and after every meter is tested and found satisfactory by meter testing division of CESC, they will be installed in consumer installations. **The Hukkeri Rural Electric Co-operative Society Ltd. :** To ensure the meters installed are of standards & specification confirming to CEA, a vigilance team is provided for inspection. The MNR meters are being immediately replaced. **Gulbarga Electricity Supply Company Limited:** All the high precision energy meters available in the market are tested at CPRI and the suppliers whose meter complied with standard specifications are short listed and only such meters are being purchased in GESCOM for servicing new installations and also for replacement of MNR/DC installations. All the old meters are being replaced by such meters in phased manner. **Mangalore Electricity Supply Company Ltd.:** While servicing new

		installations, the meters are calibrated and checked for percentage error with the acucheck instrument and for live installations the operations of the meters is ascertained by periodic testing and the periodicity of testing of meters is as follows:- 1. HT installations – Every six months. 2. LT installations – (a) More than 40 HP : Once in a year (b) 40 HP & below : Once in 2 years 3. Other installations – Once in 5 years
12.	KSERC	No complaint has been received regarding installation of non-standard energy meters.
13.	MPERC	The Commission has issued detailed guidelines through its Regulation to ensure that meters installed are of standards and specifications conforming to CEA's guidelines and Regulations on installation and operation of meters. The Commission had earlier monitored the process of procurement and installation of meter and thereafter the above mentioned Regulations were issued as a part of the Supply Code. These Regulations provide that the meters should conform to the required standards and should be installed in the prescribed manner. Right from the manufacturing works, till the installation at the consumer's premises, a number of intermediate tests have been prescribed to be carried out and the Commission has been monitoring this.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** The comments on this issue are already covered in comments given at Sr.No.2 **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: Not applicable **The Tata Power Company Ltd.-Distribution (TPC-D)**: Currently, Tata Power is procuring and installing meters for all its consumers and the standards and specifications of meters are confirming to CEA guidelines and regulations on installation and operation of meters. All meters are tested prior to installation. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Meter specifications are prepared as confirming to CEA guidelines. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Nil
15.	MSERC	
16.	OERC	Though no full proof monitoring mechanism has been devised, the Commission, on its part, has authorized the engineer of the licensee to verify the correctness of the meters. The Commission is inclined to conduct sample checks through enquiry by its staff and outside independent experts. The Commission can also take action against utilities under the provision of the Electricity Act, 2003 if they violate the CEA guidelines / regulations. **SOUTHCO:-** SOUTHCO has procured meter in accordance with CEA guidelines.

17.	PSERC	All three phase meters being provided for different category of consumers are of electronic intelligent type with accuracy class 1.0 which is in line with CEA guidelines and regulation on installation and operation of meters. However, all single phase meters being provided for DS/CS consumers are of non-intelligent type with accuracy class-1. A Committee of three CEs is already framed by Board for study of provisions of single phase intelligent meters for DS/CS consumer. Further action shall be taken on receipt of recommendations of this Committee.
18.	RERC	NIL
19.	TNERC	NIL.
20.	TERC	TSECL being the sole licensee in the state procured bulk quantity of static meter through two-part bidding process. To ensure procurement of quality and standard meters, the technical specification was finalized as per CEA norms and guideline read with relevant IS and testing of meters through third party accredit agency. The meters had been installed in the consumer premises with a unique sealing arrangement with code & numbers to avoid tempering of meters. A meter reading card also had been placed near the meter to monitor the operation of meters.
21.	UERC	Meters standards and specifications of the licensee have already been checked by the Commission and they were found to be in accordance with the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.
22.	UPERC	UPERC has made provisions in its Electricity Supply Code-2005 conforming to CEA regulations. Data has been asked from the discoms. **Noida Power Company Limited:** The specification for meter procured by the company is in accordance with CEA guidelines.
23.	WBERC	**WBSEDCL :** The instrument used for testing/calibration of energy meters are calibrated from NABL accredited Laboratory after an interval of every two years. Meters are being calibrated for centralized and decentralized bulk consumer after interval of one year and two year respectively **DPSC Ltd.:** Meter is installed conforming to CEA's guideline and all are SEMS make electrostatic meter. **CESC Ltd.:** CESC has a separate department responsible for consumer metering including setting up standards and specifications and testing so as to ensure that the meters installed are of superior quality. CESE has accredited and modern meter testing facilities. The ERC is apprised of it. **DPL :** No comment.

Q**12. Has the ERC carried out any sample check to verify the veracity of the above, and if so, the findings thereof and consequential action taken?**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Not yet.
4.	CSERC	The Commission has not carried any sample checking to verify standards and specifications of the meter. However, the contents of the CEA's regulations have repeatedly been brought to the notice of the CSEB.
5.	DERC	
6.	GERC	No sample check carried out by GERC. However, the attempts made by distribution licensees are as under: **UGVCL** Every month, utilization report for meters is being collected from field. The field officers by visiting installations of customers verify the same. No, veracity of above is reported from field. **PGVCL** As such, there is no mechanism in place to ensure that old meters installed are of standards and specifications conforming to CEA's guidelines and regulations. **MGVCL** As such, no sample check is carried out to verify the veracity of above practices. **DGVCL** Before delivery, some sample are picked up randomly from a lot manufactured by the supplier and are tested at works in presence of Company's Engineer and supplier's representative. After supply, some meters are audit tested at Hi-tech Lab of DGVCL and if any deviations are observed or say not in line with I.S. specifications than the complete lot is rejected and replaced by new qualified meters or 30% of bill amount is recovered against used meters. **TPL** Various checks/tests are carried out on sample meters selected from the lot received to ensure that the meters are in conformity with the specified standards. In case, meters do not meet the required specifications during the sample check, entire lot gets rejected. The accuracy test is carried for all meters before their installation at consumer premises.
7.	HERC	The Commission is seeking information on regulator basis from the utilities about compliance of metering norms.
8.	HPERC	Not applicable.
9.	JSERC	
10.	J&KSERC	

11.	KERC	**Bangalore Electricity Supply Company Limited: ----------** **Hubli Electricity Supply Company Limited: ----------** **Chamundeshwari Electricity Supply Corporation Limited: ------** **The Hukkeri Rural Electric Co-operative Society Ltd.:----------** **Gulbarga Electricity Supply Company Limited: ----------** **Mangalore Electricity Supply Company Ltd.:** NIL
12.	KSERC	No complaint has been received regarding installation of non-standard energy meters.
13.	MPERC	After notifying the relevant Regulations mentioned in the previous paragraph (11), some of supply lots were rejected after testing at the independent laboratories. This has resulted in to supply of good quality meters.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** No **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: No **The Tata Power Company Ltd.-Distribution (TPC-D)**: No **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** No **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** No
15.	MSERC	
16.	OERC	No. **CESU:-** No **NESCO:-** Yes **SOUTHCO:-** No.
17.	PSERC	Nil
18.	RERC	The Commission has not done any sample check yet.
19.	TNERC	NO.
20.	TERC	The information furnished by the License under serial no. 11 in respect of quality and procurement process of energy meter could not be verified time to time due to information gap. However the matter is being look into.
21.	UERC	The Commission is contemplating the in-house sample checkings of the meters.
22.	UPERC	No complaints of the standards and specifications of CEA regulations not being followed have been received. However, an independent assessment on purchase of all equipments including meters, was made by a *Equipment Quality Control Committee* constituted by the Commission, and its report submitted to State Govt., discoms and placed on Commission's website. Reportedly, large scale measures have been initiated by the discoms, and full report is awaited. **Noida Power Company Limited:** A committee constituted by UPERC to monitor the quality of materials procured by the discom has visited the company & verified the same.

23.	WBERC	**WBSEDCL :** No **DPSC Ltd.:** No **CESC Ltd.:** No **DPL :** No.

Q**13. Have the utilities in the State made any evaluation of Distribution Transformers metering. If so, the result thereof?**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Meters on Distribution Transformer are being installed by BSEB/Power Grid and BSEB will take up the matter after installation.
4.	CSERC	The evaluation of distribution transformer metering is under process. The work has been given to a consultant for carrying out the study.
5.	DERC	
6.	GERC	**UGVCL** Company has provided 100% meters on Distribution Transformers of 11 KV Urban & JGY feeders. Coding of each consumer is done DTC wise & feeder wise. Computerized billing programme is prepared to find out the transformer wise sent out, sold out & T&D losses every month. From derived data further course of action are taken to curb the theft of energy. **PGVCL** No evaluation is made. It is also very much difficult to carry out such evaluation in the present bi-monthly billing system. Therefore, we have planned to bring out all the consumers feeding power supply from a Distribution Transformer in a billing Cycle. Thereafter, code of Distribution Transformer shall be linked with the Consumers' master data, which will enable us to carry out energy audit and evaluation of Distribution Transformer metering. **MGVCL** MGVCL has already installed meters on more than 55% of total Distribution Transformer. They have in-house developed software for assessing actual loss on respective DTC. All DTCs incurring higher losses are further investigated in details for reasons and cause of higher losses. **DGVCL** Company has provided 56% meters on Distribution Transformers of various categories of feeders. Coding of each consumer is done DTC wise & feeder wise. Computerized billing programmed is prepared to find out the transformer-wise sent out, sold-out & T&D losses every month. From derived data, further course of action are taken to curb the theft of energy. **TPL** TPL collect data from meters installed at Distribution Transformer and the same is found satisfactory. Its comparison with consumer meters also helps in surveillance.
7.	HERC	The work on DT metering is still not complete; therefore, the evaluation has also not yet started. The cells that will undertake evaluation are already in place.
8.	HPERC	The board is making the regular monitoring of the metering of distribution transformers and requisite details are enclosed. **(There is no enclosure)**
9.	JSERC	
10.	J&KSERC	

11.	KERC	**Bangalore Electricity Supply Company Limited:** BESCOM is making evaluation of distribution transformer metering through energy auditing at transformer level in towns, cities and villages on a regular basis. The energy audit for the month of March, 2008 is shown below:

No. of Towns/ Villages	No. of DTCs for which meters fixed	No. of DTCs for which energy audit done	Total No. of DTCs with losses		
			Upto 5%	5% to 20%	20% to 30% and above 30%
838	24065	19975	**13469**	6335	171

The DTCs which record losses above 5% are analyzed for higher losses and remedial steps are initiated to bring down the losses.

Hubli Electricity Supply Company Limited:

Status of evaluation of DTC loss for the month of Oct. 2008

In HESCOM there are 65 towns having population of 20000 & above and energy audit of all these towns being carried out every month by installing energy meters to all the DTCs coming under all these 65 towns. The energy meters of these DTCs are also being calibrated for their correctness periodically. The result of evaluation of energy losses of DTCs installed in 65 towns of HESCOM for the month of Oct. 2008 is furnished as under:

HESCOM	Total no. of DTCs for which meters fixed	Total No. of DTCs to be metered	No. of DTCs for which DTC wise Energy Audit done	Upto 5%	5% to 10%	10% to 20%	20% to 30%	Above 30%
Total	9468	1167	7091	2611	2340	1329	425	127

Chamundeshwari Electricity Supply Corporation Limited:

a) No. of DTs existing : 41,127
b) No. of metered DTs : 10,209

The Hukkeri Rural Electric Co-operative Society Ltd.: ----------

Gulbarga Electricity Supply Company Limited: The metering of distribution transformers is taken up recently in GESCOM, about 6576 distribution transformers are metered as against 43220 without RAMR facility. The RAMR facility meters are being installed since last 4 months and a control centre to download the meter data is being set in at Corporate Office Gulbarga. Once all the urban DTC's metering work is completed, energy audit will be carried out and the results will be furnished.

		Mangalore Electricity Supply Company Ltd.: Yes, the status of metering of DTC is as follows. In urban area, the total no. of DTCs metered – 4591. In Rural area total no. of DTCs metered – 6800. And also the metering of Distribution Transformers has helped in load balancing on all the three phases & thereby reducing the Transformer failure rates.
12.	KSERC	Details are collected from the distribution licensee.
13.	MPERC	The work for installation of meter on DTRs is going on and the utilities have been directed to carry out energy audit through DTR metering.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** Distribution Transformers metering has been taken up in phases in MSEDCL. Out of 2,56,798 Distribution Transformers in service, metering has been provided for 1,18,821 Transformers Evaluation of DTC metering per say is used to undertake steps such as replacement of faulty meters, drive for detection of theft of electricity or unauthorized extension of load which has a positive impact on loss reduction. Similarly DTC Metering Phase-III plan is under the process of launching. Financial tie up and MERC's approval has been obtained. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: Since DT meters are electronic meters whose accuracy does not change with time, the need for calibration / evaluation is not considered necessary. **The Tata Power Company Ltd.-Distribution (TPC-D)**: Check meters have been installed on the distribution transformers and evaluation is carried out by carrying out energy audit on monthly basis. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** No **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Not so far
15.	MSERC	
16.	OERC	**NESCO:-** Steps have been taken to procure metering arrangement materials for distribution transformer metering. **WESCO:-** Out of 16,101 DTR 12558 are metered. The 100% metering has not been done due to scarcity of fund. **SOUTHCO:-** No.
17.	PSERC	For energy audit purpose 13288 nos. meters have been installed on distribution transformers.
18.	RERC	NIL
19.	TNERC	Evaluation of distribution transformers metering is yet to be taken up.
20.	TERC	DT metering in the State is in progress. The licensee is yet to evaluate the said metering.
21.	UERC	There are 34219 nos. of DTs with the utility out of which 13895 nos. are metered (as shown in enclosed statement). However, these meters are not being read and thus not being utilized. Some samples of DTs have been taken for energy audit purposes and corrective action has been taken up by the utility.
22.	UPERC	A lot is to be done on DTF metering in UP. There are nearly 4 lakh distribution transformers in the State, of which approximately 20% are in urban, and rest in rural with much more is being added on account of rural electrification.

		UPPCL has already installed meters on some 10,000 DTF's, and is in process of installing meters on 47,000 more with low power radio. The evaluation would be meaningful only when energy audit is achieved. In the existing urban segment, the consumers are neither indexed to the feeders nor the DTF's. Their records are maintained area wise in meter reading books. Data has been asked from the discoms. **Noida Power Company Limited:** Out of 2800 Distribution Transformers, 100 Distribution Transformers have been metered. By the financial year 2008-09 another 150 Transformers will be metered
23.	WBERC	**WBSEDCL :** Distribution Transformer metering project is in progress. 33.16% Distribution Transformers has been metered as on 30.09.2008 **DPSC Ltd.:** Since there are no distribution transformers, question does not arise. **CESC Ltd.:** CESC has installed meters on a no. of distribution transformers for the purpose of energy audit. Meter reading/monitoring is done at a remote place through GSM (Global System for Mobile) communication. A number of loss prone areas, thereby have been identified and authorities kept apprised. **DPL :** Distribution Transformer metering is yet to be implemented at DPL.

Q**14. Cost-effective methods or ways used by the Distribution utilities in the State for metering supply of electricity to agriculture consumers, in cases where supply to agriculture consumers is largely un.-metered.**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	The Commission in its Tariff Order has asked the Board to provide meters to all consumers including agriculture consumers.
4.	CSERC	In accordance with the directions of the State Commission, efforts are being made by CSEB for cent percent metering of agriculture consumers in a cost effective. So far 66% of agriculture connections have already been provided with meters.
5.	DERC	
6.	GERC	**UGVCL** Remote metering is only way for metering supply of electricity to Agriculture consumers. **PGVCL** At present we endeavor to install meters at Distribution Transformer level, so that near to correct assessment for agricultural category consumer can be carried out. **MGVCL** It is felt that most cost effective method for assessment of Agricultural Consumption is to provide suitable energy meters on each of Agriculture Distribution Transformers. The number of Agricultural Consumers connected on respective Agricultural Distribution Transformer being limited numbers, it would be rather more realistic and easy to compare the total actual consumption of respective Agricultural consumers with that of energy recorded in meter provided on Agricultural Distribution Transformers. Further the total of all energy dispatched from Agricultural Distribution Transformers can be very well compared with the energy recorded in panel meter installed on 11 KV feeders at S/s end. He above exercise more or less provides actual assessment of average agricultural consumption, Transformer wise and Feeder wise. **DGVCL** The energy accounting is being carried out by installing meter on DTC of Agriculture feeders where vide difference of energy metered at panel meter and energy consumed with respect to connected load of feeder. **TPL** TPL reported that they have very limited agricultural consumers and all are metered like other consumers.
7.	HERC	1. Consumers are being provided with MDI meters to avoid load extension. 2. All new connections are released on metered basis. 3. Load survey of unmetered agriculture consumers through M/s

		HESL is being proposed to be undertaken. 4. If unmetered agriculture consumer approaches for facilities like extension of load, dedicated transformers, shifting of tube well etc. then the facilities are provided subject to installation of meter.
8.	HPERC	Not applicable.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** The efforts to meter the agricultural consumers were met with aggressive protest from the farming community. This trend is still prevailing. In this context, a decision has been taken to meter all the DTCs existing in the Company which also serves the purpose for energy accounting. A plan has been envisaged to meter all the DTCs in urban area by March, 2009 and in Rural area by March, 2010. **Hubli Electricity Supply Company Limited:** In HESCOM at least 2 Nos. of high precision meter have been fixed to predominantly feeding IP-sets DTCs in each O&M Section. These meters are regularly read on 25th of every month. These meters are regularly calibrated by MT wing of HESCOM. The consumption recorded in each DTC meter includes consumption of IP-sets, other loads & LT line losses. The other load consumption (metered) plus 8% of LT line loss will subtracted from the total consumption to arrive the consumption of total No. of IP-sets coming under particular DTC. The average of each IP-set consumption is arrived by dividing the IP-sets consumption in DTC meter by the No. of IP-sets connected to that particular DTC. On this basis the assed consumption of the each O&M Section is calculated. Consolidation of consumption of each O&M Section will gives assessed consumption of IP-sets under each Sub-division / Division / Circle etc. **Chamundeshwari Electricity Supply Corporation Limited:** Action has been taken to meter the unmetered agricultural consumers. As there is protest meters have been provided to distribution transformers having predominantly feeding IP-sets and average consumption is taken and this data is being used for the IP sets in that boundary. There is a proposal to fix energy meters to all distribution transformers feeding in rural areas. **The Hukkeri Rural Electric Co-operative Society Ltd., : --------** **Gulbarga Electricity Supply Company Limited:** There are about 2,45,000 Nos. of IP set consumers in GESCOM and fixing meters to all the installation needs huge investment. As GOK has announced free supply to IP sets, it is made mandatory to fix meters to individual IP sets. However, it is difficult to complete the entire work within the stipulated time frame. Hence it is proposed to fix RAMR meters to all the transformers in GESCOM. At present work is taken up for metering 100% transformers centers in urban areas and 25% transformers in rural areas. Also it is proposed to complete 100% rural transformers metering by March 2010. **Mangalore Electricity Supply Company Ltd.:** The consumption of

		energy is assessed based on the pilot meter consumption recording provided to the predominantly feeding agricultural consumer distribution transformers. This has helped in arriving at higher metered energy in the case of LT4 category and thus reduced T&D loss. This has also been cross checked by a study taken up by KERC.
12.	KSERC	All connections are metered.
13.	MPERC	Hitherto the supply to rural feeders including those which have pre-dominant agricultural loads during the season is being regulated. It is understood that the utilities are now coming up with the plan for separation of agricultural feeders. This would subsequently give a fair picture of agricultural consumption by providing metering on feeders.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** In the area where supply to Agricultural consumers are unmetered, the assessment of electricity consumption by unmetered Agricultural consumer is done by computing sub division wise Index evaluated from the metered Ag. Consumption in that area. As this mechanism to arrive at near real Ag. Consumption reduces the cost of installation of meters for Ag. Consumers, this method is cost effective. This can go hand in hand with DTC Metering in agricultural dominated area, paralleling for assessment of unmetered Ag. Consumption. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: All RInfra consumers are metered. There are negligible number of consumers from agriculture in RInfra agriculture in RInfra area of supply. **The Tata Power Company Ltd.-Distribution (TPC-D)**: Tata Power as Distribution Licensee supply power to the city of Mumbai and as such does not have any agricultural consumers. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** No agricultural consumer is BEST area of supply. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Not applicable.
15.	MSERC	
16.	OERC	**CESU:-** In case of Agricultural Consumers, CESU has metered in 9% of total cases. The bills are raised on load factor basis in other cases. **NESCO:-** The metes earlier used in the industries are reused as the industries are provided with static meters. **WESCO:-** Out of 10502 agriculture consumer 10009 are metered. But practically as the meters are open and installed without any box. It is stolen or broken out in maximum cases. **SOUTHCO:-** In SOUTHCO 5003 nos. of agriculture consumer are in the billing fold as on 31st March, 2008. Out of which 4804 nos. have been metered. SOUTHCO is planning to replace the defective meter by SEMs meter removed from 3-ph consumers due to non

		availability of TOD facilities.
17.	PSERC	In PSEB AP consumers are provided electricity for tube wells on flat rate basis i.e. un-metered supply. The methodology and cost effective methods adopted to assess the realistic consumption of these un-metered AP consumers is on the basis of average consumption per KW as per data of sample study meters which are installed in various operation Divisions. These sample study meters are installed in adequate number which is 5% of the total tube well connections as per agro-climate and hydrological factor. Other local variations are also kept in mind in various areas. The consumption of these sample study meters is aggregated on Divisional basis and average AP factor whole month consumption in agriculture tube wells is calculated in each Division and summed up to assess the total AP consumption for obtaining subsidy, as free power is being given to AP Tube well consumers as per directions of Punjab Government. PSEB is in the process to raise the quantity of sample meters from 5% to 10% of the total tube well connections. The AP factor process is performed each and every month.
18.	RERC	NIL
19.	TNERC	The following methods are adopted:- (a) Metering of Distribution Transformers (b) Computation of agricultural and hut services consumption based on the consumption recorded in 3% of agricultural and hut services where meters have been provided.
20.	TERC	The water pumping system i.e. irrigation system to the Agricultural field is mainly owned by the irrigation Deptt. of the State. These are metered supply and bills are raised as per approved rate of ERC. In case where meter remains non-functional for some time, bills are raised against assessed energy based on recorded running hours of the pumps, capacity of pump, power factor etc. Procurement of 3 phase 4 Wire static energy meter for the above irrigation consumer is under process.
21.	UERC	In the State, 87.49% of agricultural consumers are metered. However, independent / separate feeders are being constructed / provided by the distribution licensee to the agriculture consumers and these will also be provided meters.
22.	UPERC	Data has been asked from the discoms. However DTF metering is being considered. **Noida Power Company Limited:** Agricultural metered consumers are mainly provided supply through dedicated transformers. The transformers capacity is decided based on the motor ratings and supply source is installed as near as possible to the usage point thereby reducing losses & eliminating possibility of potential theft. Such modular arrangement also helps in reducing faults & transformer failures.
23.	WBERC	**WBSEDCL :** STW metering Project is 83% complete upto September, 2008. Metering is being done by erection of one 10 kVA 11/04 KV Distribution Transformer and installation of meter on the Pole for each STW consumer. **DPSC Ltd.:** There are no agricultural consumers of DPSC Ltd. **CESC Ltd.:** Not applicable for CESC **DPL :** Not applicable in DPL

Q**15. Prevalence of TOD metering in the utilities – whether for select consumer categories or on benchmark of connected load.**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	The Commission in Tariff Order of 2008-09 has provided for TOD meter for H.T. consumer. Uptill now no application has been received by BSEB for TOD meter.
4.	CSERC	TOD metering has been done for all HT consumers. Compulsory TOD tariff is applicable to all HT industrial consumers.
5.	DERC	
6.	GERC	**UGVCL** Prevalence of ToD metering:- ToD metering is applicable only for selected consumers categories where consumer is covered under ToD tariff structure (i.e. all HT & W/Works having CD 50 HP & above) **PGVCL** At present all High Tension Consumers (Contracted Demand 100 KVA and above) are provided with a ToD metering facility. However, billing under different time zone is done only for the consumers having contracted/actual demand 500 KVA and above. Under the Water Works Category, above 50 HP Consumers are given certain Discount on utilization of energy during Off Peak Period and night hours i.e. 11.00 Hrs. to 18.00 Hrs. and between 20/00 Hrs. to 06.00 (Next day) Hrs. **MGVCL** The ToD type of metering is existing in case of 3 ph. LT, HT, EHT industrial consumers as all existing Electronic Trivector meters are featured for recording of energy in all time slots as specified. However, since ToD tariff is applicable only in case of HT, EHT consumers, the same is being followed as per GERC tariff order. In view of above, it may therefore be explored to introduce suitable ToD tariff in case of LT industrial consumers sector without bench marking of connected load. **DGVCL** The ToD metering is applicable only for selected consumers categories where the consumer is covered under ToD tariff structure (i.e. HT consumers having CD 500 KVA & above) **TPL** Earlier electronic meters having maximum demand recording facility were available with ToD feature and accordingly, all existing HT & HTMD consumers have the meters with ToD feature. Later on, similar metering facility extended to all high end LT consumers on the basis of consumption. Recently, we have started procuring even single phase meters with ToD feature. However, ToD tariff is prevailing only in HT category.

<table>
<tr><td>7.</td><td>HERC</td><td>TOD meters are being provided to all high end as well as medium supply consumers where HT meter & LT, CT operated meters are installed.</td></tr>
<tr><td>8.</td><td>HPERC</td><td>It is on the benchmark of the connected load.</td></tr>
<tr><td>9.</td><td>JSERC</td><td></td></tr>
<tr><td>10.</td><td>J&KSERC</td><td></td></tr>
<tr><td>11.</td><td>KERC</td><td>Bangalore Electricity Supply Company Limited: As per the Commission's Tariff Orders ToD metering is made optional for selected consumer categories. (LT and HT industrial. HT Water supply/ Sewerage Treatment.

Hubli Electricity Supply Company Limited: As per KERC 2005 tariff order, the ToD tariff is at the option of HT-2 (i) & HT-2 (ii) categories of HT-consumers and LT-5 (a) & (b) of LT-consumers. And those HT-consumers who opt for ToD tariff are not eligible for Rs.3.80. Special Incentive Scheme which is available for HT-consumer only. In the light of the above order only (i) 14 Nos. of HT-consumers & _____ Nos. of LT-consumers have availed TOD Tariff in HESCOM.

Chamundeshwari Electricity Supply Corporation Limited:
ToD metering in CESC, Mysore is not yet implemented.

The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri :
_____

Gulbarga Electricity Supply Company Limited: At present TOD metering is optional and only consumers opting for same are being given this facility. All the HT & LT consumers (above 40HP and below) are encouraged to opt for TOD metering by enlighten them about the benefits of TOD metering.

<u>Mangalore Electricity Supply Company Ltd.:</u> It is placed on selected consumers and TOD meter facility are extended on request to HT industrial and HT water supply & LT industrial intallations</td></tr>
<tr><td>12.</td><td>KSERC</td><td>All connections at HT and EHT are provided with TOD meters.</td></tr>
<tr><td>13.</td><td>MPERC</td><td>MPERC has introduced Time of Day (ToD) surcharge/rebate applicable for different periods of the day i.e. normal period, peak load and off-peak load period. The surcharge/rebate on energy charges according to the period of consumption shall be as given below:-
<table>
<tr><th>S. No.</th><th>Peak/Off-Peak period</th><th>Surcharge / Rebate on energy charges on energy consumed during the corresponding period</th></tr>
<tr><td>1</td><td>Evening peak load period (6PM to 10PM)</td><td>15% of normal rate of energy charge as surcharge</td></tr>
<tr><td>2</td><td>Off peak load period (10PM to 6PM next day)</td><td>7.5% of normal rate of energy charge as surcharge</td></tr>
</table>
(Note: Fixed charges shall always be billed at normal rates i.e. ToD surcharge/rebate shall not be applied on fixed charges).</td></tr>
</table>

		The Time of Day surcharge/rebate is applicable to all high voltage categories of the consumers except railway traction and bulk residential users.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** As per prevailing provisions of tariff, TOD tariff is applicable to few select consumer categories only. In view of this provision, MSEDCL has provided TOD meters to the consumers belonging to the said select categories. However, there is no restriction or benchmark of connected load. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: TOD metering has been carried out for LT commercial and industrial consumers with sanctioned load of >20 KW and HT consumers. **The Tata Power Company Ltd.-Distribution (TPC-D)**: Tata Power has provided TOD meters for all consumers above load 20 KW as per the directives specified in the Tariff Orders issued by MERC. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Installation of TOD meters as per MERC's Tariff Order is ensured by BEST. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Presently TOD metering is completed for HT consumers, TOD metering is in process for LT consumers.
15.	MSERC	
16.	OERC	Three phase consumers with static meters are allowed to avail TOD Tariff excluding Public Lighting @ 10 paise/unit for energy consumed during off peak hours. Drawl by the industries during off-peak hours upto 120% of Contract Demand without levy of any penalty has been allowed. The "Peak Hours" is defined as 6.00 AM to 10.00 AM and 6.00 PM to 10.00 PM and "Off-Peak Hours" for the purpose of tariff is defined as from 10.00 PM to 6.00 AM of the next day. **CESU:-** CESU has TOD maters in 14,000 consumer premises. All EHT, HT & Some LT high value commercial consumers are having TOD meters. **NESCO:-** All the HT consumers have been provided with TOD meters. **WESCO:-** Basically TOD meter is for 3-phase Consumers having 5 kw and above load excluding street light and traction. **SOUTHCO:-** SOUTHCO has used 909 nos. of TOD meter in the consumer premises as against 13669 no of three phase consumers who are entitled to get TOD benefits as per tariff order.
17.	PSERC	PSEB being a power deficit State as such TOD metering has not been introduced.
18.	RERC	TOD billing not done by utilities. The Commission has directed the Discoms to send proposal of TOD at the time of next tariff petition.

<table>
<tr><td>19.</td><td>TNERC</td><td>At present TOD metering has been installed in all HT services.</td></tr>
<tr><td>20.</td><td>TERC</td><td>All consumers under category Industrial, Tea / Coffee / Rubber garden, Bulk supply, Water works & Irrigation would have the option of taking benefit of TOD tariff.</td></tr>
<tr><td>21.</td><td>UERC</td><td>The commission had introduced ToD metering for all HT industry consumers (above 100BHP) with time of day meters from the date of installation of ToD meters or by 1st January 2004 whichever is earlier.
Subsequently, the Commission extended this to be the following category of consumers w.e.f. 01.09.2005:-
i) All Non-domestic consumers under sub-category “Hospitals/Education/Charitable Institutuions” with connected loads above 4 KW or with 3-phase supply.
ii) All other non-domestic consumers above 25 kW, and
iii) All LT industrial consumers above 25 kW.
However, The Commission in its tariff Order dated 18.03.2008 has done away with the ToD tariff for Non-Domestic category.</td></tr>
<tr><td>22.</td><td>UPERC</td><td>No new connection of 25 kW & above loads for Light, Fan & Power and 25 BHP & above for Motive Power Loads shall be given without installation of demand recording Static Tri-vector Meter (TVM) or TOD meters as may be appropriate. Licensee shall ensure installation of Tri-vector Meter (TVM) or TOD meters as may be appropriate on all existing consumers with load above 25 kW/25 BHP as the case may be.

<u>Noida Power Company Limited:</u> TOD metering is provided for all consumers covered under TOD tariff structure of UPERC tariff order. All Consumers covered under remote metering as explained (3) are having TOD metering.</td></tr>
<tr><td>23.</td><td>WBERC</td><td>WBSEDCL :
A. For L&MV consumer (i.e. connected load up to 50 HP)

<table>
<tr><th>Category of consumer</th><th>TOD metering</th></tr>
<tr><td>Metered Agriculture</td><td>Compulsory</td></tr>
<tr><td>Commercial, LT Public Water works & industrial having minimum contract demand of 30 kVA</td><td>Optional</td></tr>
</table>

B. For HV consumer (i.e. connected load 50 kVA and above)

<table>
<tr><th>Category of consumer</th><th>TOD metering</th></tr>
<tr><td>Industrial consumer</td><td>Compulsory</td></tr>
<tr><td>Short term supply for irrigation, commercial, plantation, emergency supply, Construction supply, Common Service for industrial Estate</td><td>Compulsory</td></tr>
<tr><td>Domestic, Commercial, Cold Storage, Pubic Utility, Public Water Works</td><td>Optional</td></tr>
</table>

DPSC Ltd.: TOD metering is offered as an option or is compulsory for some categories of consumers, as directed by the Regulatory Commission from time to time.</td></tr>
</table>

		CESC Ltd.: CESC has installed TOD meters for almost all high-value consumers. The West Bengal Electricity Regulatory Commission has set TOD tariff for various categories of consumers including LT Commercial, LT Industrial and LT Public Water Works having minimum load of 30 kVA. TOD meters are available for the entitled consumers whenever they opt for TOD tariff. CESC is also conducting sustained campaign among the target group of consumers to opt for TOD tariff, as per directions of the West Bengal Electricity Regulatory Commission. **DPL :** DPL can provide TOD facility to all consumers as per direction of WBERC

Q**16. Practice of pre-paid metering launched by the utilities in the State, if any. If so, the benefits derived by the utilities of such a measure.**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	The Commission in Tariff Order of 2008-09 has directed BSEB to develop scheme for introduction of prepaid meter and initiate pilot scheme but BSEB is yet to introduce the prepaid metering.
4.	CSERC	Practice of adopting of prepaid metering is under consideration of the Board.
5.	DERC	
6.	GERC	**UGVCL** The practice of prepaid metering has been launched in some urban area of Adalaj Sub Division purely on trial basis. Total 248 numbers of single phase meters are provided and as such no complaints received from consumers so far. Also, it is assumed that by introducing this system consumer may use energy on economy base as well as the company is getting revenue in advance & litigations of arrears will be reduced up to some extent. **PGVCL** Presently very few say 250 nos. of Single Phase Consumers are provided with the pre-paid meter facility. With such a low nos., benefits are very difficult to quantify. **MGVCL** MGVCL had introduced pre-paid metering as a pilot project last year and accordingly 300 nos. of prepaid meters had been procured. The meters are installed in the city area of Baroda/ Umreth town. As a matter of fact, in absence of any specific incentivized tariff, the concept of prepaid meters could not be motivated till now. Pre-paid meters has many discrete advantages, some of which are elimination of manual intervention, ease for consumers to monitor consumption and credit, ease for consumers to avoid all hazels to verify payment of bills every month, no disconnection drive or recovery drive, saving monthly billing and administrative expenses etc. **DGVCL** The practice of pre-paid metering has been launched in some urban area of Kapodra Sub Division of Surat. Around 1000 nos. of single phase meters are provided and as such no complaints received from consumers so far. Also, it is assumed that by introducing this system, the consumer may use energy on economy base as well as the Company may get revenue in advance & litigations of arrears will be reduced up to some extent. This practice has been started recently and the results are being observed. **TPL** Prepaid metering is not in existence.

7.	HERC	Launching of prepaid metering for certain category of consumers is under active consideration.
8.	HPERC	The board has recently completed a pilot project on the prepaid metering and at present the number of consumers who have opted for prepaid metering are quite less, and as such no comments can be made.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** Prepaid metering to temporary installations is taken up on a pilot basis n Bangalore city area. As on today, there are 43 Nos. of temporary installations with prepaid meters. Some difficulties are encountered in process of currency renewal of temporary installations for which consumers / contractors have expressed certain reservations. Efforts are being initiated to solve the problem. M/s Reliance Communications who have opted for prepaid metering, have been provided with prepaid meters to their installations with a sanctioned load of 120 watts under LT 3 in Bangalore city. There are 60 such installations. **Hubli Electricity Supply Company Limited:** HESCOM has not launched prepaid meter activity. **Chamundeshwari Electricity Supply Corporation Limited:** Pre-paid meters have not been launched in CESC, Mysore jurisdiction. **The Hukkeri Rural Electric Co-operative Society Ltd., Hukkeri :** _____ **Gulbarga Electricity Supply Company Limited:** At present no proposal is being considered for prepaid metering in GESCOM. **Mangalore Electricity Supply Company Ltd.:** 25 nos. of prepaid meters in Mangalore town is installed for study purpose.
12.	KSERC	Pre paid meters are used by distribution licensees such as KINFRA & CSEZ, Kochi.
13.	MPERC	So far no pre-paid metering systems have been installed.
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** So far, MSEDCL has not launched pre-paid metering for any of the consumers and therefore no comments are offered on this issue. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: No prepaid metering carried out in RInfra network. **The Tata Power Company Ltd.-Distribution (TPC-D)**: Tata Power has not yet launched and prepaid metering facility for the consumers. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Pre-paid meters are installed only for consumers for

		construction activity with single slab tariff and for temporary supply. The quantity being small cost benefits cannot be quantified and neither would be appropriated. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** No.
15.	MSERC	
16.	OERC	The Commission has allowed the practice of introduction and adoption of pre-paid meters in its OERC Distribution (Conditions of Supply) Code, 2004. **CESU:-** CESU has not started pre-paid metering system yet. However process has been initiated to adopt this system in next FY. **NESCO:-** No. **WESCO:-** Widespread campaign made by Discom by way of advertising in local Newspaper, Pamphlets, and though web-site. **SOUTHCO:-** Till now SOUTHCO has not used the pre-paid meters. SOUTHCO has planned to use prepaid meters to Govt. Consumers.
17.	PSERC	An expression of interest (EOI) has been floated for inviting interested parties to take up Pilot Project of 200 to 500 consumers for prepaid metering. The proposals are awaited from the interested parties.
18.	RERC	Not yet done. The Commission has asked the Discoms to send proposals for promoting pre-paid metering at the time of next tariff petition.
19.	TNERC	NIL.
20.	TERC	No Pre-paid metering is launched by the Utility
21.	UERC	At present, there is no prepaid metering in any area, though the licensee is considering such proposals.
22.	UPERC	Commission had issued directions to the licensee to introduce pre-paid meters on all government connections with loads below 45 kW and need to develop the necessary infrastructure and introduce the pre-paid meters within a time frame of 6 months from the date of issue of Tariff Order (2008-09), and to submit a bi-monthly progress report in this regard. Licensees have been asked to submit information. **Noida Power Company Limited:** A total of 10 meters have been installed on a trial basis. On the successful performance, it will be extended further.
23.	WBERC	**WBSEDCL :** Pre-paid metering system to M&LV domestic and commercial consumers has been introduced in the year 2006-07, so far 1942 nos. prepaid connections have been effected upto 30.09.2008 in Salt Lake and New Town area. In the prepaid metering system revenue towards energy consumption is being collected in advance and it is more cost effective as there is no regular work for meter reading, billing etc. **DPSC Ltd.:** DPSC Ltd. has not introduced pre-paid metering as yet., since none of the specified categories of consumers opted for the same. **CESC Ltd.:** CESC has already procured pre-paid meters and

		necessary modifications are being carried out in the software of the meter for adhering to the tariff order of the West Bengal Electricity Regulatory Commission. **DPL :** DPL has already procured Single phase & 3-Phase Pre-paid Meters for implementation of direction on WBERC at City Centre area. No connection has been implemented so far. Such facility will be spread over total licensed area in phases.

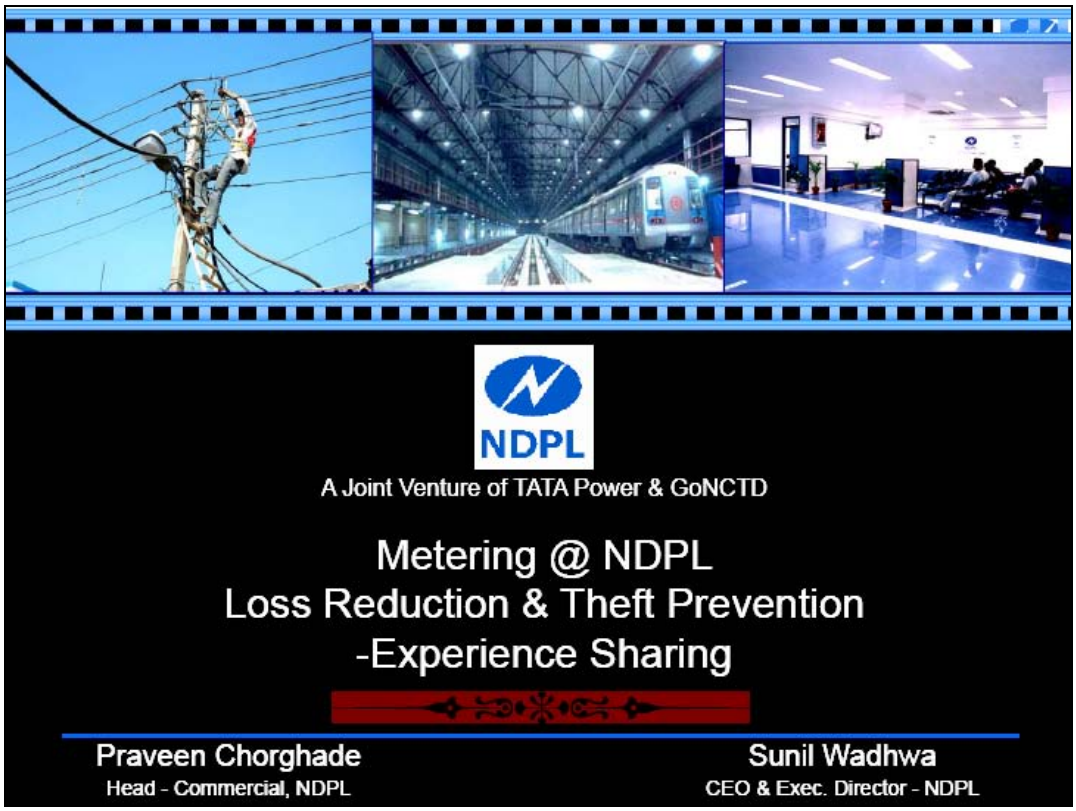
Q**17. Campaign if any launched by utilities to create awareness among consumers in the State on usefulness of metered supply and measures initiated for consumer confidence building.**

S. No.	SERC	Reply
1.	APERC	
2.	AERC	
3.	BERC	Till date no campaign has been launched by BSEB.
4.	CSERC	The Commission as well as Board has been organizing campaigns to create awareness amongst the consumers on usefulness of metered supply and measures initiated for consumer's confidence building. The Commission had given this job to an NGO to campaign in two districts of the State. The Board has been holding camps in the towns and villages for consumer education.
5.	DERC	
6.	GERC	**UGVCL :** During the various meeting with farmers senior officers of UGVCL provide guidance on such issue. At field level also during the Krushi Rath programme this issue is discussed in length with farmers. During the Energy conservation week our Agriculture officers give presentation on usefulness of metered supply over HP based supply over HP based supply with statistical data. Further company has made all efforts to convince the farmer to adopt drip irrigation as a part of energy conservation. Permanent disconnected Ag. Consumer is compulsorily allowed to reconnect his connection only with the micro irrigation system and compulsorily to bill as per metered tariff. **PGVCL:** No such campaign is launched. **MGVCL:** MGVCL has launched various effective programmes viz. Jan Sampark, MEGA and other personal contact with villagers so as to create awareness among consumers to opt more and more of metering tariff. During such programmes, the consumers are elucidated the importance of energy accounting and saving of electricity which are possible only through effective metering. The consumers are also made aware of the fact of consequences arise out of tampering and feedling with meters and metering circuit in line with provisions of Electricity Act, 2003. The line staff straining is also conducted regularly during which they are trained to create awareness and fearless approach for metering among group of consumers belonging to rural areas. **DGVCL:** During the various meetings with farmers, our senior officers provide guidance on such issue. Company is making all efforts to convince the farmer to adopt metered supply. **TPL:** TPL have 100% metered connections in their system. However, campaigns are launched for awareness and benefits of safe and legal electric connections in slum areas. Easy registration and payment options with installment facility are also given for release of legal connections in slum areas.

7.	HERC	A plan is proposed to be launched to educate the long standing flat rate consumers of agriculture un-metered category to use efficient pump-sets and convert to metered category.
8.	HPERC	The board has launched the campaign on the prepaid metering and conservation of energy by distributing 4 nos. CFLs to each domestic Consumer free of cost in order to boost the conservation of energy.
9.	JSERC	
10.	J&KSERC	
11.	KERC	**Bangalore Electricity Supply Company Limited:** Campaign to create awareness among consumers on usefulness of metered supply and measures initiated for consumer confidence building shall be taken up in BESCOM in the days to come. **Hubli Electricity Supply Company Limited:** HESCOM is giving full awareness to consumers on usefulness of metered supply through Grahakar Kaipidi etc. **Chamundeshwari Electricity Supply Corporation Limited:** During Jana Samparka Sabhas, in Hobli and Taluk level the staff are creating awareness in Consumers regarding metering of all installations and the usefulness of providing energy meters and hence gaining Consumer confidence. **The Hukkeri Rural Electric Co-operative Society Ltd.: --------** **Gulbarga Electricity Supply Company Limited:** During monthly JANASAMPARKA SABHA'S arranged in taluka headquarter and Hobli's GESCOM officials are enlightening consumers about benefits of metering such as how metered data helps in load forecasting, system strengthening and reducing system losses etc. **Mangalore Electricity Supply Company Ltd.:** The usefulness of metered supply to consumers is made aware in the janaspandana sabhas held regularly.
12.	KSERC	All connections are metered.
13.	MPERC	There have been a number of attempts made by the utilities and the Commission to create awareness amongst the consumers of the State on usefulness of metered supply. Measures like visit to field areas and meeting various consumer groups has been taken up by the Commission. In addition, the NGOs have also been involved by arranging Workshop with them
14.	MERC	**Maharashtra State Electricity Distribution Company Ltd. (MSEDCL):** As submitted hereinabove, only 14,57,521 agricultural consumers (as on December 1, 2008) in the State are un-metered and these consumers are also provided meter in phased manner. In view of this, so far MSEDCL has not launched any campaign. **Reliance Infrastructure Ltd.-Distribution (RInfra-D)**: As directed by MERC the consumer right statement has been published in various newspapers every quarter. Energy conservation messages are also printed on the electricity bills for consumer awareness.

		The Tata Power Company Ltd.-Distribution (TPC-D): Tata Power has enforced 100% metering for all its consumer categories. The consumer base of Tata Power is urban and it is found through consumer meets that they are well aware of the usefulness of metered supply. **Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST):** Since 100% metering, it is not applicable. **Mula-Pravara Electric Co. Op. Soc. Ltd. (MPECS):** Campaign in progress.
15.	MSERC	
16.	OERC	The Commission has been making periodical awareness campaign through newspaper publication and Radio/TV. **CESU:-** CESU is creating awareness among consumers in the State on usefulness of meter supply by circulating leaflets among consumers & periodic advertisement through press. **NESCO:-** Advertisements are being done through electronic media and posters to create awareness among the consumers. **SOUTHCO:-** Yes SOUTHCO has taken following steps for awareness among consumer on usefulness of metered supply: ➢ Through loud speaker announcement ➢ Distribution of FAQ book let ➢ In consumer meets awareness programme ➢ Through Poster/Banner ➢ Paper advertisement ➢ Electric Media
17.	PSERC	In PSEB all categories of consumers except AP are 100% metered.
18.	RERC	NIL
19.	TNERC	So far no programme has been launched.
20.	TERC	To create awareness among consumers in the state, the message is being given in the administrative camp through out the state organized by Govt. Apart from this, TSECL launched its own website from where consumer can get all service & supply related information as per regulation of ERC.
21.	UERC	Till now no such campaign has been launched by the licensee.
22.	UPERC	To incentivize honest consumers, it has been provided that if a consumer gives his consent to the licensee for metering installation of a check meter outside their premises on electricity pole or otherwise in a separate or collective meter housing created for the purpose, from which supply is extended to them, shall be provided a discount of 5% on energy charge applicable to them provided the variation in the reading of the consumer meter and the check meter is less than 2%. **Noida Power Company Limited:** The company is engaged into many social activities viz session in schools, mobile schools, village community centers etc. to spread message of energy saving by the consumer.
23.	WBERC	**WBSEDCL :** Unmetered consumers mostly STW, Lokdeep/ Kutirjyoti. As on 30.09.2008 STW consumers metered 83% and Lokdeep / Kutirjyoti consumers metered 75.08%.

		DPSC Ltd.: Since all consumers are metered from the date of connection, consumers are aware regarding utility of metered supply. **CESC Ltd.:** CESC has provided 100% metering for all categories of consumers except a very small section of municipal in proportion), where existing agreements stand in the way of providing metered supplies. CESC has taken up the issues with the authorities in various forums. After prolonged negotiations and persuasion, CESC Ltd. was able to carry out Joint inspection for pilot project for providing metered street lighting supplies with remote meter reading facilities and overload protection in different locations. **DPL :** DPL arranged for an awareness camp at local 'Mela' displaying all type of meters regarding usefulness of their use.

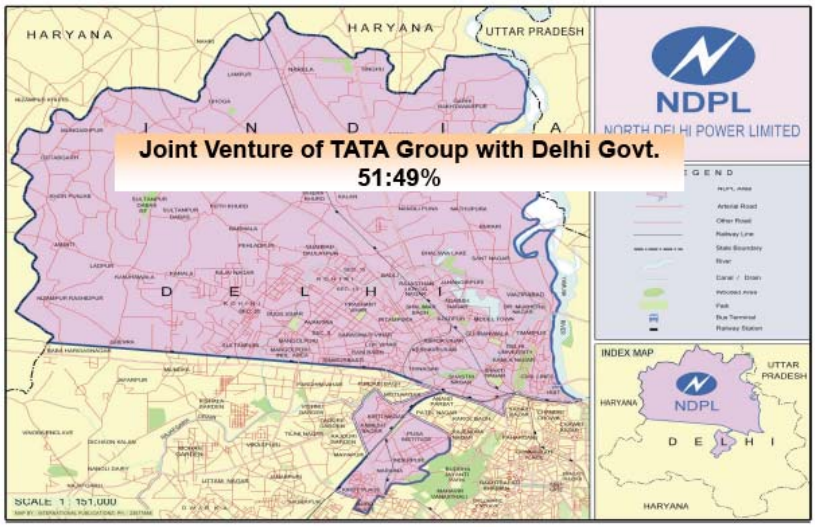


Structure of Presentation

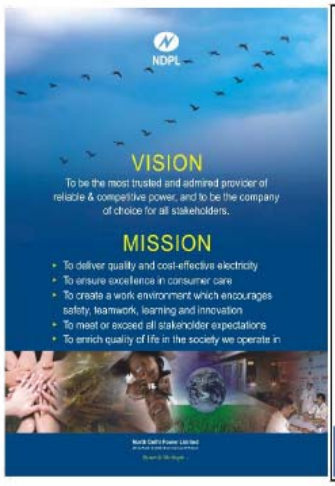
NDPL

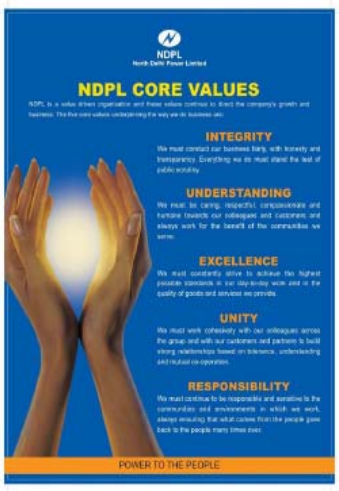
- **Overview-NDPL profile**
- **Metering : Backdrop & Enabling Framework**
- **Metering Technologies in NDPL**
  - Electronic Meters
  - Automated Meter Reading & Communication Technologies
  - Typical issues
- **Applications of Metering in AT&C Loss Management**
- **Theft Prevention**
  - Typical Examples & Issues
- **Results- NDPL Experience**

NDPL- Supply Area

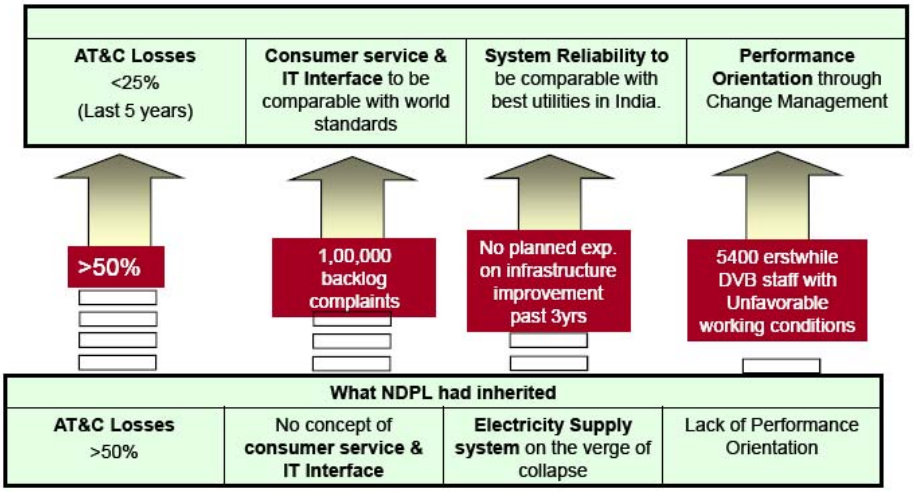


NDPL- The Company





Strategic Roadmap



NDPL Profile

Turnover (FY 2007-08)	**USD 600 Mn** *(Rs 2052 Cr)* *(enhanced from USD 275 Mn in FY 03)*
Peak Load	**1100 MW**
Annual energy requirement (FY 2007-08)	**6273.14 Mn. Units**
Total registered consumers *(0.743 Mn on T/o)*	**0.91 Mn. (Actual estimated 1 Mn.) (10 lacs)**
Number of employees	**3800 (5600 in July 2002)**
Area	**510 Sq Kms**
Population serviced in Network area (approx)	**4.5 Mn.**
Per Capita Consumption (Units)	**1394 (National Average of ~500, Mumbai – close to 850)**
Number of consumers per Sq.Kms	**1784 (Only Registered)**
Employees per `000 consumers	**3.7**
Employees per Mn. Unit input	**0.6**

Consumer Profile - Salient Aspects

Consumer Category	No.	% Total	Month Mu's	% Mus
Xpress >500 kW	180	0.02	44.7	12.3
KCG >100kW	1610	0.16	41.2	11.3
G&I	6477	0.64	10.3	2.8
HRB >10KW	26261	2.59	105.9	29.1
HCB < 10kW	112405	96.60	161.5	44.1
Total	1013023	100	360.6	100

96% of the consumers in domestic category consume 44% of MUs

< 1% of consumers in non-domestic category consume 24% of MUs

Network- Salient Aspects

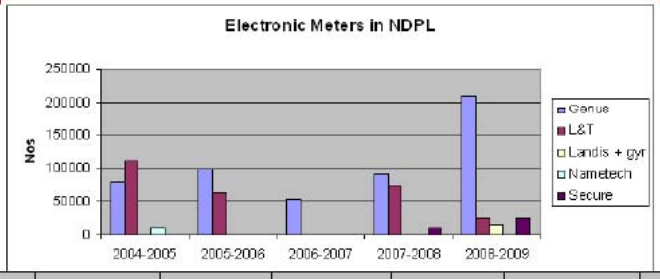
Particulars	Level	Unit	On takeover Jul 2002	2009	% Change
Transformation Capacity	66 kV	MVA	860	1475	71
	33 kV	MVA	791	1413	77
	11 kV	MVA	1703	3430	101
Total		**MVA**	**3354**	**6318**	**88**
Transmission Lines	66 kV	km	176	293	66
	33 kV	km	156	283	81
	11 kV	km	2245	3475	55
Total		**km**	**2578**	**4051**	**57**

NDPL has met highest ever demand of 1140 MW / 23.15 Mus on 050908.

Every year witnesses a new peak

8

Metering in NDPL- Salient Aspects



Make	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	Total
Genus	80000	100000	53950	92000	210000	535950
L&T	110000	65000	0	75000	25000	275000
Landis+gyr	0	0	0	0	15000	15000
Nametech	10000	0	0	0	0	10000
Secure	0	0	0	10000	25000	35000
Total	200000	165000	53950	177000	275000	870950

Structure of Presentation

- **Overview-NDPL profile**
- **Metering : Backdrop & Enabling Framework**
- **Metering Technologies in NDPL**
  - Electronic Meters
  - Automated Meter Reading & Communication Technologies
  - Typical issues
- **Applications of Metering in AT&C Loss Management**
- **Theft Prevention**
  - Typical Examples & Issues
- **Results- NDPL Experience**

Enablers and provisions for Electronic Metering

- **Electricity Act 2003**

  Metering made mandatory: Section-55

  "No Licensee shall supply electricity, after the expiry of 2 years from the appointed date, except through installation of a correct meter in accordance with the regulations to be made in the behalf by the Authority……" ie CEA

- Functions & duties of Authority ….Section 73 (b) & (e)
- Powers to make Regulations .. ..Section 177

  73: Sub Clause(b) - "…specify the technical standard for construction of electrical plant, electric lines and connectivity to the grid"

  73: Sub Clause(e) – "Specify the conditions for installation of meters for transmission and supply of electricity…"

- Offences & penalties

  DAE – section 135

  Interference with Meters or works of licensee – section 138

Enablers and provisions for Electronic Metering

CEA – Regulations

Central Electricity Authority(Installation and Operation of Meters) Regulation, 2006

- Defines Usage- Interface meters, Consumer meters , EA & A Meters
- Provides for Static meters to be mandatory for all applications
- Mandates Changing of non-compliant meters
- Repeals IE Rules-1956 relating to installation and operation of meters
- Defines application of Technical Standards for usage of meters and seals and allows usage of any equivalent IE or International Standards, where BIS is not available
- Defines anti-tamper features for each of the meter application
- Enables adoption of new technologies in Metering, like pre-paid, ToD, AMR etc

Enablers and provisions for Electronic Metering

NDPL

- **State Regulatory Commission- DERC Supply Code**

- Defines Standards of utility performance on metering, billing, consumer protection and applicable tariff
- Provisions on Metering & billing, primarily
- Defines Usage- Consumer category wise
- Provides guidelines for wiring etc..
- Defined periodicity of Testing of Consumer's meters
- Provides guidelines for assessments during deviations and DAE cases

DERC has mandated DISCOMs to meter all consumers including JJ clusters

Enablers and provisions for Electronic Metering

NDPL

- **Standards & Technical Specifications**

Enabling features for utilities to go ahead with Electronic Metering…since 1993

- Primarily governed by

  - IS 13779 A. C. Static Watthour Meters, Class 1 & 2 Specifications 1993….last amendments in June,2006
  - IS 14697 A. C. Static Transformer Operated Static Watthour and VAR meters, Class 0.2 S, 0.5 S, & 1.0 S Specifications
  - IS 15707 Testing Evaluation Installation & maintenance of AC Electricity meters – Code of Practice

Enablers and provisions for Electronic Metering

Suggested Issues for Deliberation

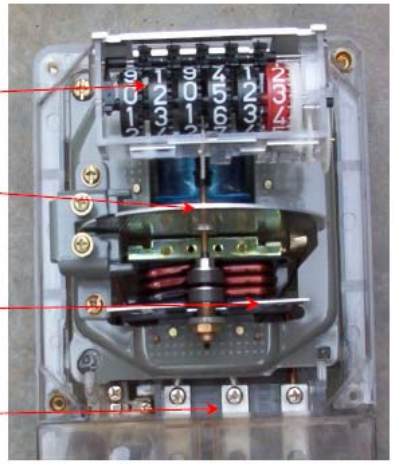
- CBIP report 88….defines spec. including anti-tamper features
- Anti-tamper features in BIS-reference standards
- Periodic Testing of Meters
- Enablers for New Technology applications in metering..
- Open Standards for Meter Communication protocols, DLMS -Device Language for Message Specifications, COSEM- Companion Specification for Energy Metering, IEC 62056
- Courts/Forums look for physical evidences of software tamper, data tamper(missing data), data corruption…etc analogous to software crash
- Meter Reading methods……guidelines /standards

Structure of Presentation

- **Overview-NDPL profile**
- **Metering : Backdrop & Enabling Framework**
- **Metering Technologies in NDPL**
  - **Electronic Meters**
  - **Automated Meter Reading & Communication Technologies**
  - **Typical issues**
- **Applications of Metering in AT&C Loss Management**
- **Theft Prevention**
  - **Typical Examples & Issues**
- **Results- NDPL Experience**

The Electromechanical Meter- Near Extinction

- Simple Classic Engineering text-book Construction
- Comprised moving parts
- Installation required good workmanship practices
- Accuracy levels obtained through various mechanical adjustments
- Accurate meters were costly
- Required regular testing/calibration to maintain accuracy levels
- Prone to tamper through various means.



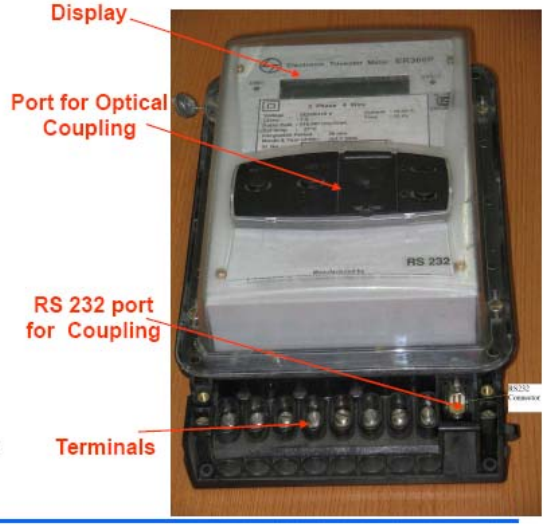
Static / Electronic Meter- The Evolution

- PCB mounted devices for measurement
- Comprises no moving/rotating parts
- Extremely modular designs and compatible to measurements
- Meter not affected by mounting arrangements
- Accuracy levels do not drift and obtained through choice of components and software- Factory set
- Economies of scale reduce costs
- **Tamper proofing requires continuous upgrade**

Supreme Court: Suresh Jindal vs NDPL has directed the installation of electronic meters

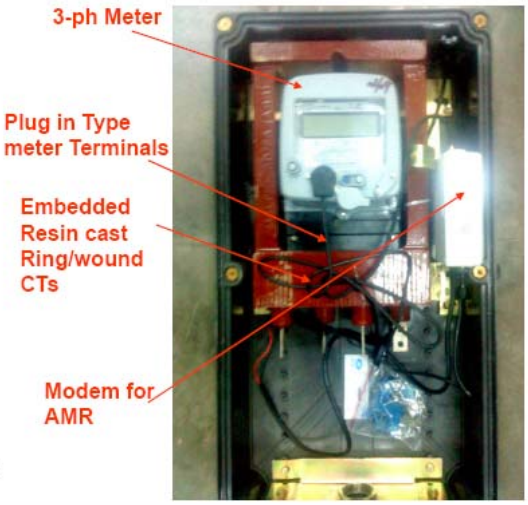
Static / Electronic Meter – The Evolution

- Three-phase electronic meters
- Conform to relevant standards for accuracy
- Multi-parameters displayed including tamper
- Data storage for 60 days for periodical measurements for load survey, tamper analysis and ABT application
- Compatible for communication to enable AMR



The Static / Electronic Meter – Application in NDPL

- Meters enclosed in sealed (polycarbonate) boxes during installation
- 3-phase meters CT meters in sealed boxes along with modems.
- Use of resin-cast CTs with secondary terminals plug-in into meters directly
- Ensure uniform CT .PT ratio,s for an MF=1
- Modem connections also with plug-in power supply
- Only outgoing power terminals accessible once sealed



Group Metering : – Application in NDPL

- Multiple meters in a sealed box
- Variants in 9, 6, and 4 meters to different requirements.
- Suitable for Flats, 2/3-storyed houses
- Suitable for out-door mounting with IP 65 enclosure
- Spring loaded clamping termination for incomer cable and outgoing service cables
- Individual meters & box sealed

Group Metering

Addresses workmanship problems, aesthetics, Tamper Prevention and better sealing

Automated Meter Reading and Communication Technologies

- Use of HHDs (Hand Held Devices) for meter Reading
- K. Nos. of meters & readings stored in HHDs in walking sequence
- Meter reader punches meter readings as read (previous reading not known to reader – avoids manipulation)
- In-built logics & Reading time analysis increase accuracy of meter readings
- Readings transferred into the Reading Repository daily while the HHDs are docked
- Reading thro' Optical Port /RS232 port or SMART Card, "Spot Billing " are scalable applicable technologies

Automated Meter Reading and Communication Technologies (AMR)

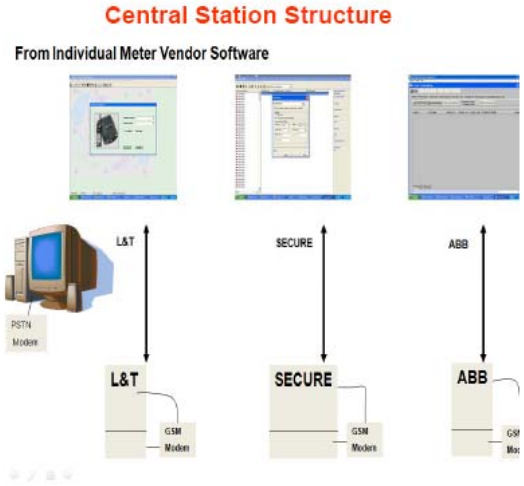
NDPL

- Use of GSM communication for meter data
- Use of CDMA in meter data communication
- Radio Frequency communication- LPR
- Power line carrier communication –PLCC
- Combination of these for "Split metering"

Automated Meter Reading and Communication Technologies

NDPL

- Use of GSM for one way communication for meter data
- Use of Vendor propriety API interfaces
- Common Framework Software with embedded APIs at the Central station
- API data converted to XML using common nomenclature to achieve inter-operabilty
- Remote switching / disconnection can be achieved through GSM

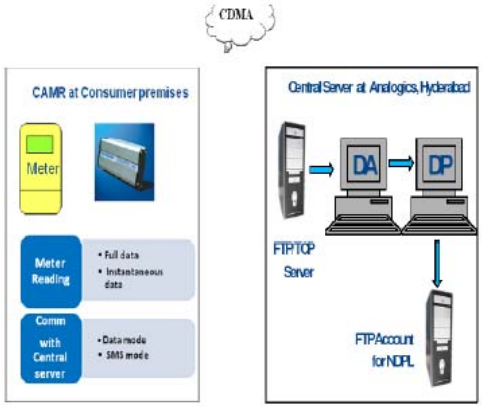


Automated Meter Reading and Communication Technologies

NDPL

- Use of CDMA & IP for two-way communication
- Meter to Modem communication on propriety protocol
- Modem to Central FTP server in TCP/IP protocol. API used at central servers.
- Faster and two-way communication achieved
- Remote switching can be done

CDMA Communication : Architecture

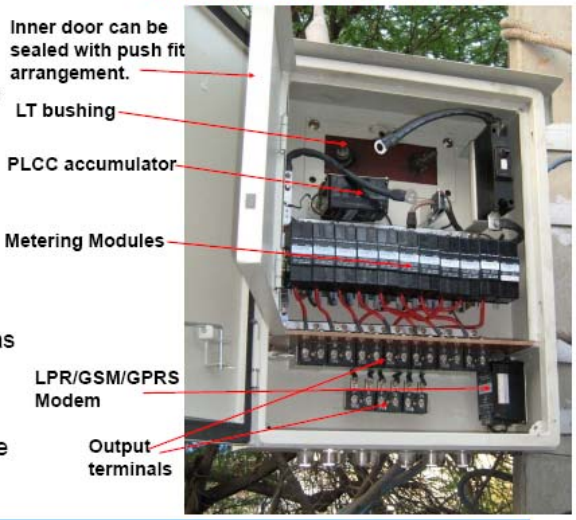


Automated Meter Reading and Communication Technologies

NDPL

- Use of PLCC and LPR communication
- Split Metering – meter on pole end and Display device in Consumer's premises
- Tamper Resistant metering Infrastructure
- Applications in High Loss areas together with HVDS
- Remote switching can be done

Split Metering : Infrastructure



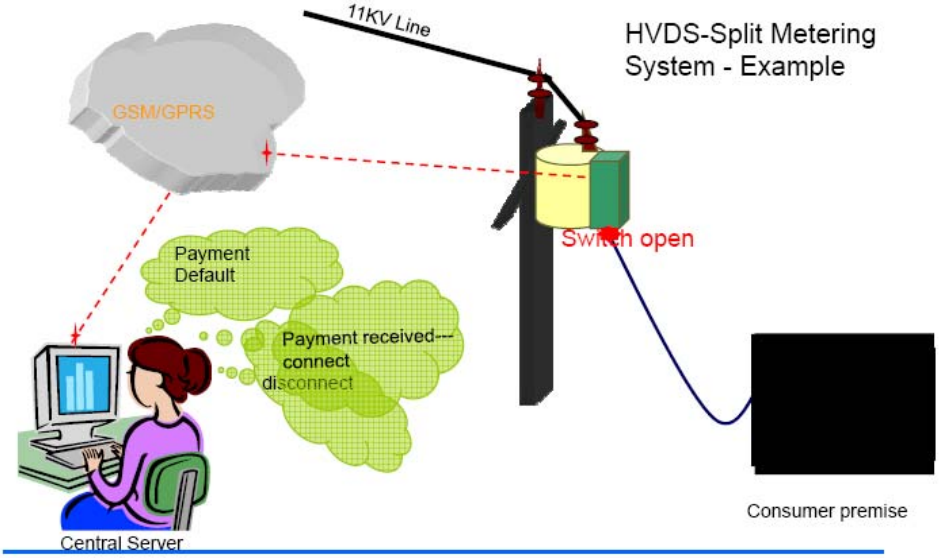
Automated Meter Reading and Communication Technologies

NDPL

- Use of PLCC and LPR communication
- Split Metering – meter on pole end and Display device in Consumer's premises
- Tamper Resistant metering Infrastructure
- Applications in High Loss areas together with HVDS
- Remote switching can be done

Automated Meter Reading and Communication Technologies

NDPL

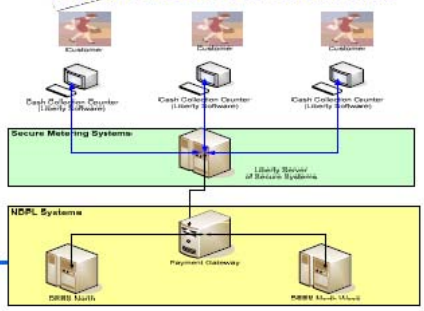


Automated Meter Reading and Communication Technologies

- Prepaid Metering introduced for Govt. & Institutional Connections
- ~ 3000+ Installed in 1-ph& 3-ph metering
- Security Coded Coupon generation and dispensation decentralized.
- ToD usage and tariff programmable
- Switches –Off on zero balance
- Adequate Credit facility programmed
- Limited Anti tamper features
- Propriety IT software for coupon generation, dispensation & billing requires IT integration

Prepaid Meters

Top Level Architecture for Integration between Prepaid and DEBS for coupon generation

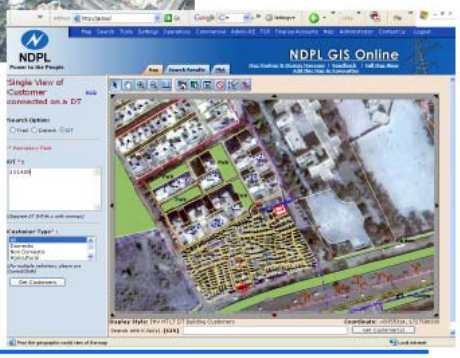


Structure of Presentation

- **Overview-NDPL profile**
- **Metering : Backdrop & Enabling Framework**
- **Metering Technologies in NDPL**
  - Electronic Meters
  - Automated Meter Reading & Communication Technologies
  - Typical issues
- **Applications of Metering in AT&C Loss Management**
- **Theft Prevention**
  - Typical Examples & Issues
- **Results- NDPL Experience**

Applications of Metering in AT&C Loss Management

- Use of GIS Application
- Meter & billing data linked to Consumer Indexing in GIS
- All 400kVA and above DTs metered on the LV side
- All 11kV feeders metered at the breaker panel and at HVDS 'T'-Offs.
- Energy Audit : feeder wise, DT-wise infer loss areas
- Selective LT feeders are remote switched, load-shed followed by Metering Camps to increase the new metered consumers



GIS Application & Energy Audit

Applications of Metering in AT&C Loss Management

- Extensive experimentation on Meter Tamper to enhance meter specifications
- Each New Meter Lot ordered with enhanced spec. on tamper-proofing and type testing for tampers
- This approach has helped NDPL install electronic meters with increased immunity to tamper w.r.t ESDs, Magnetic Influence, DC injections.

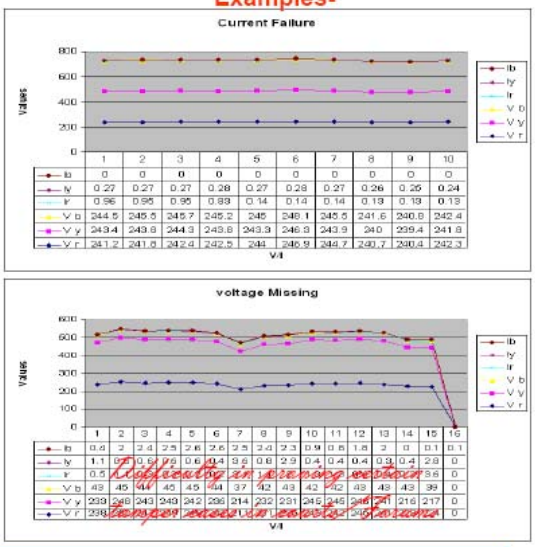
Type Testing Tamper & Improve Tamper Resistance

Video Clip of ESD

Applications of Metering in AT&C Loss Management

- Periodic Meter Data Analysis and Tamper Event Analysis of all AMR meters
- Data analysed for consumption pattern, current failure, voltage failure, Abnormal behaviour of parameters indicating tamper,
- DAE cases analysed through downloaded meter data

Examples-

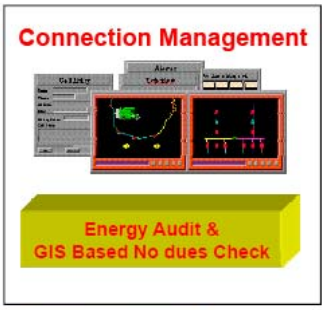


Structure of Presentation

- **Overview- NDPL profile**
- **Metering : Backdrop & Enabling Framework**
- **Metering Technologies in NDPL**
  - Electronic Meters
  - Automated Meter Reading & Communication Technologies
  - Typical issues
- **Applications of Metering in AT&C Loss Management**
- **Theft Prevention**
  - Typical Examples & Issues
- **Results- NDPL Experience**

Loss Detection and Prevention

- Periodic Energy Audit
- Surveillance & Consumption Analysis of Disconnected Cases(DW) and Live Cases
- Detection of Dues on premises using GIS based search
- Instant New Connection Meter Installation within 24 Hrs for Demand –note payment…The last new connection was installed within 3 Hrs of DN payment.



Instant Camp Connection

Loss Detection and Prevention

- Mobile Meter Installation Teams
- Periodic Inspection of Meter Installations & Enforcement Visits to AMR referred tamper suspects.
- Mass raids in Direct Tapping areas from Energy Audit Analysis
- Mobile Teams for Meter Testing & calibration of CT meters and HV installation through primary injection

Loss Detection and Prevention

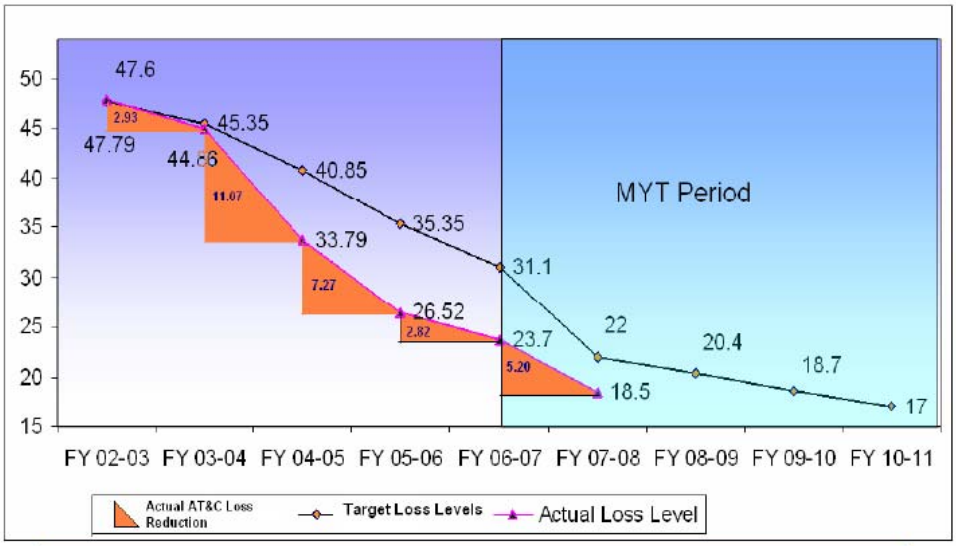
- Dishonest Abstraction of Energy (DAE) resorted to by consumers using new methods
  - External Concealed Shunt
  - External influence of Magnetic Field
  - Electrostatic Discharge using crude HV spark generators
  - High Voltage DC injection
  - Component level changes on the PCB
  - CT/PT circuits tampering
- Enforcement Teams conduct Meter Installation Inspection

Difficulty in proving certain tamper cases in courts/ Forums

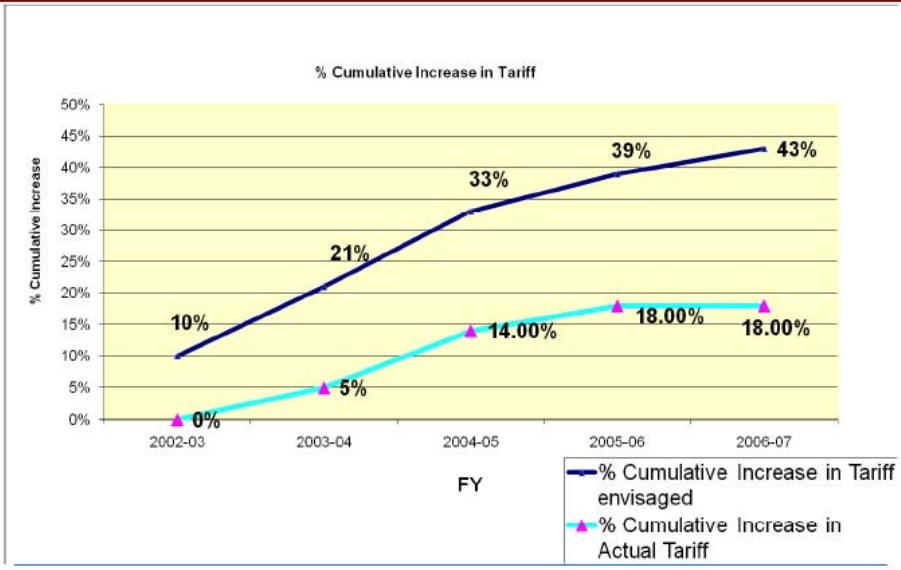
Structure of Presentation

- **Overview- Backdrop & Framework**
- **NDPL profile**
- **Metering Technologies in NDPL**
  - **Electronic Meters**
  - **Automated Meter Reading & Communication Technologies**
  - **Interface metering**
- **Applications of Metering in AT&C Loss Management**
- **Theft Prevention**
  - **Typical Examples & Issues**
- **Results- NDPL Experience**

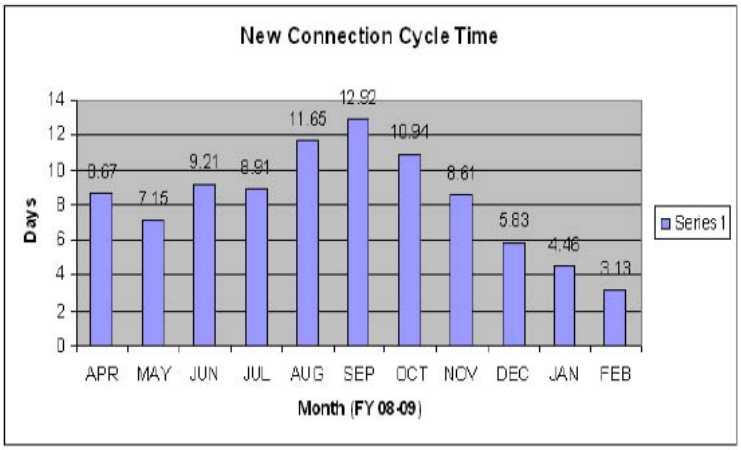
AT&C Loss Reduction



AT&C Loss Reduction- Impact of Tariff

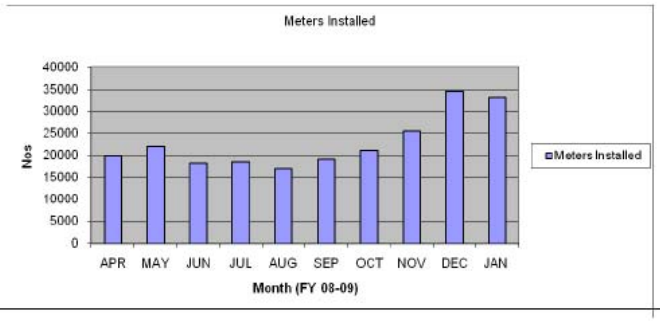


Results – Metering Installations & Cycle time



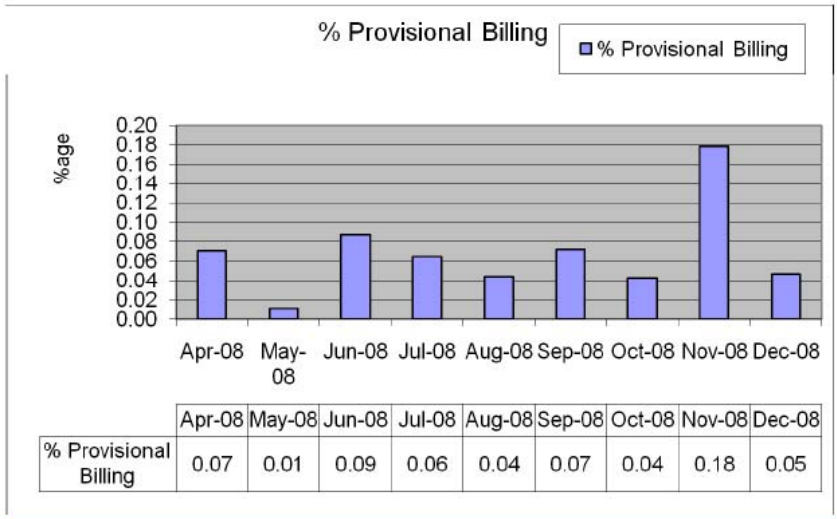
Instant "Tatkal" New Connection Started in Feb-09 : Meter installed on the same day of Request and Demand note paid.

Results – Metering Installations CFY



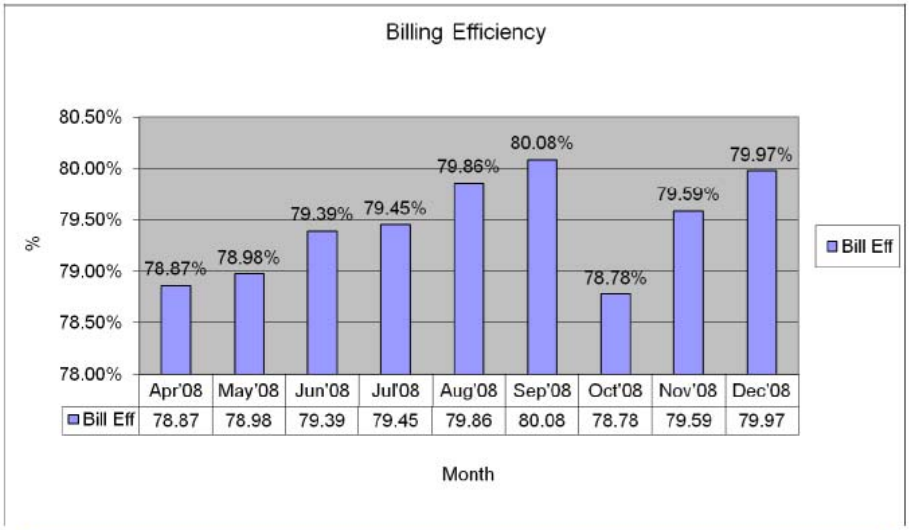
MONTH (FY 08-09)										
APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	Total
19944	22042	18232	18428	16938	19022	21101	25440	34548	32910	228605

Metering:Billing- Provisional Billing



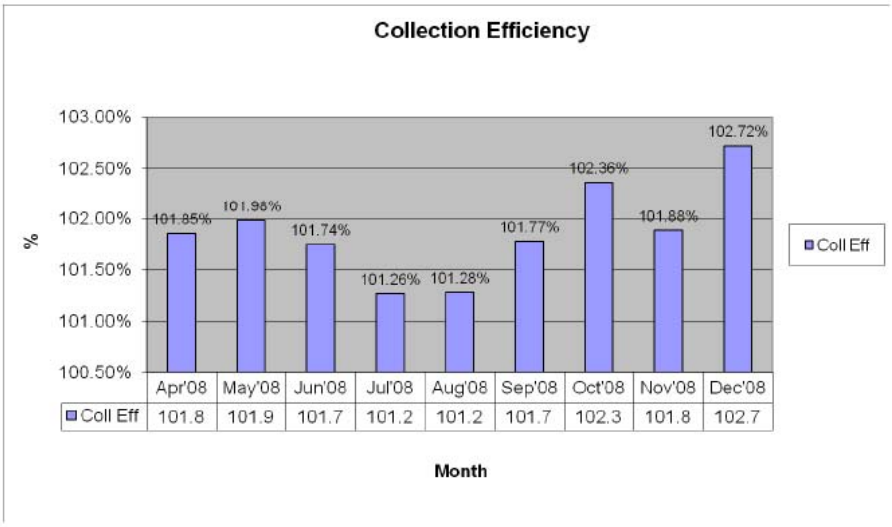
	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08
% Provisional Billing	0.07	0.01	0.09	0.06	0.04	0.07	0.04	0.18	0.05

Results – Billing and Collection Efficiency

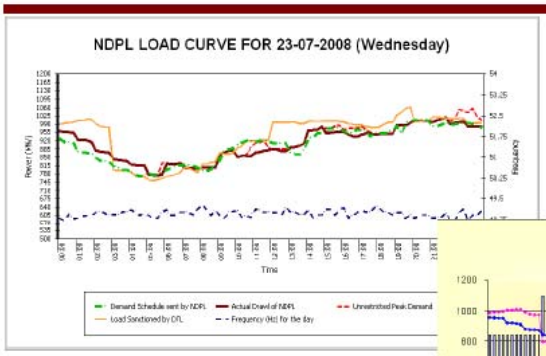


	Apr'08	May'08	Jun'08	Jul'08	Aug'08	Sep'08	Oct'08	Nov'08	Dec'08
Bill Eff	78.87	78.98	79.39	79.45	79.86	80.08	78.78	79.59	79.97

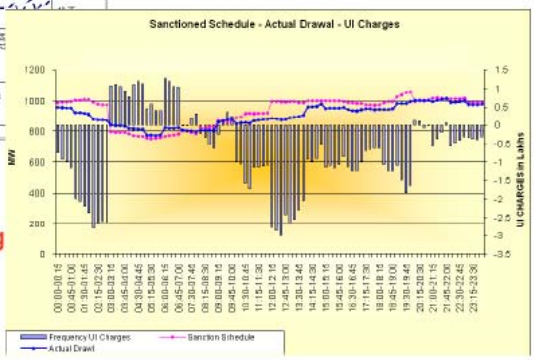
Results – Billing and Collection Efficiency



Interface Metering – ABT Meters



Meter Data
Daily download at 2400 Hrs
- **Load Forecasting**
- **Demand Scheduling**
- **UI and Short term power procurement**

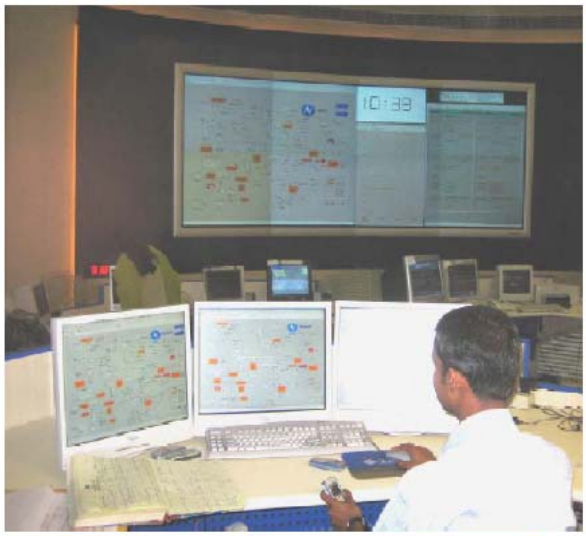


Optimization of Bulk Power Sourcing

Centre for Network Management (CENNET) At Pitampura

NDPL

- Computerized, state-of-the-art, centralized Power System Control -SCADA
- Monitoring and Control of the 33KV, 66kV Network and unmanned grid stations
- Real time monitoring of generation and transmission through SLDC and NRLDC interface
- Distribution Network Management & Control to be integrated with GIS
- Area LDC



Challenges in a few areas

NDPL

- Last mile bare overhead network & connections
- Unauthorized Extensions leading to unsafe network & Theft
- Direct Tapping in some areas and Asset abuse resulting in equipment failures

48

Recognitions

NDPL

Year	Award		
2003-2004	 Intelligent Enterprise		 Transparency in Billing
2004-2005	 Public Lok Adalat Award	 Award For Best Billing Solutions	 Corporate Social Responsibility

Recognitions

NDPL

National Award for Meritorious Performance
for FY 2004-2005 & 2005-2006

Asian Power Awards 2007
"UTILITY OF THE YEAR"
amongst 40 renowned Utilities in Asia

Recognitions

NDPL

Infraline Energy Excellence Award 2007

ICWAI National Award for Excellence in Cost Management 2007

51

Recognitions

NDPL

PC Quest Award 2007- GIS Implementation

Geospatial Excellence Awards- 2008
Excellence in
Geospatial Technology Application

Recognitions

NDPL has won the "Most Honored International Award in Power Industry "

Edison Electric Institute (EEI) 2008- Edison Award

for

Implementation of Geographic Information Systems (GIS)

Award Bestowed For " *Distinguished Leadership, Innovation and Contribution to the Advancement of the Electric Industry for the Benefit of All*"

53

Recognitions

National Meritorious Award for Distribution - Bronze

NDPL

Thank You

WELCOME

TO

PRESENTATION

ON

METERING ISSUES

By

CEA

1

Metering issues

- Salient features of existing Regulations and proposed amendment
- Status of metering and road map
- New metering Solutions
- Protocol for communication with meters
- kVAh metering

2

SALIENT FEATURE OF CEA REGULATIONS ON METERING

- LICENSEE TO PROVIDE A CORRECT METER
- CONSUMER CAN PURCHASE A METER
- IE RULES NO LONGER APPLICABLE REGARDING METERING
- TYPE OF METERS :INTERFACE ,CONSUMER ,ENERGY ACCOUNTING AND AUDIT **METER**
- ALL METERS SHALL BE STATIC TYPE
- METERS NOT COMPLYING WITH REGULATIONS TO BE REPLACED BY LICENSEE ON HIS OWN OR ON REQUEST OF CONSUMER
- METERS BE REPLACED AS PER REGULATIONS OR DIRECTIONS OF THE APPROPRIATE COMMISSION OR PURSUANT TO THE REFORMS PROGRAMME OF APPROPRIATE GOVERNMENT
- METER SHALL COMPLY WITH BIS.

3

SALIENT FEATURE OF CEA REGULATIONS ON METERING

- LOCATION:CONSUMER PREMISES OR OUTSIDE THE CONSUMER PREMISES
- DISPLAY UNIT TO BE PROVIDED AT THE CONSUMER PREMISES.
- DISPLAY UNIT NOT TO BE TAKEN FOR THE BILLING PURPOSE.
- NO LOOPING OF PHASE OR NEUTRAL ON CONSUMER SIDE WIRING
- EARTH LEAKAGE PROTECTIVE DEVICE (ELPD) BY CONSUMER
- CONSUMER RESPONSIBLE FOR SAFETY OF METERS IN CASE METERS ARE LOCATED IN CONSUMER PREMISES OTHERWISE LICENSEE SHALL BE RESPONSIBLE

4

SALIENT FEATURE OF CEA REGULATIONS ON METERING

- SYSTEM OF QUALITY ASSURANCE AND TESTING OF METERS WITH THE APPROVAL OF APPROPRIATE COMMISSION.
- APPROPRIATE NUMBER OF ACCREDITED TESTING LABORATORIES OR UTILIZE THE SERVICES OF OTHER ACCREDITED TESTING LABORATORIES.
- IMMEDIATE ACTION TO GET THE ACCREDITATIONS OF EXISTING METER TESTING LABORATORIES FROM NABL
- TESTING AT SITE AT LEAST ONCE IN FIVE YEARS

5

SALIENT FEATURE OF CEA REGULATIONS ON METERING

ACCURACY

INTERFACE METERS	**0.2S**
CONSUMER METERS	
UP TO 650 VOLTS	**1.0 or better**
ABOVE 650 VOLTS AND UP TO 33 KILO VOLTS	**0.5S or better**
ABOVE 33 KILO VOLTS	**0.2S**
ENERGY ACCOUNTING AND AUDIT METERS **GENERATION AND TRANSMISSION SYSTEM >= 0.2S** **DISTRIBUTION SYSTEM >= 0.5S**	
Accuracy of CT and VT not less than that of meter.	

6

Proposed Amendment To Regulations

- **DISPLAY UNIT ON CONSUMER'S REQUEST AT CONSUMER'S PREMISES.**
- **THE LOCATION OF METER & HEIGHT OF METER DISPLAY AS PER IS 15707**
- **FOR OUTDOOR INSTALLATIONS,METERS SHALL BE PROTECTED BY IP 55**
- **ENERGY ACCOUNTING AND AUDIT METERS ONLY ON HT MOTOR FEEDER INSTEAD ON ALL FEEDER TO AUXILIARIES.**
- **GENERATING STATIONS, THE ACCURACY CLASS OF METERS AT A POINT AFTER THE GENERATOR STATOR TERMINALS AND BEFORE THE TAP OFF TO THE UNIT AUXILIARY TRANSFORMER (S) SHALL NOT BE INFERIOR TO THAT OF 0.2S ACCURACY CLASS. HOWEVER, THE ACCURACY CLASS OF OTHER METERS SHALL NOT BE INFERIOR TO THAT OF 1.0S ACCURACY CLASS.**

7

Status of Metering and Road Map

- Consumer metering excluding agriculture 89%
- Feeder metering 98%
- DT metering is very low and is around 13%.
- Agriculture Metering varies from 20% to 50%
- A road map to be drawn for 100% consumer ,feeder and DT metering
- Carry out then DT wise energy audit
- Few states still purchasing Electro-mechanical meters

8

DIFFICULTY IN METERING OF AGRICULTURE CONSUMERS

- Cost not commensurate with revenue collection.
- Objections from farmers
- Difficulty in meter reading, billing , collection at regular interval
- Damage of meters by consumers.
- Appoint franchisee for metering billing and collection as it is mandatory for RGGVY

9

New Metering Solution

- Group Modular metering system
- RS-232C interface provided on both display and metering units.
- Individual LED indication for each consumer for calibration or accuracy check.
- Storage capacity of several months data.
- All connections have individual displays.
- Tampering and power theft difficult due to installation in open space.
- Maximum Demand data also viewable.

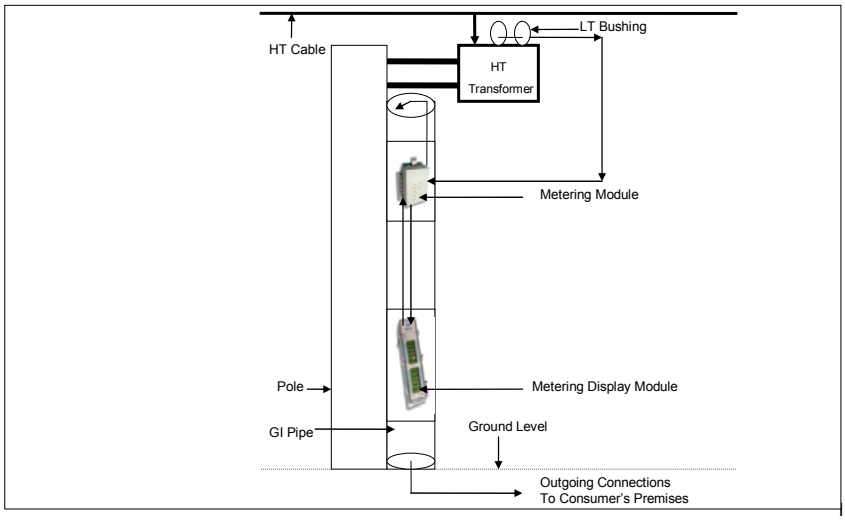
10

New Metering Solution

- Mounted directly on the HV bushings Transformer or poles.
- Metering module can meter up to 10 connections individually.
- Display module is mounted on a pole and provides the consumption data for each user separately.
- Installed outside the premises of the consumers.
- A display unit can be provided in consumer house up to 100 meter.

11

GROUP METERING SYSTEM



12

Protocol for Communication with Meters

- A High level committee set up by MOP under chairmanship of Member (GO&D) recommended
  (a) IEC 62056 for new meters
  (b) API/MIOS/Protocol converter for legacy meters
- MOP set up another committee under chairmanship of DG CPRI for standardizing parameters and finalizing implementation of IEC 62056
- Parameters circulated to utilities
- Meetings with WR and SR already held
- Meetings with other regions by Feb 2009

13

kVAh Metering

- **Single Phase**

- Phasor KVA(S)= $\sqrt{P^2+Q^2}$ **(Without Distortion)**

- Apparent KVA(U)= $\sqrt{P^2+ Q^2+ D^2}$ **(With Distortion)**
  =VrmsXArms
- Arithmetic Apparent Power KVA(Ua)= V1XA1**(Scalar qty)**

- **Three Phase**

- Phasor KVA(S)= $\sqrt{(P1+P2+P3)^2+ (Q1+Q2+Q3)^2}$**(Without Distortion)**

- Apparent KVA(U)= $\sqrt{(P1+P2+P3)^2+ (Q1+Q2+Q3)^2+ (D1+D2+D3)^2}$
  (With Distortion)
  =VrmsXArms

- Arithmetic Apparent Power KVA (Ua)
  = $\sqrt{(P1^2+Q1^2+D1^2)+ \sqrt{(P2^2+Q2^2+D2^2)^2+ \sqrt{(P3^2+Q3^2+D3^2)}}$
  = U1+U2+U3
  =V1XA1+V2A2+V3A3 **(Scalar qty)**

14

kVAh Metering issues

- Different utilities have different practice for reactive energy calculation
- Whether lead kVARh to be taken into account
- All utilities to follow same method of calculation of kVAh
- Presently accuracy of kVARh or kVAh is not tested at site
- Accuracy of kWh and kVARh to be tested as accuracy of kVAh is not defined

15

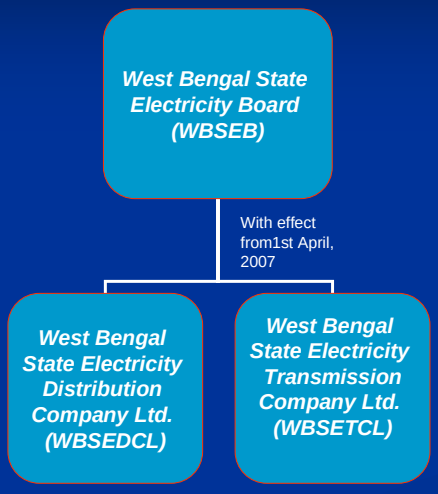
16

IN THIS PRESENTATION

- ***SECTOR OVERVIEW***
- ***EFFICIENCY IMPROVEMENT INITIATIVES & RESULTS***
- ***IT INITIATIVES***
- ***WAY FORWARD***

2

State Electricity Board Restructuring



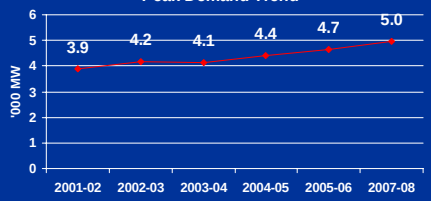
- WBSEB
  - Integrated Utility
- WBSEDCL
  - Distribution, Hydel Generation and Trading Business
- WBSETCL
  - Transmission and System Operation

WBSEDCL - Overview

Figures for FY 08

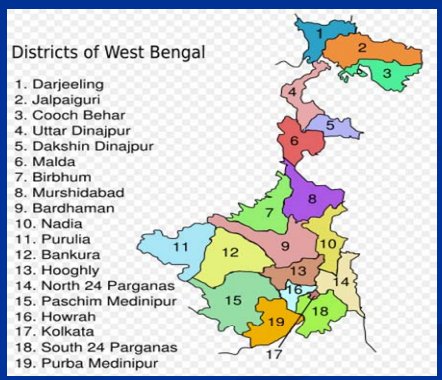
Consumers	7.0 Million
Peak Demand	4,970 MW
Energy Sales (Dist.)	17,428 GWh
Energy Sales (Trading)	891 GWh
Revenue	Rs. 6066 Cr.
Number of DTRs	97,648
Number of Employees	24,544

Peak Demand Trend



WBSEDCL has distribution and retail supply license for entire state except:

- **Kolkata Municipality Area**
- **Part of Bardhaman District**



APPROACH FOR EFFICIENCY IMPROVEMENT AND REDUCTION OF LOSSES

Identification of "Revenue Leakage" points by complete energy auditing

Meters installed at every transition point, from inter-utility boundary points upto 11 kV outgoing feeders of all 33/11 kV sub stations

Static Tri-vector meters installed in 30 % of total 1 lakh Distribution Transformers

Boundary metering of forty nos. towns to come under R-APDRP – under process

Metering of all agricultural consumers

5

Project Scope (100% Metering):-

- **Installation of static meters of class 0.2 &0.5 for all feeders at EHV & HV substation.**
- **Installation of 66 kV, 33 kV CTs & PTs & 11 kV PTs wherever required**
- **Installation of Communication system for remote data acquisition from approx. 4000 meter using PSTN network.**
- **Data collection & MIS reporting for Energy accounting & other system studies.**

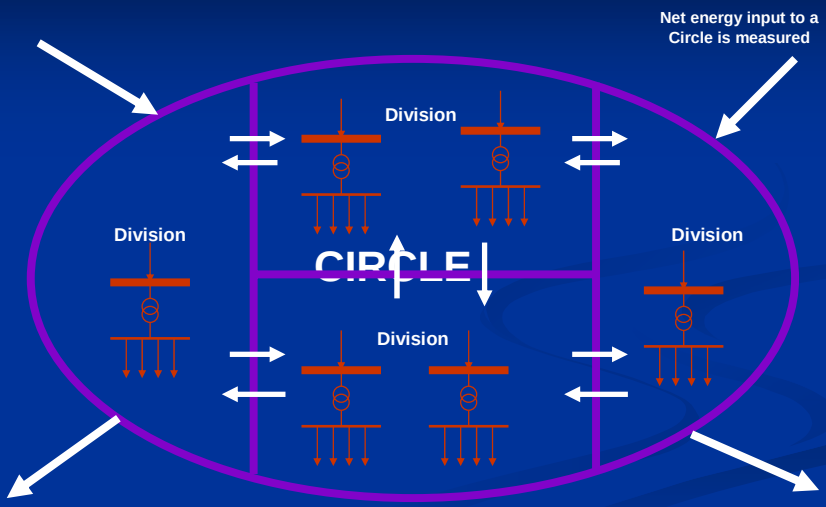
6

0.5 Meters in HV s/s

0.2 rack mounted meters in EHV s/s

10

Energy Accounting: Topology



11

System output

- Comprehensive monthly energy accounting & MIS for efficient operation of System
  - Energy received by WBSEDCL & loss in system (up to 11/6.6/6 kV outgoing feeders)
  - Energy received by WBSEDCL from other Utilities, self generation, co-generation
  - Energy sent out from WBSEDCL
  - Energy sent out from distribution feeders
  - Load pattern, Load duration curves, peak contribution factors
  - FAADI, Interruption, Voltage profiles .. and much more
  - Actual Energy/Time duration v/s frequency - ABT report
  - Energy & Demand Duration Curves at different frequency intervals
  - Energy Mismatch reports
  - Voltage Fluctuation report at different bus voltage
  - Covers not only energy accounting but information for Load Management, Load Forecasting, and Demand Side Management as well
  - This is comprehensive Metering Project with complete IT support

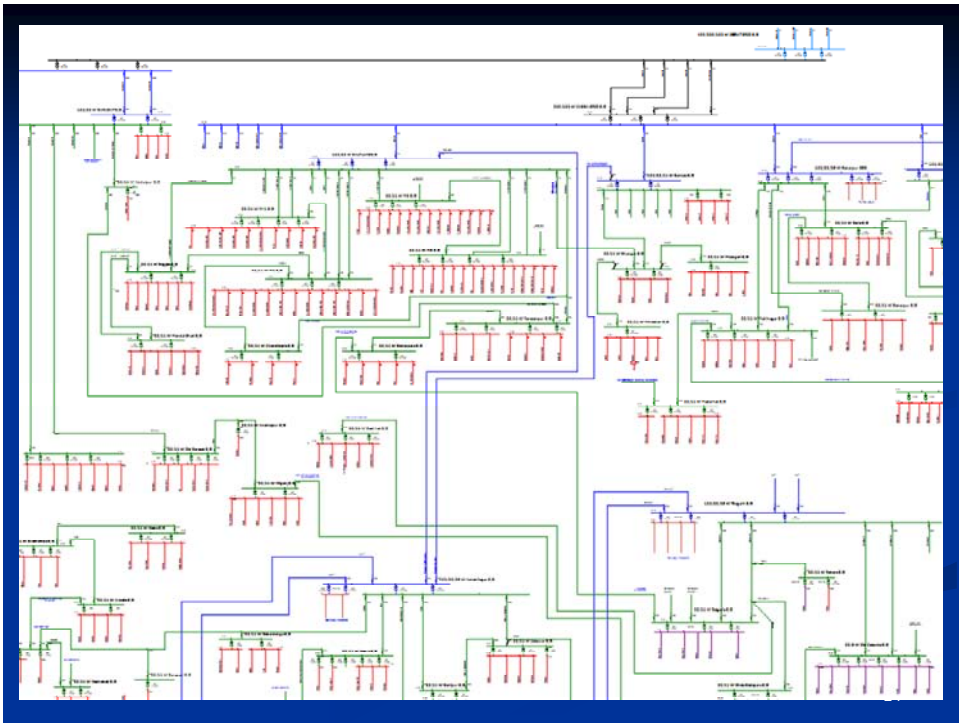
12

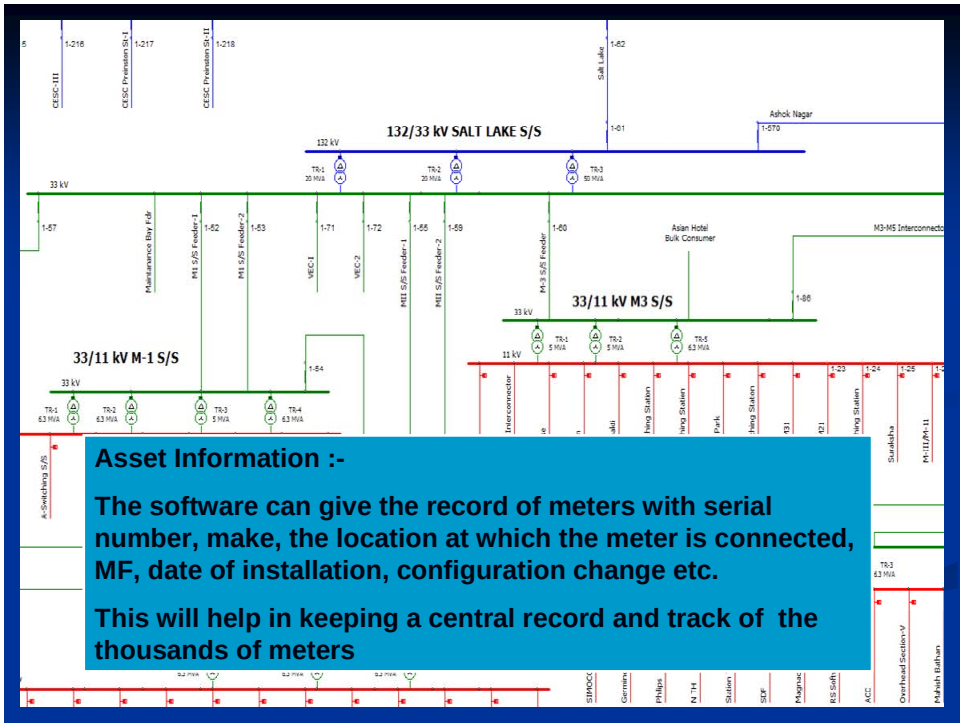
The Software Features

- The software has time-linked MF to take care of
  - CT ratio, and changes in ratio in due course
  - PT ratio, etc.
- Grouping meter locations by defining virtual locations
  - To define WBSEDCL boundary
  - To define Zone, Circle, & Division boundaries
  - To define Substations
  - … all of which may change over time
- Processing time-of-day energies of virtual locations
  - To arrive at load curves for each area
  - To arrive at peak demand of each area
  - To arrive at peak contribution factor of each area

A network management software is also used

13





ENERGY AUDITING

- *Sub station wise monthly energy balance and loss estimation*
- *Loss assessment of each line from 400 kV to 33 kV*
- *Monthly energy accounting and calculation of T&D and AT &C losses for each zone, circle, division and supply*
- *Analysis and monitoring*

VOLTAGE CLASS	400 KV	220 KV	132 KV	66 KV	33 KV	11 KV
NO. OF FEEDERS METERED	8	27	206	16	635	2,434

16

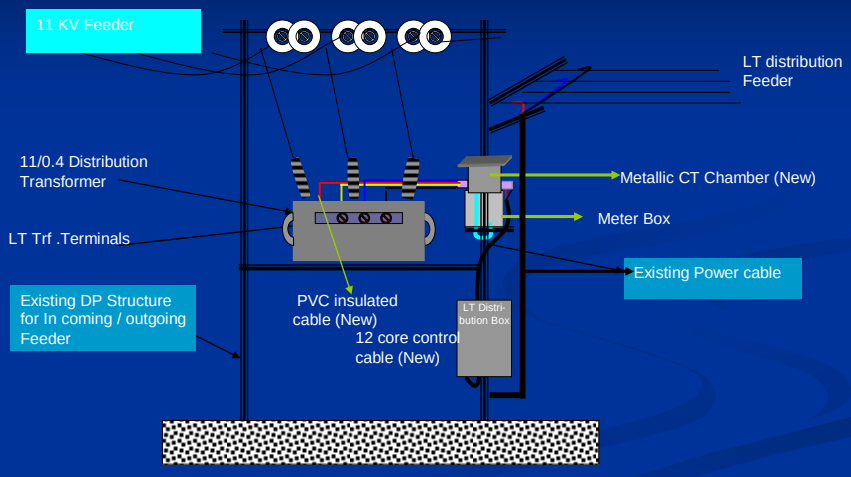
Er. Apurba Sarker
Er. Niranjan Saha

Distribution Transformer Metering
Towards Energy Audit

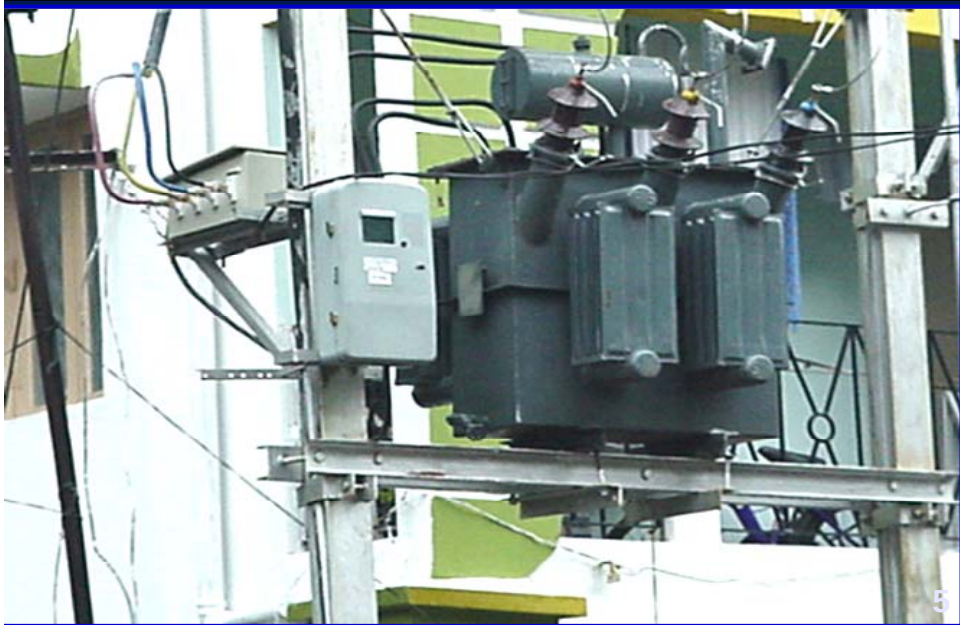
Introduction:

For utilities in developing countries, proper accounting of power usage is a difficult task. It is compounded by electricity theft and network losses. This ultimately reduces the total amount of power available to the utility's consumer base. Utilities require an efficient and accurate means to audit power from the top of the network all the way down to the consumer meter. With the introduction of energy accounting, WBSEB took up 100% Metering Project way back in 2001. WBSEB has been pioneer in maintaining energy accounting on monthly basis across the length and breath of its system up to 11KV voltage level.

Schematic Arrangement of DT Metering System



Physical arrangement of DT



5

CT KIOSK with 12 core cable

6

Physical arrangement of LPR and DT meter

7

DTR Meter

Current Specifications :

- 1/2 hourly data logging for
- KWh_{3phase}
- KVA_{3phase}
- V_R, V_Y, V_B
- I_R, I_Y, I_B
- [All averaged value]
- 6 No History data
- 45 days load survey
- Logging of primary parameters
- Measurements as per primary energy

228

Proposed Approach

(For a Distribution area to be audited)

1st STEP:

Installation & commissioning of 0.5 class 3 phase 4 wire CT operated Static Meters at the LT end of each DTR.

2nd STEP:

- **DTR wise consumer segregation.**
- **Sub-station(33/11)→Fdr→DTR→Consumer → Gr. E/ S-- Indexing**
- **HT & LT Network Drawing & preparation of Technical data base.**

PROPOSED APPROACH (Contd.)

3rd STEP:

- Energy data recording & comparing with Billing data.
- Month wise Energy Audit Report generation.
- Segregation of Technical & commercial losses.

4th STEP

COMMERCIAL LOSS REDUCTION AVENUES AND ACTION PLAN :

- Energy Audit Result Review
- Meter Replacement
- Tamper Detection
- Hook Connection Areas
- O/H Line Replacement With ABC.

PROPOSED APPROACH (Contd.)

5th STEP

- THREE PHASE POWER FLOW STUDY WITH LOAD DATA COLLECTED FOR SAY 90 DAYS - FOR PEAK PERIOD.
- COMPUTATION OF SYSTEM LOSS WITH REPLICA MODEL.
- IDENTIFICATION OF NETWORK CONSTRAINTS.
- TECHNICAL INTERVENTION PROGRAMME SCHEDULING.

25 12

What Distribution Transformer Meters Log

- Apparent Demand
- Active Demand
- Apparent Energy
- Active Energy
- Voltage (all the 3 phases)
- Current (all the 3 phases)
- Power Factor
- Forward logging logic (in CT reversal cases)

26 15

The other role of DT Meters

- Balancing of energy between Feeder & DTs
- LT system load flow study (for tech. & non tech. losses)
- Determining operating parameters for DT's load
- Assessing unmetered consumption
- Determining LT system unbalance & neutral shifting
- Overloading, unbalancing
- Reliability of supply in LT system

Appropriate meters provide a host of information for DMS & revenue protection

16

- ***STRICT ENFORCEMENT OF ANTI-THEFT LEGISLATION***

SECURITY & LOSS PREVENTION CELL AT ALL THE 17 CIRCLE OFFICES AND CENTRALLY AT HEAD QUARTER

S&LP CELL FOCUS

- ***High-value customers were provided with dedicated feeders, high quality & tamper-proof electronic meters inside protective boxes.***
- ***Meter reading instruments were provided to inspection teams to download monthly data for variation analysis, load survey etc.***
- ***Adopting modern technologies e.g. electronic intelligent meter, CMRI, Laptop & remote metering system; improved management information systems.***
- ***100 % metering for all consumers including agricultural.***

28

SPOT BILLING MACHINE

1

What is SBM ?

- A Battery Operated, user-friendly, Intelligent device with built-in printer.
- It is also known as Integral Hand Held Terminal (IHHT) or simply Hand Held Computer (HHC)
- An Electro-mechanical device that generates energy bills on the spot

What is SBM ?

- ✓ It is integrated with ::
  - ❖Keypad for input
  - ❖LCD Screen for display
  - ❖Dot matrix Printer for printing bills and reports
- ✓ Uploading and downloading facility from/to the main desktop computer/Server

DIFFERENT TYPE OF SPOT BILLING MACHINE




Specifications of Spot Billing Machine

- ✓ 24-column high-speed printer (2.7 lines/sec).
- ✓ 20x4 char, Alphanumeric LCD with Backlight
- ✓ 5x6 custom keypad (30 keys).
- ✓ Two high-speed communication ports.
- ✓ 20-year calendar built-in RTC with battery backup

Specifications of Spot Billing Machine

- ✓ Built-in 1.5 Ahr rechargeable NiMh battery –
  - SBM contains the Intelligent fast charging circuit with temperature, time and voltage sensors.
  - 14V AC/DC Adapter to charge the battery is available with SBM.
- ✓ 256k Flash memory, 1MB RAM
- ✓ In SBM, Software can be programmed in 'C' language.
- ✓ SBM can be operated in between 0°°C to 50 C in 5-95% humid atmosphere

Specifications of Spot Billing Machine

- ✓ The machine is password protected and a few operation can be performed by Station Manager.
- ✓ Data can be uploaded /downloaded from a remote place using internet

PERFORMANCE OF THE S&LP CELL

RAIDS AND REALISATION

	2007-08	2008-09 (UPTO OCT'08)
TOTAL NUMBER OF ANTI-THEFT RAIDS CONDUCTED	7830 NOS.	3705 NOS.
TOTAL CLAIMS AGAINST THE RAIDS	RS.29.23 CR	RS. 8.81 CR
TOTAL REALISATION	RS. 14.97 CR	RS. 5.09 CR

8

APPROACH FOR EFFICIENCY IMPROVEMENT

EFFICIENCY IMPROVEMENT WITH MINIMAL INVESTMENT

- *Investments providing equity returns above 16% are prioritized (this is above the assured return allowed by the Regulator) – to minimize adverse tariff impact*

(Investments for expansion of network into uncovered areas are funded from Central & State budget)

9

EFFICIENCY IMPROVEMENT WITH MINIMAL INVESTMENT

1 INSTALLATION OF CAPACITORS

- *AT 11 KV BUS OF 33/11 KV SUB STATIONS*
  - *-- 1st Ph : work taken up at 83 nos. Sub Stations, 106 MVAR*
  - *-- 2nd Ph : under process, 154 more Sub Stations*
- *AT DISTRIBUTION TRANSFORMERS*
- *AT THE PREMISES OF ALL 80,000 LT INDUSTRIES AT COMPANY'S COST*

10

EFFICIENCY IMPROVEMENT WITH MINIMAL INVESTMENT

2 BIFURCATION OF OVERLOADED 11 KV FEEDERS

RE-ORIENTATION OF LONG 11 KV FEEDERS

AUGMENTATION OF CONDUCTOR / CABLE SIZE AND / OR DRAWAL OF PARALLEL FEEDERS

3 REGULAR BALANCING OF PHASE LOADINGS OF DISTRIBUTION TRANSFORMERS, INFORMATION AVAILABLE FROM DTR METERING DATA-BASE

11

EFFICIENCY IMPROVEMENT WITH MINIMAL INVESTMENT

4 USE OF SMALLER CAPACITY DISTRIBUTION TRANSFORMERS AT THE LOAD CENTRES, TO IMPROVE HT/LT RATIO. PRESENT HT/LT RATIO IN WBSEDCL IS 0.91

5 USE OF AB CABLES IN THEFT PRONE AREAS

12

EFFICIENCY IMPROVEMENT WITH MINIMAL INVESTMENT

6 INTRODUCTION OF SPOT BILLING

INTRODUCED IN 103 SUPPLY AREAS. ANOTHER 100 SUPPLIES --- UNDER PROCESS

TO ENHANCE BILLING EFFICIENCY

7 INTRODUCTION OF MULTIPLE BILL PAYMENT OPTIONS

TO ENHANCE COLLECTION EFFICIENCY AND CASH FLOW

- 24 HOUR OPEN BILL PAYMENT KIOSKS AT CONVENIENT LOCATIONS
- PAYMENT THROUGH ECS, POST OFFICES, RURAL BANKS
- PAYMENT THROUGH VILLAGE COMMUNITY CENTRES
- PREPAID METERING WITH EASY RECHARGE
- WEB BASED AND SMS ACTIVATED PAYMENT

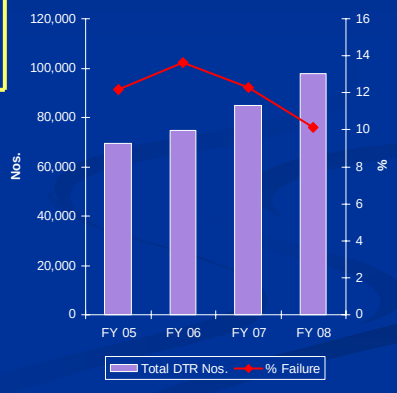
13

EFFICIENCY IMPROVEMENT WITH MINIMAL INVESTMENT

8 REGULAR MAINTENANCE OF DIST. TRANSFORMERS

- REDUCTION IN DTR FAILURE
- REDUCTION IN SUPPLY INTERRUPTIONS
- REDUCTION OF REVENUE LOSS DUE TO ABOVE

REDUCTION IN DTR FAILURE RATE

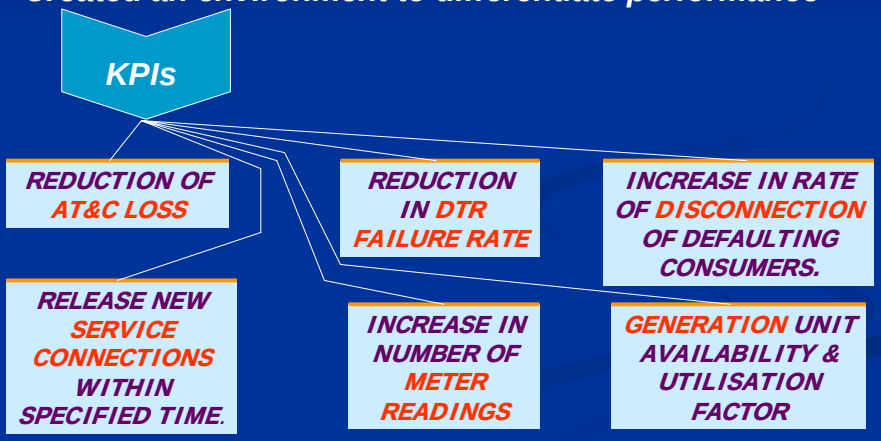


14

EMPLOYEE MOTIVATION
PERFORMANCE LINKED INCENTIVE

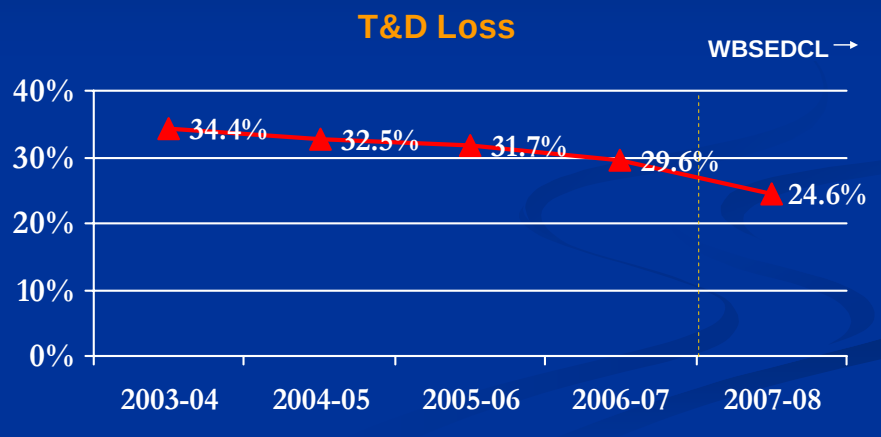
Performance Linked Group Incentive Scheme introduced in FY 08

Created an environment to differentiate performance



15

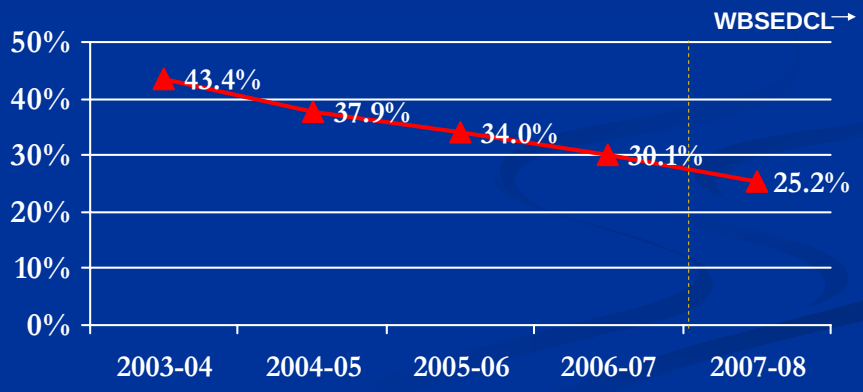
Results - Key Performance Indicators



16

Results - Key Performance Indicators

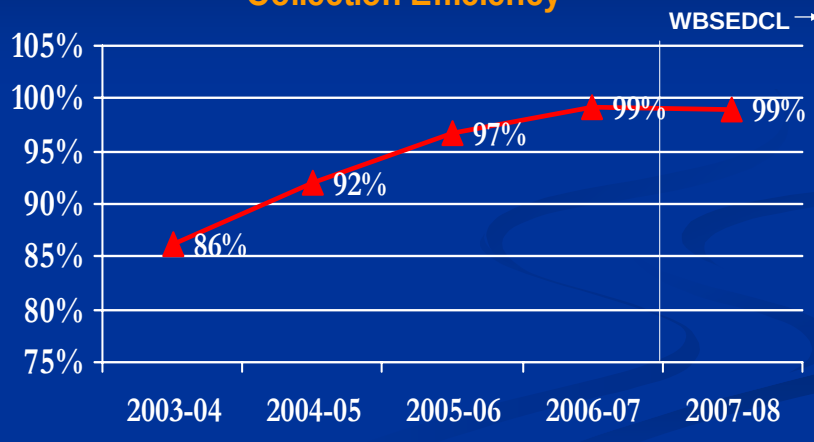
AT&C LOSS



17

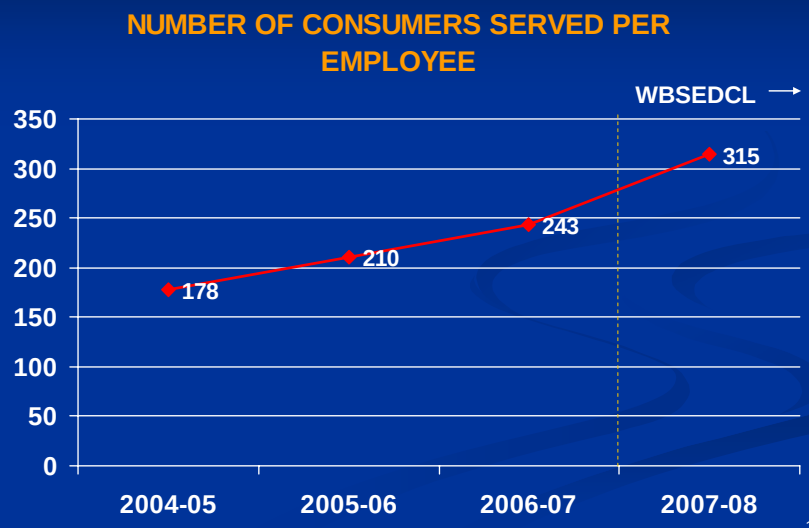
Results - Key Performance Indicators

Collection Efficiency



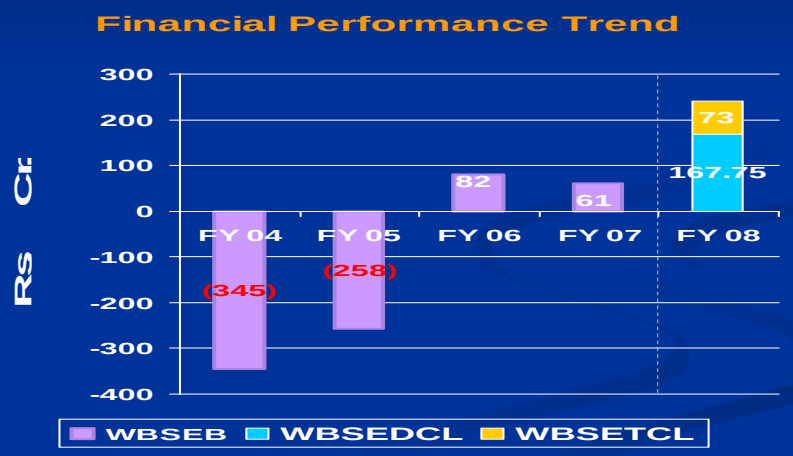
18

Results - Key Performance Indicators



19

Financial Turnaround



20

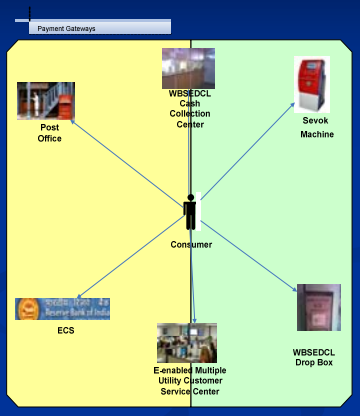
FINANCIAL TURNAROUND

	2003-04	2007-08
LOSS LEVEL	AT&C LOSS 43.43 %	AT&C LOSS 25.21 %
COLLECTION EFFICIENCY	86.19 %	99.00 %
NET PROFIT / LOSS	NET LOSS RS. 344.53 CR	NET PROFIT RS. 240.75 CR (WBSEDCL: 167.75 + WBSETCL: 73)
(DEBT SERVICING OF GOVT. LOANS	NIL	RS. 270 CR
SUBSIDY SUPPORT FROM GOVT.	SUBSIDY SUPPORT REQUIRED	NO GOVT SUBSIDY

21

Initiatives for Enhancing Customer Service

- Better infrastructure at Customer Interface points
- Establishment of "Call Centers" using state of art CRM systems
- Developing soft skill for front-end staff
- Implementation of GIS
- Multiple payment gateways for consumers
- Option of Pre-paid meters for LT residential and commercial consumers



- Modernisation of Supply Offices upto the standard maintained foreign Banks or Insurance Offices for convenience of the consumers and better working environment

22

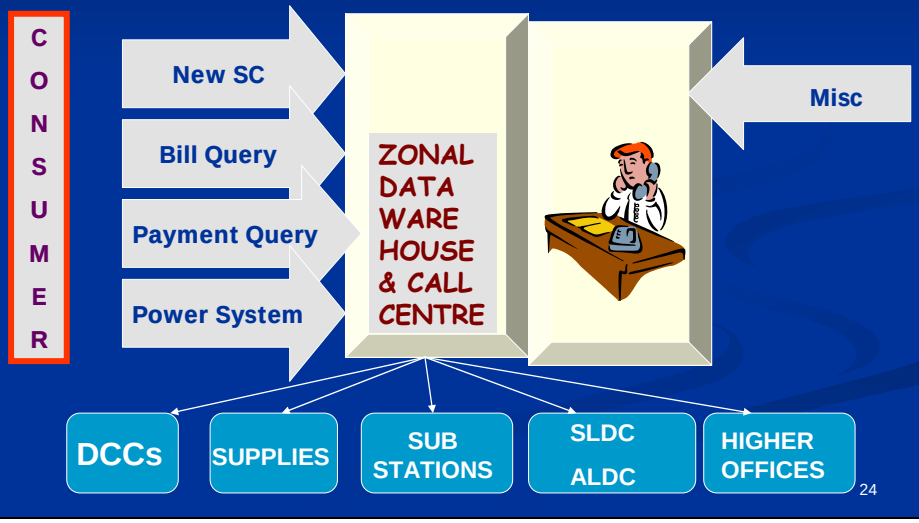
IT INITIATIVES

COMMERCIAL	TECHNICAL	ADMINISTRATIVE
ENERGY BILLING	SATCOM	MIS
24X7 CASH COLLECTION	FEEDER METERING	PIS
CASH COLLECTION THROUGH VILLAGE CSCs	DTR METERING	MMIS
ENERGY AUDITING	BOUNDARY METERING	CMS
PREPAID METER	AUTOMATIC METER READING	AMS
SPOT BILLING	GIS	ERP
	CONSUMER INDEXING	
	ZONAL DATA WAREHOUSE & CC	

23

ZONAL CALL CENTRES

ONE WINDOW SERVICE TO THE CONSUMERS



24

COMMISSIONING OF INDIA'S LARGEST PUMP STORAGE PROJECT AT PURULIA

CAPACITY
900 MW (4 X 225)

PUMPING WATER TO UPPER DAM DURING LEAN HOURS(LOW COST POWER)

GENERATING POWER DURING PEAK HOURS

25

RECOGNITION

WBSEDCL HAS BEEN ADJUDGED THE WINNER OF POWER INDIA 2008 EXCELLENCE AWARD FOR POWER SECTOR REFORMS INITIATIVES BY HON'BLE JURY PANEL OF INDIA TECH FOUNDATION, HEADED BY SHRI A. M. AHMADI, FORMER CHIEF JUSTICE OF INDIA

WINNER'S TROFFY

CMD WBSEDCL RECEIVING THE AWARD FROM FORMER CHIEF JUSTICE OF INDIA

26

Vision- Emerged from Internal Discussions

WBSEDCL VISION

To be the best utility in India
in terms of customer service, efficiency and financial viability

27

WAY FORWARD

- ACHIEVING VISION OF best utility in the country in 3 years.
- Customer orientation at all levels in the organization.
- Radical changes in business processes and systems to bring Quantum improvements.
- Creating Learning and Growing organization.
- Motivated and performance driven workforce.

CHALLANGE ISis to carry all THE stakeholders in the journey to excellence

28


THANK YOU
WBSEDCL
Journey to excellence
29

AWARENESS PROGRAM ON ELECTRONIC METERS & IT'S TAMPER PROOF FEATURES

- Section 55 of the ACT
- (1) No licensee shall supply electricity, after the expiry of two years from appointed date (10.6.2003), except through installation of correct meter in accordance with the regulations to be made in this behalf by the Authority
- Provided that the State Commission may, by notification, extend the said period of two years for a class or classes of persons or for such areas as may be specified in that notification
- (3) If a person makes default in complying with the provisions contained in this section or the regulations made under sub-section (1), the Appropriate Commission may make such order as it thinks fit for requiring the default to be made good by licensee…

What is Electricity Meter

A device to record Energy consumption.

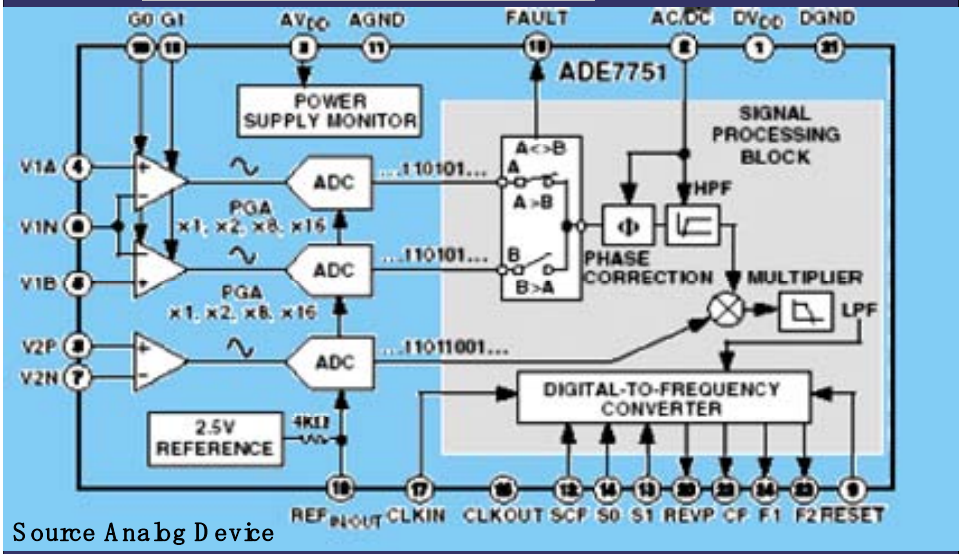
What is Meter Prrincipal

- Instantaneous Multiplication of Voltage and Current is Power
- Power is rate of Energy consumption, if recorded cumulatively it is Energy.

What is Meter Principal

- Electronic meters
- Using R-Network and CT, Voltage and Current are converted into signal and multiplied using ASIC or Micro-Processor.

Electronic meter IC



Source Analog Device

Mechanical Meter

Voltage and Current pass through electromagnets, generating FLUX, which develop Torque which in Turn Rotate Al Disc.

Meter Terminology

- Current Range
- Starting Current
- No load Test
- Influence parameters

Meter Range

- Mechanical Meter ..... 1% to 200(400)%
- Electronic Meter ..... 0.2% to 600%
- Rating Mechanical:.....2.5A, 5A and 10A (Depend upon Load)
- Rating Electronics:..... 10A only.

Meter Range

Sr. No	Rating	Range
1.0	2.5~5A (Mech.)	25ma~5Amp
2.0	5A~10A (Mech.)	50ma~10Amp
3.0	5A~20A (mech.)	50ma~20A
4.0	10~40A (Mech.)	100ma~40A
5.0	10~60A (Elect.)	20ma~60A

Meter Type v/s Recording

- If Load is 2 AC, 1 Geyser, 1 Fridge, 1 TV, 20 bulb
- Current ..... 38 Amp

Sr. No	Rating	Recording
1.0	2.5~5A (Mech.)	Read inacc.
2.0	5A~10A (Mech.)	Read inacc.
3.0	5A~20A (mech.)	Read inacc.
4.0	10~40A (Mech.)	Read Okay
5.0	10~60A (Elect)	Read Okay

Meter Accuracy

- Meter Accuracy is calculated by comparing "energy recorded by meter under test Em" with "energy recorded by reference meter Er".
- Error % = ((Em - Er)*100) / Er.

METER TESTING WITH ACCUCHECK

Testing Of Meter

Step ..1

- Check Meter for type & Phase.
- Isolate all the consumer's load and Connect external load (Say 3 Kw) On each phase.

Step ..2

- Connect Crocodile (P.T. wire) in Parallel With Meter.
- Clamp the C.T on current wire.
- Set Scanner in front of Meter Pulse/Disc and Synchronize them With Meter.

Step ..3

- Set Accucheck Programming as Per Meter Configuration.
- Set test duration for 1 Unit.
- Make final report.

Step ..4

- Check your Connection, Synchronization of Scanner & C.T direction.
- If reading is not Ok.

Reference Meter

- Typical Accuracy level

House Meter	—	1.0/2.0%
Field Ref. Meter	—	0.2/0.5% *
Lab Ref. Meter	—	0.05% *
NPL Ref. Meter	—	0.005% *

Electronic Meters are highly accurate and thus used as reference meter.

Influence Parameters

- Parameters that affect the accuracy of meters
  - Temperature
  - Voltage
  - Frequency
  - Magnetic Field
  - Phase sequence/ Presence

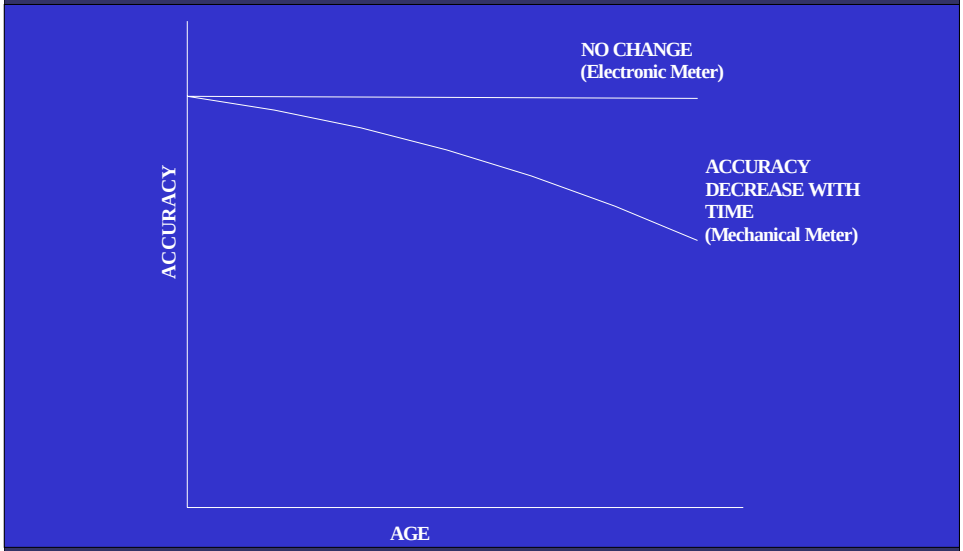
Influence Parameters

- Typical for Electromechanical Meters
  - Age
  - Dust
  - Mounting
  - Moisture
  - Wiring Sequence

Why change old meters

- Electronic meter:
  - Sustained accuracy
  - Low effect of influence parameters
  - Wide current Range
  - Anti-Temper
  - Tariff Requirement
  - Intelligent Meters

SUSTAINED ACCURACY



Intelligent Meters

- Accurate
- MultiParameters
- Logics
- Computation
- Communication
- Interfacing
- I/O
- Memory

Electronic Meters

- Specification
  - 》Rating 10~60A
  - 》Starting 0.2%
  - 》Kwh and MD in KW
  - 》TOD, 6 Tariff and 6 time zone
  - 》6 Month Billing data
  - 》RS232C




Accuracy of electro-mechanical meters may drift and are often a cause for revenue loss

Electronic meters are now replacing electro-mechanical meters, but consumers are sometimes sceptical

We all know that

Complaints of meters running fast

Why does this happen? Is there a solution ?

FAQ

- Why Mechanical meter Read less
  - » Influence Parameters
  - » Age
  - » Wear and Tear
  - » Narrow Range
  - » Mounting
  - » Dust and Oil effect
  - » Mechanical Counters

Traditional problems

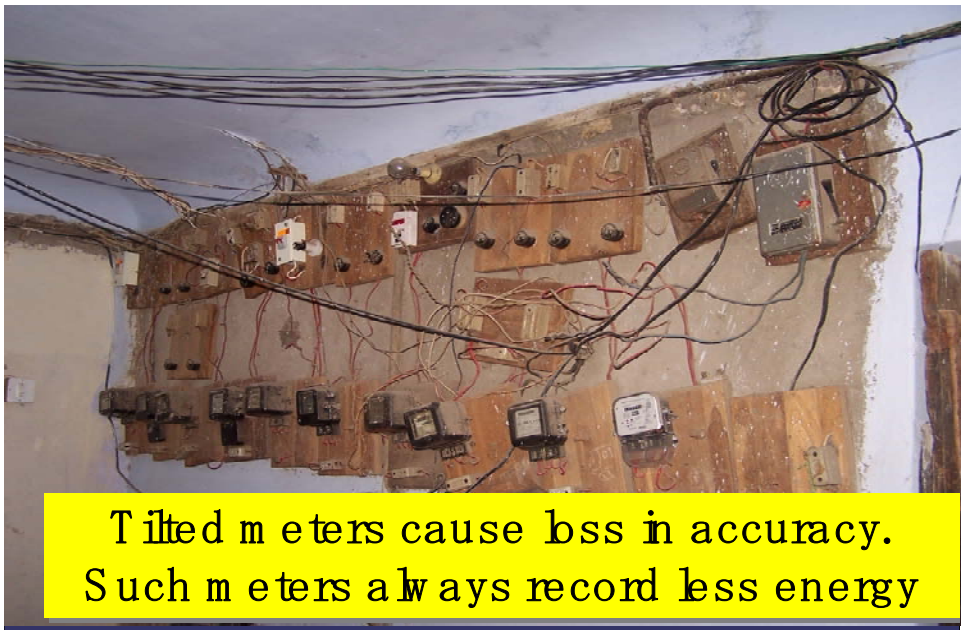
We know poor quality meters & aged meters may have large errors

We also know electro-mechanical meters do not log different parameters to meet tariff requirements

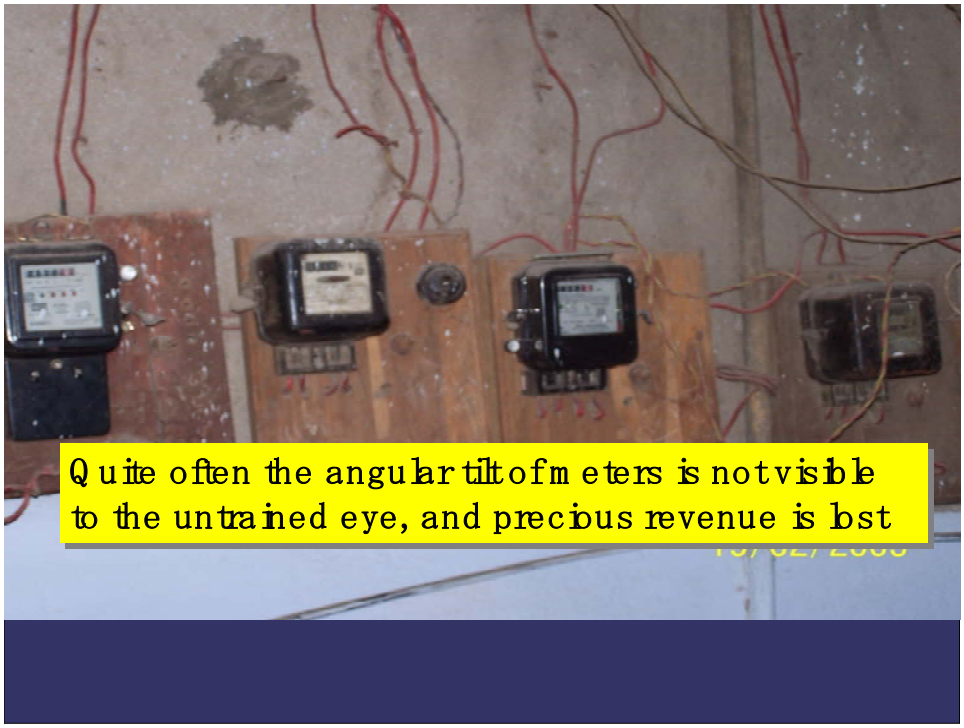
Poor installations also cause problems

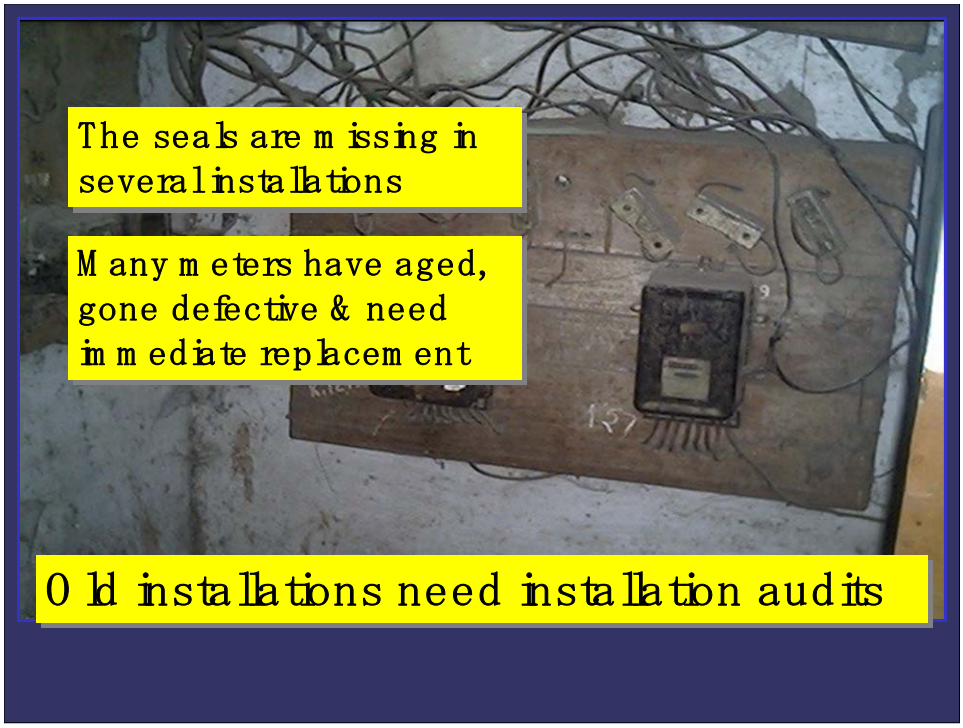
Meters may record less energy if they are not installed in vertical alignment

Meters may record incorrect energy if phase & neutral wires are inter-changed



Tilted meters cause loss in accuracy. Such meters always record less energy


Quite often the angular tilt of meters is not visible to the untrained eye, and precious revenue is lost


The seals are missing in several installations
Many meters have aged, gone defective & need immediate replacement
Old installations need installation audits

FAQ

- Why electronic meter are preferred
  - » Wide Range
  - » Low starting current
  - » Less effect of Influence parameters
  - » More accurate
  - » Temperproof

JANHEET MAI JARI

- Don't keep Electrical gadget "ON" in idle condition
- Proper Earthing
- Use ELCB /RCCB in circuit to ensure no unbalance/avoid Leakage.
- Use proper conductor for house wiring by calculating actual load
- Totally Isolated supply of phase and neutral.
- Inverter and generator shall be totally isolated.
- Use Magnetic Switch for Gadgets with heavy motor (AC & Pumps etc).
- Balance load (in 3Ph)
- Surge protection.

Electronic Meter In India

- In use Since 1992.
- In use for house hold Metering Since 1995.
- Rajasthan was first state to buy Electronic Meter.
- Almost all Grid Meter and HT Meter in India is Electronic.
- Presently 92% Meter production in India is Electronic.

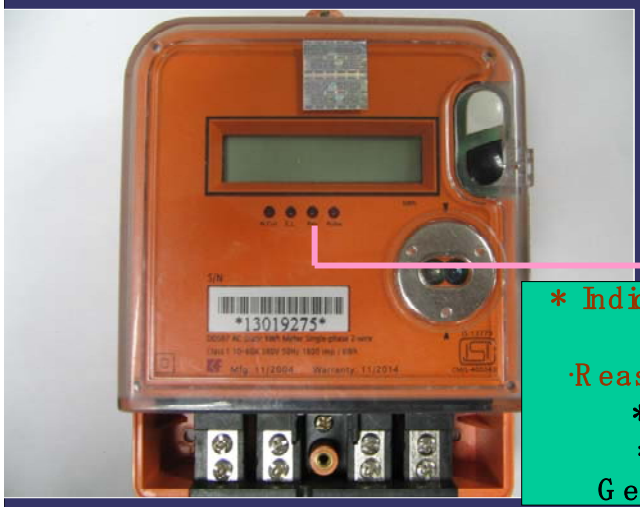
ROLE OF LED

ROLE OF LED

CAL LED

High resolution Out Put devices for Meter checking

ROLE OF LED



REV LED

* Indicate Reverse flow of Energy

·Reason

* Wrong wiring

* Use of un isolated Generator/Inverters

ROLE OF LED

EL

·Due to Unbalance Curr

· Need Attention

ROLE OF LED

N-Cut

·Indicate Current without Voltage on Meter

· Contact DISCOM immediately

KNOW ABOUT EL

The glowing of the EL LED indicates the following:

- Earth is being used as neutral
- Neutral is touching the earth.
- Phase wire is touching with the neighbours phase wire.
- Neutral wire is touching with the neighbours neutral wire.

KNOW ABOUT EL

Wrong wiring, among others things can result in:

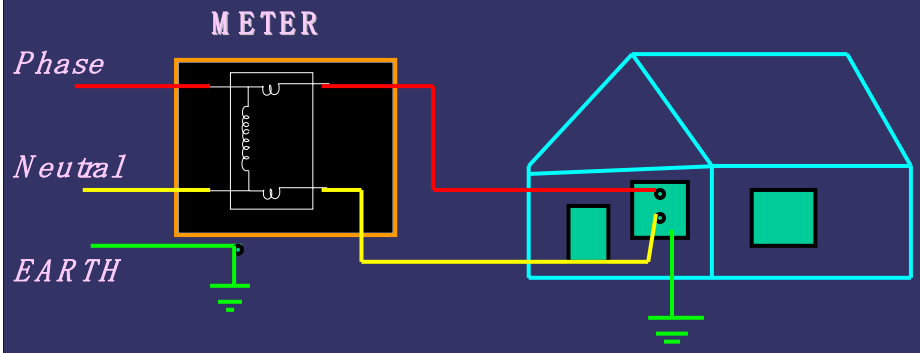
- Safety hazards (wires are still live, even when the main switch is off).
- Cause fire (if by mistake phase and neutral wires get interchanged)
- Wrong consumption (the neighbours current can flow through your meter)

KNOW ABOUT EL

If EL ON, get your internal wiring checked for any leakages and other problems and also carefully look at the EL LED in the Electronic Meters. EL LED, in Electronic Meters, however small, is of great importance and consumers are advised not to ignore its usefulness.

HOUSE WIRING AND CURRENT THROUGH METER

METERED HOUSE

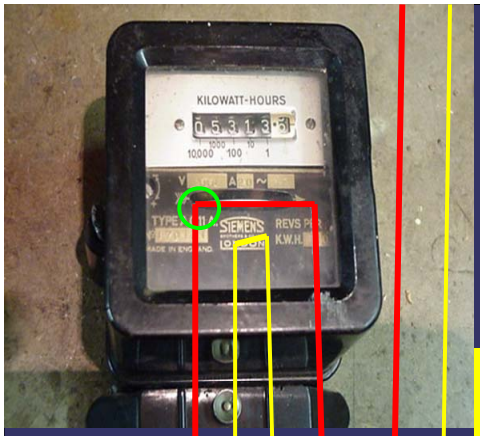


Good electronic meters have Current sensors in both the

Phase path, and Neutral path

For Measurement it choose higher * of the two current.

* In general Phase current is used for measurement however if neutral Current more by 10~ 12 % then Neutral current selected



Electro-mechanical Meter has Current sensor only on one wire

All Measurement based on phase wire current even when connected to neutral

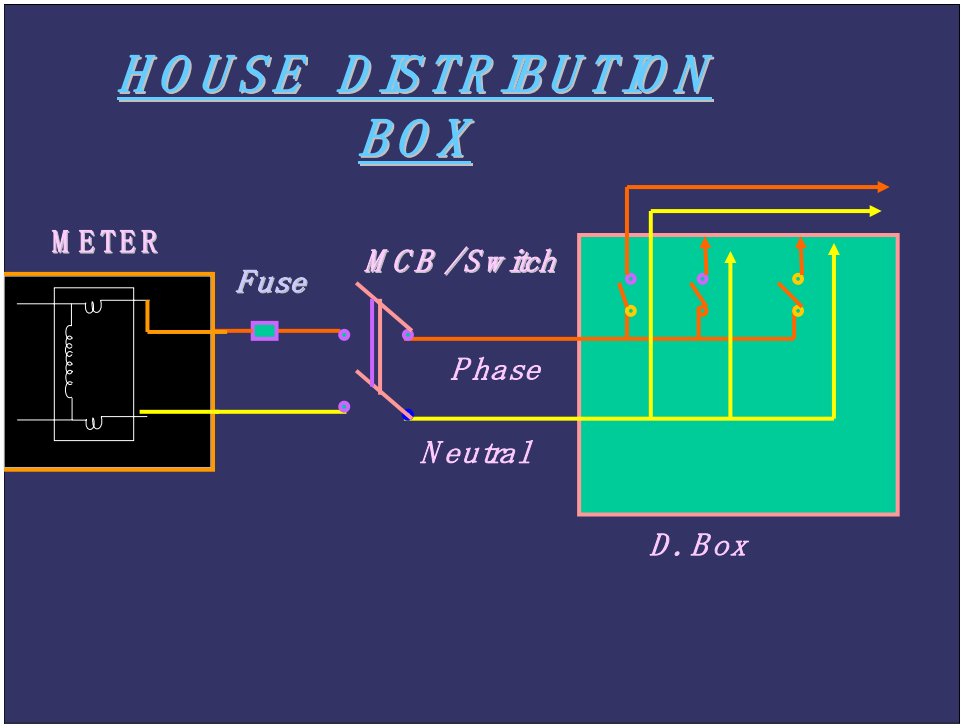
Good electronic meters have Current sensors in both the

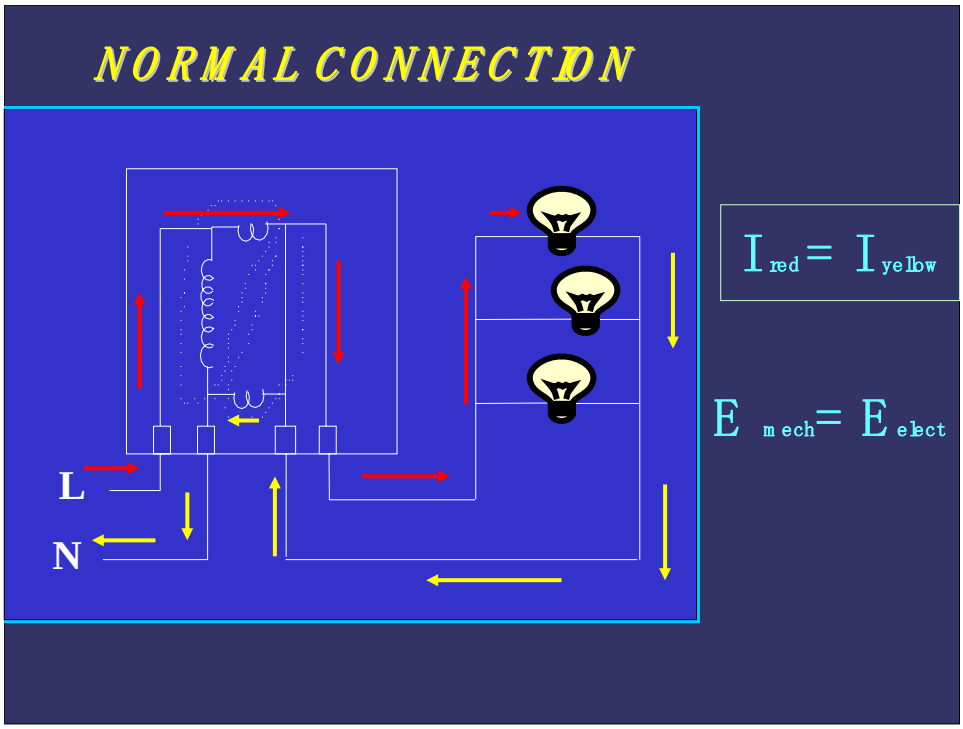
Phase path, and Neutral path

This is an advantage of electronic meters over electromechanical meters

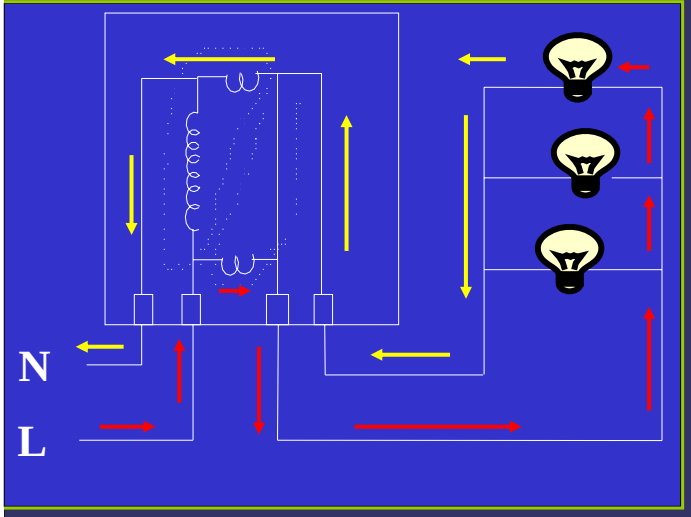
Never buy electronic meters without this feature

But neutral looping may cause the meter to "run Extra"


HOUSE DISTRIBUTION BOX
METER
Fuse
MCB /Switch
Phase
Neutral
D. Box


NORMAL CONNECTION
L
N
$I_{red} = I_{yellow}$
$E_{mech} = E_{elect}$

INPUT PHASE /NEUTRAL INTERCHANGE

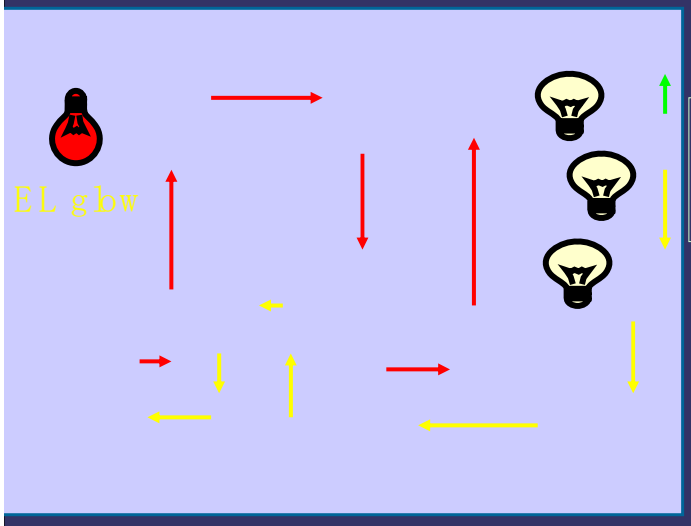


$I_{red} = I_{yellow}$

$E_{mech} = E_{elect}$

NO EFFECT

NEUTRAL TOUCHING TO EARTH

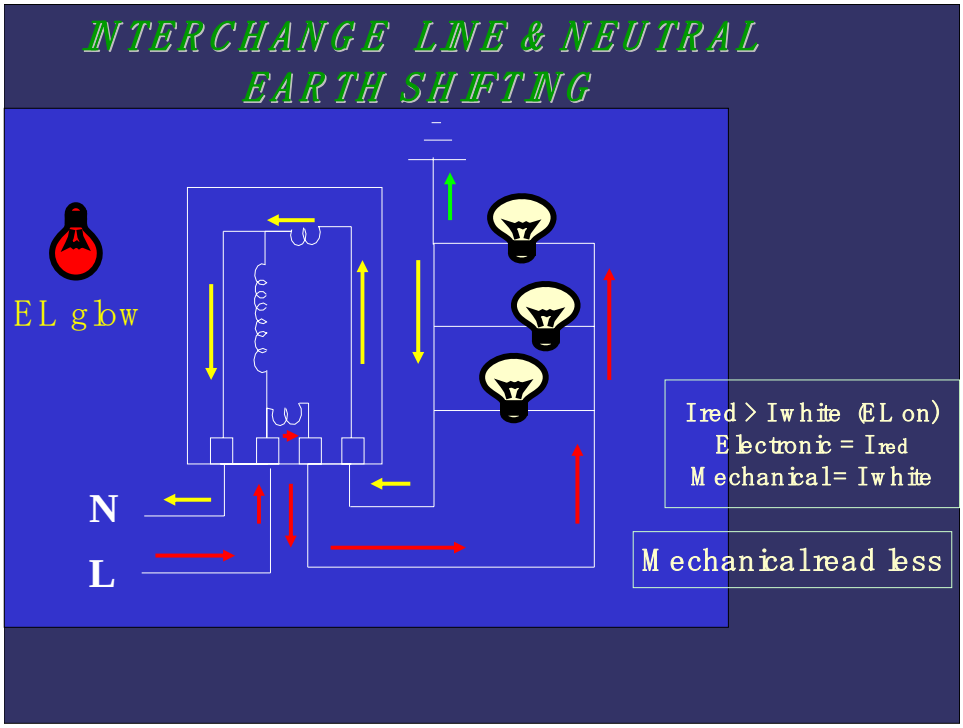


$I_{white} < I_{red}$ (EL on)
Electronic = I_{red}
Mechanical = I_{red}

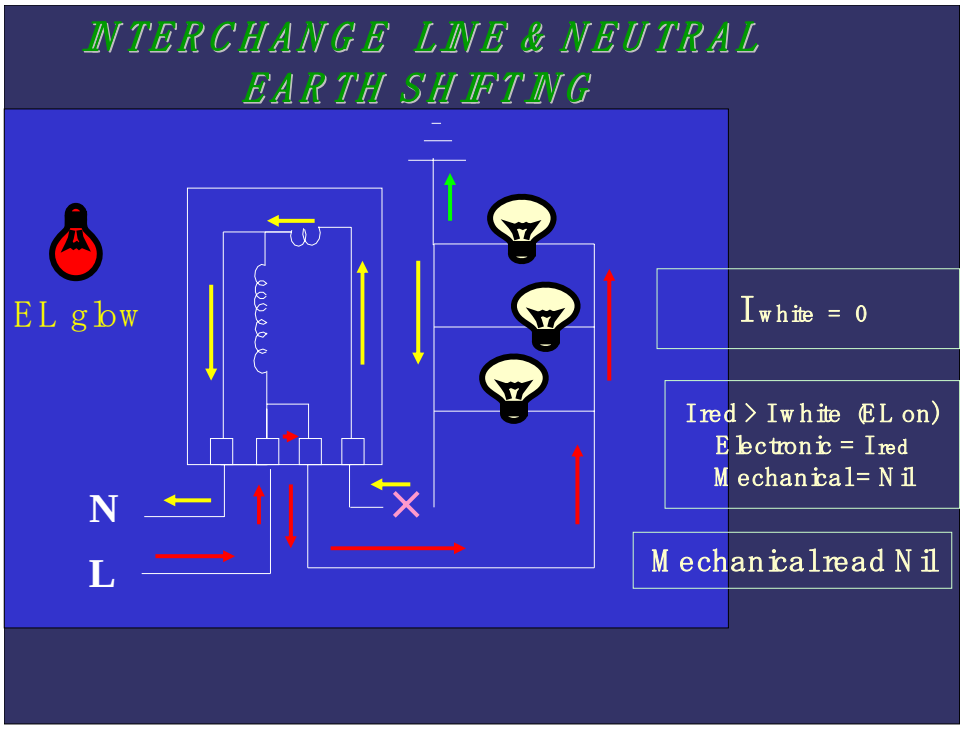
$E_{mech} = E_{elect}$

NO EFFECT

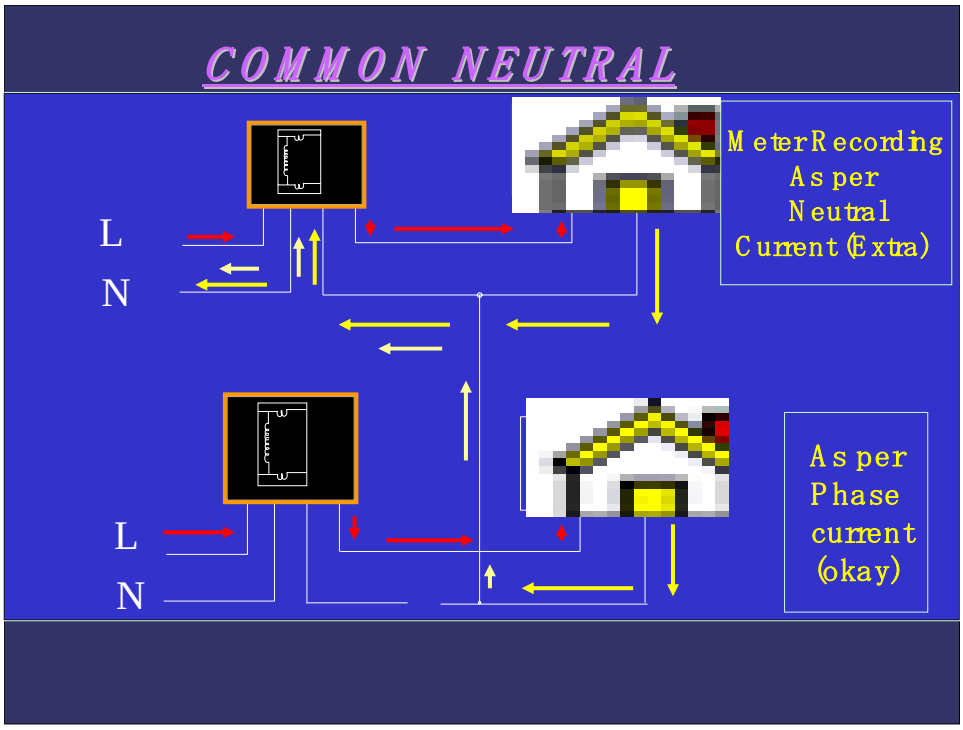
INTERCHANGE LINE & NEUTRAL EARTH SHIFTING

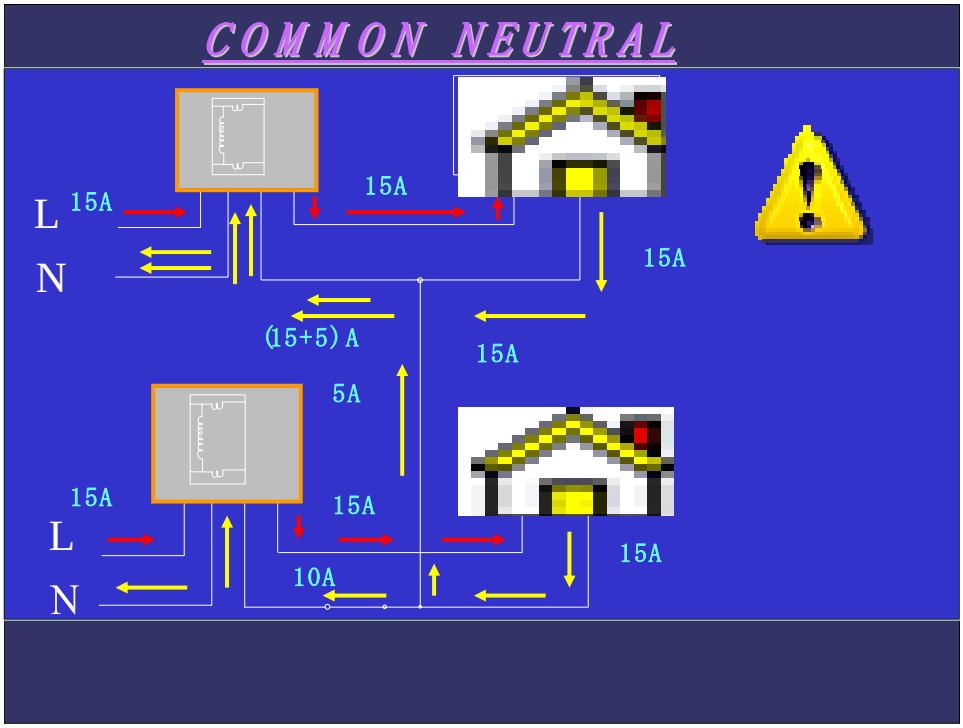


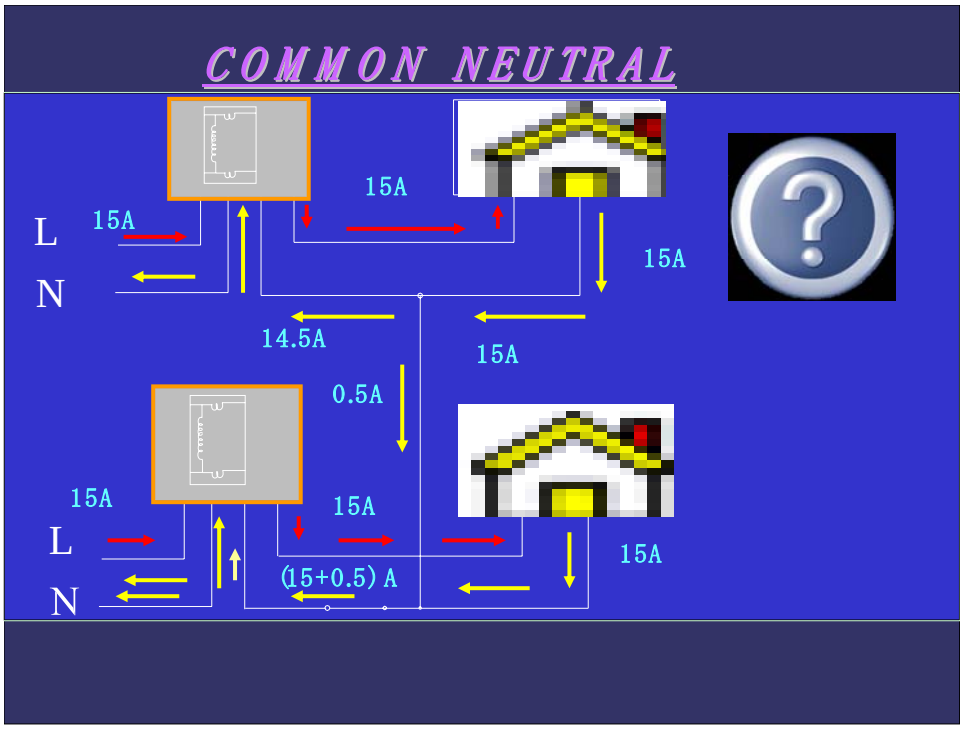
INTERCHANGE LINE & NEUTRAL EARTH SHIFTING

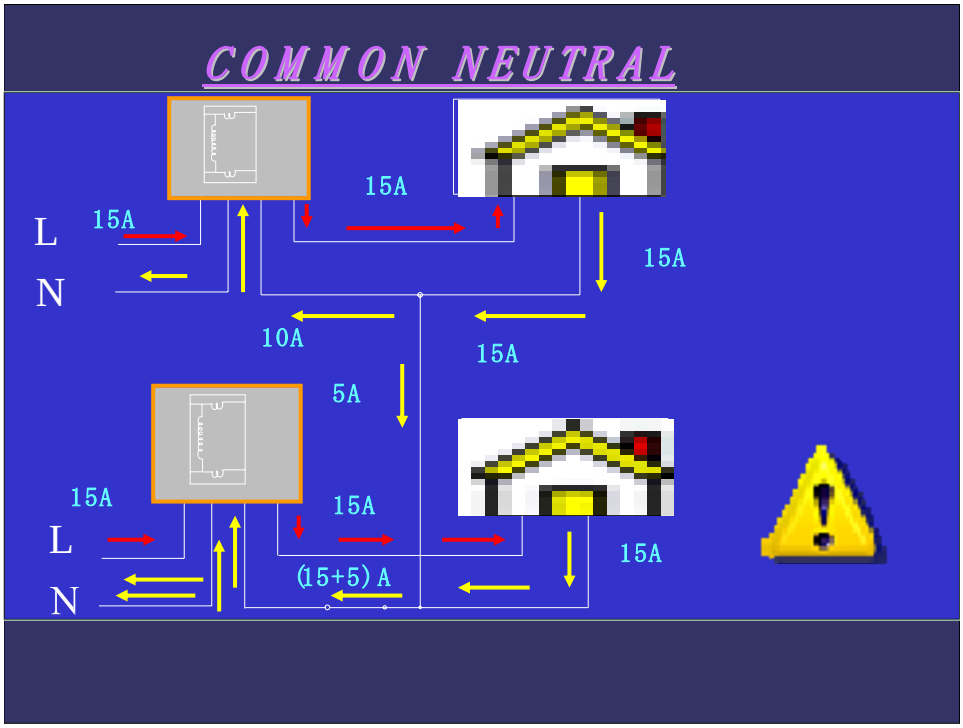


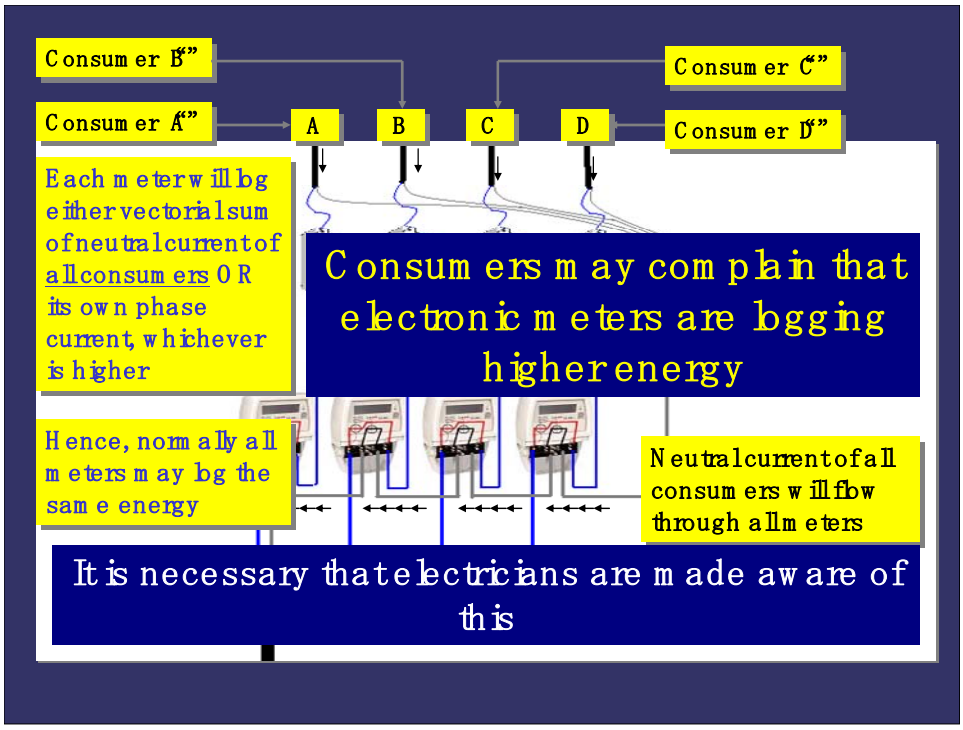

Essential of wiring
practices
in the era of
electronic meters

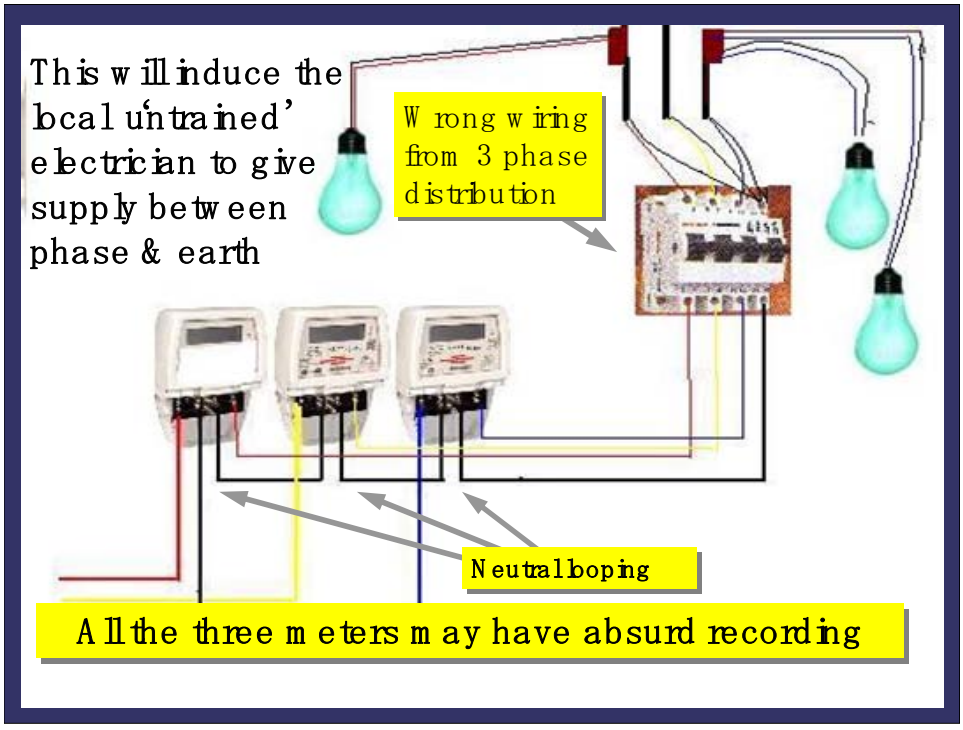

COMMON NEUTRAL
L
N
L
N
Meter Recording
As per
Neutral
Current (Extra)
As per
Phase
current
(okay)

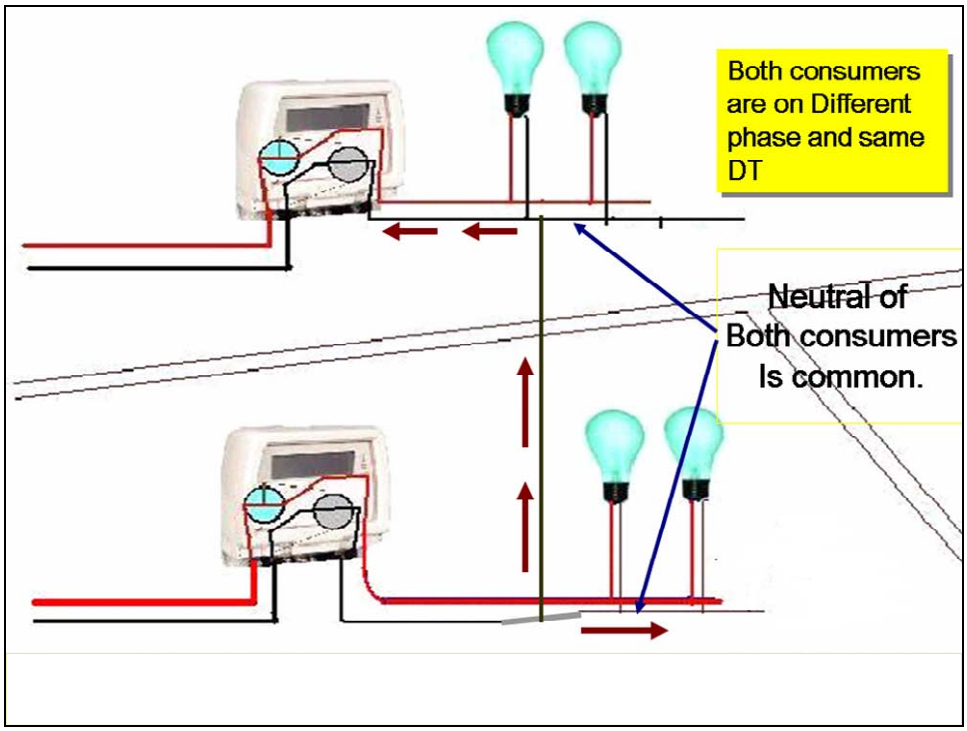

COMMON NEUTRAL
L
N
15A
15A
15A
(15+5) A
15A
5A
15A
15A
15A
10A
L
N

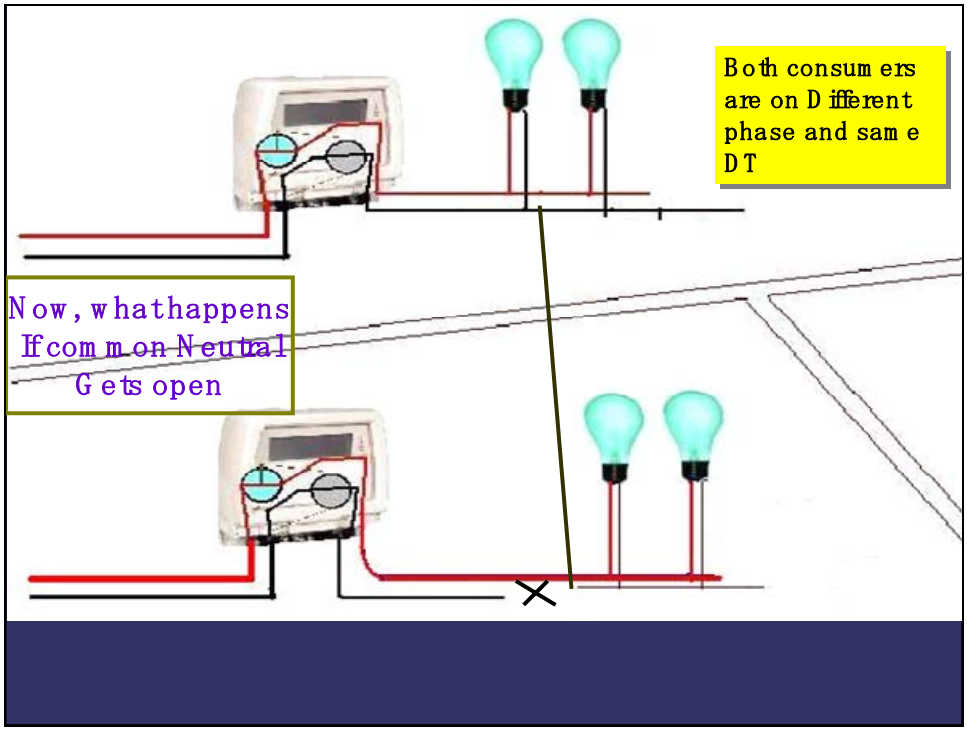

COMMON NEUTRAL
L
N
15A
15A
15A
14.5A
15A
0.5A
15A
15A
15A
(15+0.5) A
L
N


COMMON NEUTRAL
L
N
15A
15A
15A
10A
15A
5A
15A
15A
15A
L
N
(15+5) A


Consumer B"
Consumer C"
Consumer A"
A
B
C
D
Consumer D"
Each meter will log either vectorial sum of neutral current of all consumers OR its own phase current, whichever is higher
Consumers may complain that electronic meters are logging higher energy
Hence, normally all meters may log the same energy
Neutral current of all consumers will flow through all meters
It is necessary that electricians are made aware of this


This will induce the local 'untrained' electrician to give supply between phase & earth
Wrong wiring from 3 phase distribution
Neutral loping
All the three meters may have absurd recording

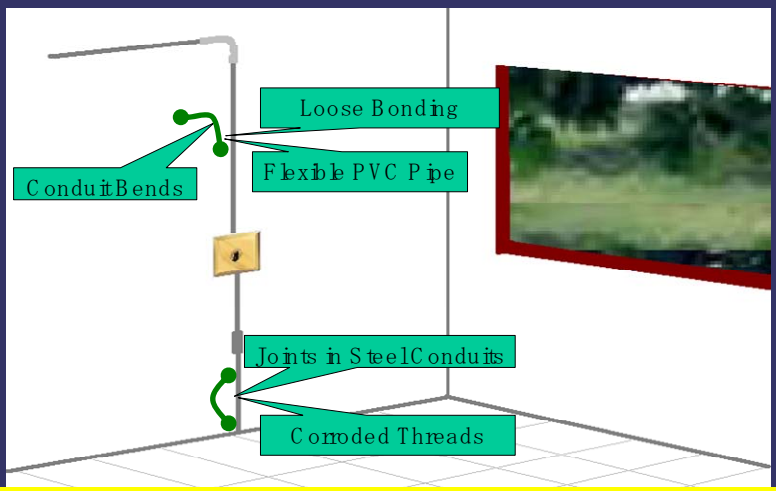

Both consumers are on Different phase and same DT
Neutral of Both consumers Is common.


Both consumers are on Different phase and same DT
Now, what happens If common Neutral Gets open


Common Neutral load also damage appliances
Distribution Transformer
Suddenly Appliance will turn Defective
Neighbour on same may this
Consumer will blame it on supply is not really a fact

Consumers also need education

Consumers need education

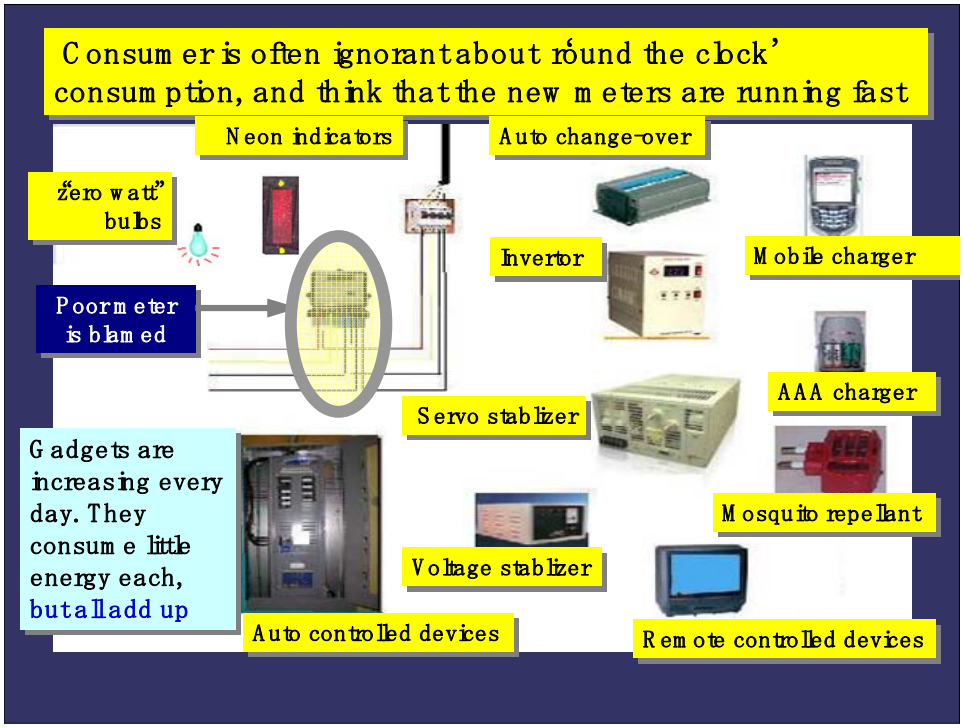


Consumers need education to use earth bonding wires

Consumers can be educated to avoid octopus wiring

Never over-connect gadgets on same plug

Can lead to energy loss & pose a safety hazard

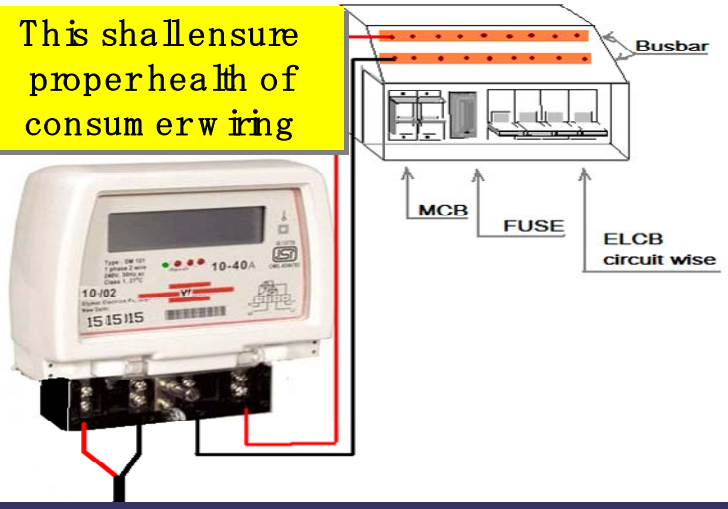


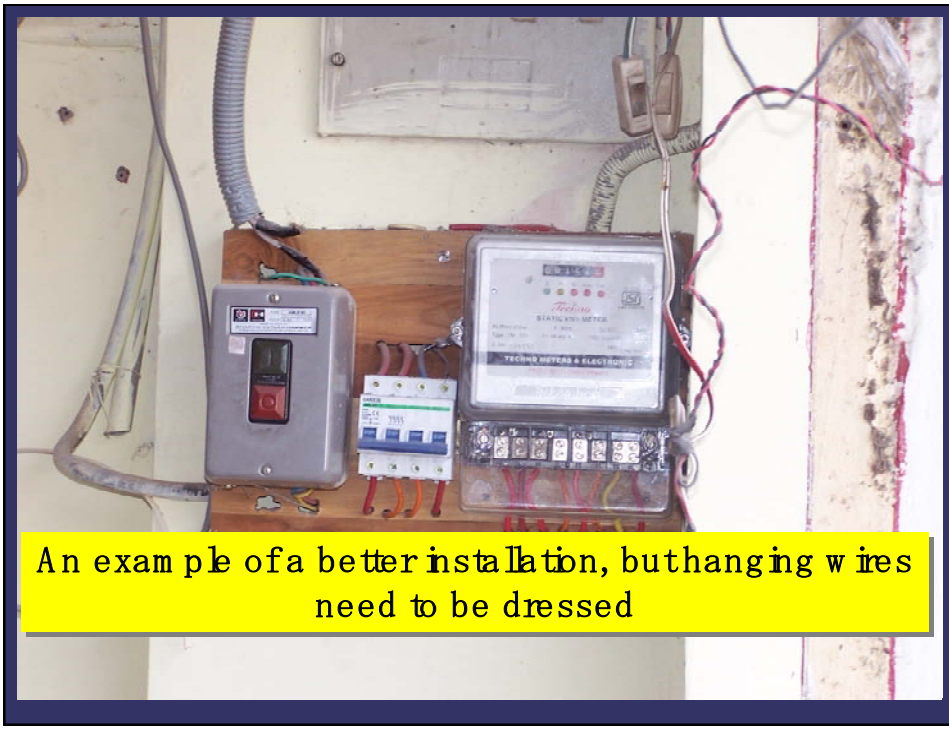
Good Installations take care of

- Neutral looping, insulation between earth & neutral, wire dressing, terminations etc.
- Proper sizing of phase & neutral conductor
- Use of earth bonding conductors for joints/elbows with flexible PVC pipes between MS conduits & trunkings
- Use of cables/trunking with fire retardant properties
- Bonding of metallic sheaths at both ends of run for parallel conductors
- Taking care of bend radius & mechanical stresses
- Shielding for UV radiation in case of XLPE cables etc.

Good Consumer Installation

This shall ensure proper health of consumer wiring





An example of a better installation, but hanging wires need to be dressed

Example of a good installation, showing the wire dressing

Never allow shortcuts in wiring & installation

They prove to become too expensive for not only the consumer, but also for the utility

Correct wiring practice is very relevant for the electronic meter era

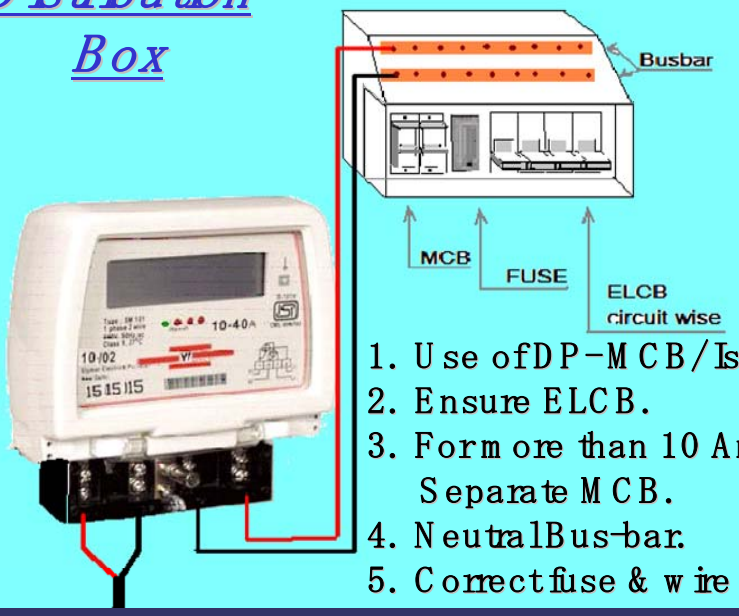
HOUSE WIRING FAULT DETECTION AND CORRECTION.

Wiring Defect

Type Of Defects

- Distribution Box
- Wiring

Distribution Box



1. Use of DP-MCB/Isolator.
2. Ensure ELCB.
3. For more than 10 Amp ckts. Separate MCB.
4. Neutral Bus-bar.
5. Correct fuse & wire size.

Wiring Defect

- Earth (No Neutral)
- N-E
- Common N
- Common P
- Combination

Wiring Defect

Tools

- Clamp on tester
- Bulb tester
- Line tester
- Electrician Kit.

Wiring Defect

Step-1.

If no. of Meter in one Premise is only one then there is no common wire problem.

Step-2. Load On

→ Check I_{phase} & $I_{neutral}$

If Ineutral = 0

Earth is used.

If Ineutral < Iphase

Earth & Neutral Common

Step-3.

If Neutral remove from MCB still bad working than wiring problem.

If total MCB Off and still bad working, then both wire sharing.

Step-4.

At MCB

If Phase Off, then EL Off
Means Neutral-Earth Problem.

Step-5.

If neighbour Phase Off
Then EL Off,
Means Common wire.

Step-6.

If $V_{EN} \neq 0$

Then Earth not touching Neutral

Step-7.

If common wire

Disconnect one by one Neutral Ckt.
From Bus-bar & see if EL off.

Step-8.

Once Ckt. Identified then repair
The defect.

Step-9.

Once again check all current.
ie. $I_p = I_n$

Typical Defect Pts.

- Common Load. E.g. Motor
- Stair Case Light (ie. two way switch.
- Common Invertors / Generator.
- Houses with separate power & light meter.

Typical Pts. Where Earth gets common with neutral

- Metallic body Appliances.
- Appliances connected with metal pipe line.
- Building RCC.

!! Beware !!

Meter can only be touch by
Discom employee.

Thank You

(Published in the Gazette of India, Extraordinary, Part III, section iv)

Central Electricity Authority

New Delhi, dated the 17th March, 2006

NOTIFICATION

No. 502/70/CEA/DP&D In exercise of the powers conferred by sub-section (1) of section 55 and clause (e) of section 73 read with sub-section (2) of section 177 of Electricity Act, 2003, the Central Electricity Authority hereby makes the following regulations for regulating the installation and operation of meters, namely :-

1. Short title and commencement. -

(1) These regulations may be called the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006.

(2) These Regulations shall come into force on the date of their publication in the Gazette of India.

2. Definitions. -

(1) In these regulations, unless the context other wise requires, -

(a) 'Act' means the Electricity Act, 2003;
(b) 'Accredited Test Laboratory' means a test laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL);
(c) 'Active Energy' means the electricity supplied or consumed during a time interval, being the integral of Active Power with respect to time, measured in the units of 'Watt – hours' or standard multiples thereof. One 'kilowatt – hour' (kWh) is one unit;
(d) 'Active Power' means the electrical power, being the product of root mean square (rms) voltage, root mean square (rms) current and cosine of the phase angle between the voltage and current vectors and measured in units of 'Watt' (W) or in standard multiples thereof;
(e) 'Appropriate Load Despatch Centre' means 'National Load Despatch Centre' (NLDC) or 'Regional Load Despatch Centre' (RLDC) or the 'State Load Despatch Centre' (SLDC) as the case may be;
(f) 'Appropriate Transmission Utility' means the 'Central Transmission Utility' (CTU) or the 'State Transmission Utility' (STU), as the case may be;
(g) 'Availability Based Tariff (ABT)' means a tariff structure based on availability of generating units and having components, viz, Capacity Charges (CC),

Energy Charges (EC) or Variable Charges (VC) and charges for Unscheduled Interchange (UI);

(h) 'Buyer' means any generating company or licensee or consumer whose system receives electricity from the system of generating company or licensee;

(i) 'Check Meter' means a meter, which shall be connected to the same core of the Current Transformer (CT) and Voltage Transformer (VT) to which main meter is connected and shall be used for accounting and billing of electricity in case of failure of main meter;

(j) 'Consumer Meter' means a meter used for accounting and billing of electricity supplied to the consumer but excluding those consumers covered under Interface Meters;

(k) 'Correct Meter' means a meter, which shall at least have, features, Accuracy Class and specifications as per the Standards on Installation and Operation of Meters given in Schedule of these Regulations;

(l) 'Energy Accounting and Audit Meters' means meters used for accounting of the electricity to various segments of electrical system so as to carry out further analysis to determine the consumption and loss of energy therein over a specified time period;

(m) 'Instrument Transformer' means the 'Current Transformer' (CT), 'Voltage Transformer' (VT) and 'Capacitor Voltage Transformer' (CVT);

(n) 'Interface Meter' means a meter used for accounting and billing of electricity, connected at the point of interconnection between electrical systems of generating company, licensee and consumers, directly connected to the Inter-State Transmission System or Intra-State_Transmission System who have to be covered under ABT and have been permitted open access by the Appropriate Commission;

(o) 'Main Meter' means a meter, which would primarily be used for accounting and billing of electricity;

(p) 'Meter' means a device suitable for measuring, indicating and recording consumption of electricity or any other quantity related with electrical system and shall include, wherever applicable, other equipment such as Current Transformer (CT), Voltage Transformer (VT) or Capacitor Voltage Transformer (CVT) necessary for such purpose;

(q) 'Power Factor' means the cosine of the electrical angle between the voltage and current vectors in an AC electrical circuit;

(r) 'Prepaid Meter' means a meter which facilitates use of electricity only after advance payment;

(s) 'Reactive Energy' means, the integral of Reactive Power with respect to time and measured in the units of 'Volt-Ampere hours reactive (VARh) or in standard multiples thereof;

(t) 'Reactive Power' means the product of root mean square (rms) voltage, root mean square (rms) current and the sine of the electrical phase angle between the voltage complexor and current complexor, measured in 'Volt – ampere reactive' (VAr) and in standard multiples thereof;

(u) 'Standards' means 'Standards on Installation and Operation of Meters' given in the Schedule of these Regulations unless otherwise any other standard specifically referred;

(v) 'Standby Meter' means a meter connected to CT and VT, other than those used for main meter and check meter and shall be used for accounting and billing of electricity in case of failure of both main meter and check meter;

(w) 'Supplier' means any generating company or licensee from whose system electricity flows into the system of another generating company or licensee or consumer;

(x) 'Time of the Day (TOD) Meter' means a meter suitable for recording and indicating consumption of electricity during specified time periods of the day.

(2) The words and expressions used and not defined in these Regulations but defined in the Act shall have the meaning assigned to them in the Act.

3. Applicability of regulations. -

(1) These Regulations shall be applicable to meters installed and to be installed by all the generating companies and licensees who are engaged in the business of generation, transmission, trading, distribution, supply of electricity and to all categories of consumers.

(2) After coming into force of these regulations, the provisions of the Indian Electricity Rules, 1956 relating to installation and operation of meters in this regard shall not be applicable.

(3) These regulations provide for type, standards, ownership, location, accuracy class, installation, operation, testing and maintenance, access, sealing, safety, meter reading and recording, meter failure or discrepancies, anti tampering features, quality assurance, calibration and periodical testing of meters, additional meters and adoption of new technologies in respect of following meters for correct accounting, billing and audit of electricity:

(i) Interface meter
(ii) Consumer meter
(iii) Energy accounting and audit Meter

4. Type of meters. -

(1) All interface meters, consumer meters and energy accounting and audit meters shall be of static type.

(2) The meters not complying with these regulations shall be replaced by the licensee on his own or on request of the consumer. The meters may also be replaced as per the regulations or directions of the Appropriate Commission or pursuant to the reforms programme of the Appropriate Government.

5. Standards. -

All interface meters, consumer meters and energy accounting and audit meters shall –

(a) comply with the relevant standards of Bureau of Indian Standards (BIS). If BIS Standards are not available for a particular equipment or material, the relevant British Standards (BS), International Electro-technical Commission (IEC) Standards, or any other equivalent Standard shall be followed:

Provided that whenever an international Standard or IEC Standard is followed, necessary corrections or modifications shall be made for nominal system frequency, nominal system voltage, ambient temperature, humidity and other conditions prevailing in India before actual adoption of the said Standard;

(b) conform to the standards on 'Installation and Operation of Meters' as specified in Schedule annexed to these regulations and as amended from time to time.

.

6. Ownership of meters. -

(1) **Interface meters**

(a) All interface meters installed at the points of interconnection with Inter-State Transmission System (ISTS) for the purpose of electricity accounting and billing shall be owned by CTU.

(b) All interface meters installed at the points of interconnection with Intra-State Transmission System excluding the system covered under sub-clause (a) above for the purpose of electricity accounting and billing shall be owned by STU.

(c) All interface meters installed at the points of inter connection between the two licensees excluding those covered under sub-clauses (a) and (b) above for the purpose of electricity accounting and billing shall be owned by respective licensee of each end.

(d) All interface meters installed at the points of inter connection for the purpose of electricity accounting and billing not covered under sub-clauses (a), (b) and (c) above shall be owned by supplier of electricity.

(2) **Consumer meters**

(a) Consumer meters shall generally be owned by the licensee.

(b) If any consumer elects to purchase a meter, the same may be purchased by him. Meter purchased by the consumer shall be tested, installed and sealed

by the licensee. The consumer shall claim the meter purchased by him as his asset only after it is permanently removed from the system of the licensee.

(c) All consumer meters shall bear BIS mark, meet the requirements of these regulations and have additional features as approved by the Appropriate Commission or pursuant to the reforms programme of the Appropriate Government. To facilitate this, the licensee shall provide a list of makes and models of the meters.

(3) **Energy accounting and audit meters**

Energy accounting and audit meters shall be owned by the generating company or licensee, as the case may be.

7. Locations of meters.-

(1) The location of interface meters, consumer meters and energy accounting and audit meters shall be as per the Table given below :

Provided that the generating companies or licensees may install meters at additional locations in their systems depending upon the requirement.

Table

Sl. No	Stages	Main meter	Check meter	Standby meter
A.	**Generating Station**	On all outgoing feeders.	On all outgoing feeders.	(i) High Voltage (HV) side of Generator Transformers (ii) High Voltage (HV) side of all Station Auxiliary Transformers
Explanation: The location of main, check and standby meters installed at the existing generating stations shall not be changed unless permitted by the Authority.				
B.	**Transmission and Distribution System**	At one end of the line between the sub-stations of the same licensee, and at both ends of the line between sub-stations of two different licensees. Meters at both ends shall be considered as main meters for respective	-	There shall be no separate standby meter. Meter installed at other end of the line in case of two different licensees shall work as standby meter.

		licensees.		
C.	**Inter-Connecting Transformer (ICT)**	High Voltage (HV) side of ICT.	-	Low Voltage (LV) side of ICT.
D.	**Consumer directly connected to the Inter-State Transmission System or Intra-State Transmission System who have to be covered under ABT and have been permitted open access by the Appropriate Commission or Any other system not covered above**	As decided by the Appropriate Commission.		

(a) **Interface Meters**

(i) Consumers who have interconnection with the Inter-State Transmission System or Intra-State Transmission System and have been permitted open access by the Appropriate Commission shall be provided with interface meters.

(ii) For consumers connected to distribution system and permitted open acess, provision of interface meters may be made as per the regulations or directions of the Appropriate Commission.

(iii) The scheme for location of interface meters shall be submitted to the CTU or the STU or the CTU or the STU or the licensee by owner of the meter in advance, before the installation of the scheme.

(b) **Consumer meters**

(i) The consumer meter shall be installed by the licensee either at consumer premises or outside the consumer premises:

Provided that where the licensee installs the meter outside the premises of the consumer, then the licensee shall provide real time display unit at the consumer premises for his information to indicate the electricity consumed by the consumer:

Provided further that for the billing purpose, reading of consumer meter and not the display unit shall be taken into account.

(ii) In the event the Appropriate Commission allows supply of electricity directly from a generating company to consumer on a dedicated transmission system, the location of the meter will be as per their mutual agreement.

(c) **Energy accounting and audit meters**

Energy accounting and audit meters shall be installed at such locations so as to facilitate to account for the energy generated, transmitted, distributed and consumed in the various segments of the power system and the energy loss. The location of these meters shall be as under:

(i)Generating Stations

(1) at the stator terminal of the generator;
(2) on HV and LV sides of the station and the unit auxiliary transformers;
(3) on feeders to various auxiliaries.

(ii)Transmission System

All incoming and out going feeders (If the interface meters do not exist).

(iii)Distribution System

(1) all incoming feeders (11 kV and above);
(2) all outgoing feeders (11 kV and above);
(3) Sub-Station Transformer including Distribution Transformer – Licensee may provide the meter on primary or secondary side or both sides depending upon the requirement for energy accounting and audit.

8. Accuracy Class of meters. -

Every meter shall meet the requirement of accuracy class as specified in the standards given in the Schedule.

9. Installation of meters. -

(1) Generating company or licensee, as the case may be, shall examine, test and regulate all meters before installation and only correct meters shall be installed.

(2) The meter shall be installed at locations, which are easily accessible for installation, testing, commissioning, reading, recording and maintenance. The place of installation of meter shall be such that minimum inconvenience and disruptions are caused to the site owners and the concerned organizations.

(3) In case of single phase meters, the consumer shall ensure that there is no common neutral or phase or looping of neutral or phase of two or more consumers on consumers' side wiring. If such common neutral or phase or looping of neutral or phase comes to the notice of the licensee, it shall suitably inform the consumer through installation report or regular electricity bills or meter test report as applicable.

(4) Consumer shall install the Earth Leakage Protective Device (ELPD) in accordance with the provisions of the rules or regulations in this regard.

(5) If the earth leakage indication is displayed in the meter the licensees shall suitably inform the consumer through installation report or regular electricity bills or meter test report as applicable.

(6) In case CTs and VTs form part of the meters, the meter shall be installed as near the instrument transformers as possible to reduce the potential drop in the secondary leads.

10. Operation, Testing and Maintenance of meters. -

The operation, testing and maintenance of all types of meters shall be carried out by the generating company or the licensee, as the case may be.

11. Access to meter. -

The owner of the premises where, the meter is installed shall provide access to the authorized representative(s) of the licensee for installation, testing, commissioning, reading and recording and maintenance of meters.

12. Sealing of meters. -

(1) Sealing Arrangements

(a) All meters shall be sealed by the manufacturer at its works. In addition to the seal provided by the manufacturer at its works, the sealing of all meters shall be done as follows at various sealing points as per the standards given in the Schedule:

(i) Sealing of interface meters, shall also be done by both the supplier and the buyer.
(ii) Sealing of consumer meters shall be done by the licensee.
(iii) Sealing of energy accounting and audit meters shall be done by the licensee or generating company as the case may be.

(b) A tracking and recording software for all new seals shall be provided by the manufacturer of the meter so as to track total movement of seals starting from manufacturing, procurement, storage, record keeping, installation, series of inspections, removal and disposal.

(c) Seal shall be unique for each utility and name or logo of the utility shall be clearly visible on the seals.

(d) Only the patented seals (seal from the manufacturer who has official right to manufacture the seal) shall be used.

(e) Polycarbonate or acrylic seals or plastic seals or holographic seals or any other superior seal shall be used.

(f) Lead seals shall not be used in the new meters. Old lead seals shall be replaced by new seals in a phased manner and the time frame of the same shall be submitted by the licensee to the Appropriate Commission for approval.

(2) Removal of seals from meters

(a) Interface meters

Whenever seals of the interface meters have to be removed for any reason, advance notice shall be given to other party for witnessing the removal of seals and resealing of the interface meter. The breaking and re-sealing of the meters shall be recorded by the party, who carried out the work, in the meter register, mentioning the date of removal and resealing, serial numbers of the broken and new seals and the reason for removal of seals.

(b) Consumer meters

Seal of the consumer meter shall be removed only by the licensee. No consumer shall tamper with, break or remove the seal under any circumstances. Any tampering, breaking or removing the seal from the meter shall be dealt with as per relevant provisions of the Act.

(c) Energy accounting and audit meters

Seal of the energy accounting and audit meter shall be removed only by the generating company or the licensee who owns the meter.

13. Safety of meters. -

(1) The supplier or buyer in whose premises the interface meters are installed shall be responsible for their safety.

(2) The consumer shall, as far as circumstances permit, take precautions for the safety of the consumer meter installed in his premises belonging to the licensee.

(3) Licensee shall be responsible for the safety of the consumer meter located outside the premises of the consumer and the consumer shall be responsible for the safety of the real time display unit installed by the licensee in consumer premises.

(4) The generating company or the licensee who owns the energy accounting and audit meters shall be responsible for its safety.

14. Meter reading and recording. -

(1) **Interface meters**

It shall be the responsibility of the Appropriate Transmission Utility or the licensee to take down the meter reading and record the metered data, maintain database of all the information associated with the interface meters and verify the correctness of metered data and furnish the same to various agencies as per the procedure laid down by the Appropriate Commission.

(2) **Consumer meters**

(a) It shall be the responsibility of the licensee to record the metered data, maintain database of all the information associated with the consumer meters and verify the correctness of metered data.

(b) The licensee shall maintain accounts for the electricity consumption and other electrical quantities of its consumers.

(c) Brief history, date of installation and details of testing, calibration and replacement of meters shall be maintained by the licensee.

(3) **Energy accounting and audit meters**

It shall be the responsibility of the generating company or licensee to record the metered data, maintain database of all the information associated with the energy accounting and audit meters and verify the correctness of metered data. Each generating company or licensee shall prepare quarterly, half-yearly and yearly energy account for its system for taking appropriate action for efficient operation and system development.

15. Meter failure or discrepancies. -

(1) **Interface meters**

(a) Whenever difference between the readings of the Main meter and the Check meter for any month is more than 0.5%, the following steps shall be taken:

(i) checking of CT and VT connections;
(ii) testing of accuracy of interface meter at site with reference standard meter of accuracy class higher than the meter under test.

If the difference exists even after such checking or testing, then the defective meter shall be replaced with a correct meter.

(b) In case of conspicuous failures like burning of meter and erratic display of metered parameters and when the error found in testing of meter is beyond the permissible limit of error provided in the relevant standard, the meter shall be immediately replaced with a correct meter.

(c) In case where both the Main meter and Check meter fail, at least one of the meters shall be immediately replaced by a correct meter.

(d) Billing for the Failure period:

(i) The billing for the failure period of the meter shall be done as per the procedure laid down by the Appropriate Commission.

(ii) Readings recorded by Main, Check and Standby meters for every time slot shall be analysed, crosschecked and validated by the Appropriate Load Despatch Centre (LDC). The discrepancies, if any, noticed in the readings shall be informed by the LDC in writing to the energy accounting agency for proper accounting of energy. LDC shall also intimate the discrepancies to the Appropriate Transmission Utility or the licensee, who shall take further necessary action regarding testing, calibration or replacement of the faulty meters in accordance with the provisions laid down.

(e) The defective meter shall be immediately tested and calibrated

(2) **Consumer meters**

In case the consumer reports to the licensee about consumer meter readings not commensurate with his consumption of electricity, stoppage of meter, damage to the seal, burning or damage of the meter, the licensee shall take necessary steps as per the procedures given in the Electricity Supply Code of the Appropriate Commission read with the notified conditions of supply of electricity.

(3) **Energy accounting and audit meters**

Energy accounting and audit meters shall be rectified or replaced by the generating company or licensee immediately after notice of any of the following abnormalities:

(a) the errors in the meter readings are outside the limits prescribed for the specified Accuracy Class;
(b) meter readings are not in accordance with the normal pattern of the load demand;
(c) meter tampering, or erratic display or damage.

16. Anti-tampering features of meters. -

The meters shall be provided with such anti-tampering features as per the Standards on Installation and Operation of Meters given in the Schedule.

17. Quality assurance of meters. -

(1) The distribution licensee shall put in place a system of quality assurance and testing of meters with the approval of Appropriate Commission.

(2) The licensee shall set up appropriate number of accredited testing laboratories or utilize the services of other accredited testing laboratories. The licensee shall take immediate action to get the accreditations of their existing meter testing laboratories from NABL, if not already done.

(3) The generating company or licensee shall ensure that all type, routine and acceptance tests are carried out by the manufacturer complying with the requirement of the relevant IS or BS or IEC as the case may be.

18. Calibration and periodical testing of meters. –

(1) **Interface meter**

(a) At the time of commissioning, each interface meter shall be tested by the owner at site for accuracy using standard reference meter of better accuracy class than the meter under test.

(b)All interface meters shall be tested at least once in five years. These meters shall also be tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Whenever there is unreasonable difference between the quantity recorded by interface meter and the corresponding value monitored at the billing center via communication network, the communication system and terminal equipment shall be tested and rectified. The meters may be tested using NABL accredited mobile laboratory or at any accredited laboratory and recalibrated if required at manufacturer's works.

(c) Testing and calibration of interface meters may be carried out in the presence of the representatives of the supplier and buyer. The owner of the meter shall send advance notice to the other party regarding the date of testing.

(2) **Consumer meters**

The testing of consumer meters shall be done at site at least once in five years. The licensee may instead of testing the meter at site can remove the meter and replace the same by a tested meter duly tested in an accredited test laboratory. In addition, meters installed in the circuit shall be tested if study of consumption pattern changes drastically from the similar months or season of the previous years or if there is consumer's complaint pertaining to a meter. The standard reference meter of better accuracy class than the meter under test shall be used for site testing of consumer meters up to 650 volts. The testing for consumers meters above 650 volts should cover the entire metering system including CTs, VTs. Testing may be carried out through NABL accredited mobile laboratory using secondary injection kit, measuring unit and phantom loading or at any accredited test laboratory and recalibrated if required at manufacturer's works.

(3) **Energy accounting and audit meters**

Energy accounting and audit meters shall be tested at site at least once in five years or whenever the accuracy is suspected or whenever the readings are inconsistent with the readings of other meters, e.g., check meters, standby meters. The testing must be carried out without removing the CTs and VTs connection. Testing may be carried out through NABL accredited mobile laboratory using secondary injection kit, measuring unit and phantom loading or at any accredited test laboratory and recalibrated if required at manufacturer's works.

19. Additional meters. -

In addition to any meter which may be placed for recording the electricity consumed by the consumer, the licensee may connect additional meters, maximum demand indicator or other apparatus as he may think fit for the purposes of ascertaining or regulating either the quantity of electricity supplied to the consumer, or the number of hours during which the supply is given, or the rate per unit of time at which energy is supplied to the consumer, or any other quantity or time connected with the supply to consumer:

Provided that the meter, indicator or apparatus shall not, in the absence of an agreement to the contrary, be placed otherwise than between the distributing mains of the licensee and any meter:

Provided further that, where the charges for the supply of energy depend wholly or partly upon the reading or indication of any such meter, indicator or apparatus as aforesaid, the licensee shall, in the absence of an agreement to the contrary, keep the meter, indicator or apparatus correct.

20. Adoption of new technologies. -

The distribution licensee shall make out a plan for introduction and adoption of new technologies such as pre-paid meters, time of the day meters (TOD), automatic remote meter reading system through appropriate communication system with the approval of the Appropriate Commission or as per the regulations or directions of the Appropriate Commission or pursuant to the reforms programme of the Appropriate Government.

SCHEDULE

(see regulations 2,5,8,12 and 16)

Standards on Installation and Operation of Meters

Part I Standards Common To All Type of Meters

(1) These standards provide for specification of meters, immunity to external factors, sealing points and functional requirements that are required from regulatory perspective. Detailed technical specification shall be prepared by the purchaser of the meter.

(2) **Specifications of meters**

<table>
<tr><td>Standard Reference Voltage</td><td>As per IS</td></tr>
<tr><td>Voltage Range</td><td>As per IS</td></tr>
<tr><td>Standard Frequency</td><td>As per IS</td></tr>
<tr><td>Standard Basic Current</td><td>As per IS

(Current range of consumer meters shall be so chosen as to record the load current corresponding to the sanctioned load)</td></tr>
<tr><td>Accuracy Class</td><td>Meters shall meet the following requirements of Accuracy Class:

<table>
<tr><td>Interface meters</td><td>0.2S</td></tr>
<tr><td colspan="2">Consumer meters</td></tr>
<tr><td>Up to 650 volts</td><td>1.0 or better</td></tr>
<tr><td>Above 650 volts and up to 33 kilo volts</td><td>0.5S or better</td></tr>
<tr><td>Above 33 kilo volts</td><td>0.2S</td></tr>
<tr><td colspan="2">Energy accounting and audit meters

The accuracy class of meters in generation and transmission system shall not be inferior to that of 0.2S Accuracy Class. The accuracy class of meters in distribution system shall not be inferior to that of 0.5S Accuracy Class</td></tr>
</table>
</td></tr>
<tr><td>Starting Current and Maximum Current</td><td>As per IS</td></tr>
</table>

Power Factor Range	As per IS
Power Frequency Withstand Voltage	As per IS
Impulse Voltage Withstand Test for 1.2/50 micro sec	As per IS
Power Consumption	As per IS

(3) Meter shall have downloading facilities of metered data through Meter Reading Instrument (MRI).

(4) **Immunity to External Factors**

The meter shall be immune to external influences like magnetic induction, vibration, electrostatic discharge, switching transients, surge voltages, oblique suspension and harmonics and necessary tests shall be carried out in accordance with relevant standard.

(5) **Sealing Points**

Sealing shall be done at the following points (as applicable):

(a) Meter body or cover

(b) Meter terminal cover

(c) Meter test terminal block

(d) Meter cabinet

(6) The accuracy class of Current transformers (CTs) and Voltage transformers (VTs) shall not be inferior to that of associated meters. The existing CTs and VTs not complying with these regulations shall be replaced by new CTs and VTs, if found defective, non-functional or as per the directions of the Appropriate Commission. In case the CTs and VTs of the same Accuracy Class as that of meters can not be accommodated in the metering cubicle or panel due to space constraints, the CTs and VTs of the next lower Accuracy Class can be installed.

(7) The Voltage Transformers shall be electromagnetic VT or Capacitive Voltage Transformer (CVT).

Part II Standards for interface meters

(1) **Functional Requirements:**

(a) The Interface meters suitable for ABT shall be static type, composite meters , as self –contained devices for measurement of active and reactive energy, and certain other parameters as described in the following paragraphs. The meters shall be suitable for being connected directly to voltage transformers (VTs) having a rated secondary line-to-line voltage of 110 V, and to current transformers (CTs) having a rated secondary current of IA (Model-A :3 element 4 wire or Model C: 2 element , 3 wire) or 5A (model-B: 3 element , 4 wire or Model D: 2 element 3 wire). The reference frequency shall be 50Hz.

(b) The meters shall have a non-volatile memory in which the following shall be automatically stored:

(i) Average frequency for each successive 15-minute block, as a two digit code (00 to 99 for frequency from 49.0 to 51.0Hz).
(ii) Net Wh transmittal during each successive 15-minute block, upto second decimal, with plus/minus sign.
(iii) Cumulative Wh transmittal at each midnight, in six digits including one decimal.
(iv) Cumulative VArh transmittal for voltage high condition, at each midnight, in six digits including one decimal.
(v) Cumulative VArh transmittal for voltage low condition, at each midnight, in six digits including one decimal.
(vi) Date and time blocks of failure of VT supply on any phase, as a star(*) mark.

(c) The meters shall store all the above listed data in their memories for a period of at least ten days. The data older than ten days shall get erased automatically. Each meter shall have an optical port on its front for tapping all data stored in its memory using a hand held data collection device. The meter shall be suitable for transmitting the data to remote location using appropriate communication medium.

(d) The active energy (Wh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy as per class 0.2 S of IEC-687/IEC-62053-22. In model-A and C, the energy shall be computed directly in CT and VT secondary quantities, and indicated in watt-hours. In model-B and Model D , the energy display and recording shall be one fifth of the Wh computed in CT and VT secondary quantities.

(e) The Var and reactive energy measurement shall also be on 3-phase, 4-wire principle, with an accuracy as per class 2 of IEC-62053-23 or better. In model-A or Model C, the Var and VArh computation shall be directly in CT and VT secondary quantities. In model-B or Model D, the above quantities shall be displayed and recorded as one-fifth of those computed in CT and VT secondary quantities. There shall be two reactive energy registers, one for the period when average RMS voltage is above 103% and the other for the period the voltage is below 97%.

(f) The 15-minute Wh shall have a +ve sign when there is a net Wh export from substation busbars, and a –ve sign when there is a net Wh import. The integrating (cumulative) registers for Wh and Varh shall move forward when there is Wh/Varh export from substation busbars, and backward when there is an import.

(g) The meters shall also display (on demand), by turn, the following parameters :

(i) Unique identification number of the meter
(ii) Date
(iii) Time
(iv) Cumulative Wh register reading
(v) Average frequency of the previous 15-minute block
(vi) Net Wh transmittal in the previous 15-minute block, with +/-sign
(vii) Average percentage voltage
(viii) Reactive power with +/- sign
(ix) Voltage-high VArh register reading
(x) Voltage-low VArh register reading.

(h) The three line-to-neutral voltages shall be continuously monitored, and in case any of these falls below 70%, the condition shall be suitably indicated and recorded. The meters shall operate with the power drawn from the VT secondary circuits, without the need for any auxiliary power supply. Each meter shall have a built-in calendar and clock, having an accuracy of 30 seconds per month or better.

(i) The meters shall be totally sealed and tamper-proof, with no possibility of any adjustment at site, except for a restricted clock correction. The harmonics shall be filtered out while measuring Wh, Var and VArh, and only fundamental frequency quantities shall be measured/computed.

(j) The Main meter and the Check meter shall be connected to same core of CTs and VTs.

Part III Standards for consumers meters

(1) **Measuring Parameters**

(a) The consumer meter shall be suitable for measurement of cumulative active energy utilized by the consumer.

(b) The consumer meter may have the facilities to measure, record and display one or more of the following parameters depending upon the tariff requirement for various categories of consumers. All parameters excluding instantaneous electrical parameters shall also be stored in memory.

(i) Cumulative reactive energy

(ii) Average power factor

(iii) Time of use of energy

(iv) Apparent power

(v) Maximum demand

(vi) Phase voltage and line currents

(2) All the three phase meters shall have data storage capacity for at least 35 days in a non-volatile memory.

(3) **Anti-Tampering Features**

(a) The meter shall not get damaged or rendered non-functional even if any phase and neutral are interchanged.

(b) The meter shall register energy even when the return path of the load current is not terminated back at the meter and in such a case the circuit shall be completed through the earth. In case of metallic bodies, the earth terminal shall be brought out and provided on the outside of the case.

(c) The meter shall work correctly irrespective of the phase sequence of supply (only for poly phase).

(d) In the case of 3 phase, 3 wire meter even if reference Y phase is removed, the meter shall continue to work. In the case of 3 phase, 4 wire system, the meter shall keep working even in the presence of any two wires i.e., even in the absence of neutral and any one phase or any two phases.

(e) In case of whole current meters and LV CT operated meter, the meter shall be capable of recording energy correctly even if input and output terminals are interchanged.

(f) The registration must occur whether input phase or neutral wires are connected properly or they are interchanged at the input terminals.

(g) The meter shall be factory calibrated and shall be sealed suitably before dispatch.

(h) The meter shall be capable of recording occurrences of a missing potential (only for VT operated meters) and its restoration with date and time of first such occurrence and last restoration along with total number and duration of such occurrences during the above period for all phases.

(i) Additional anti-tampering features including logging of tampers such as current circuit reversal, current circuit short or open and presence of abnormal magnetic field may be provided as per the regulations or directions of the Appropriate Commission or pursuant to the reforms programme of the Appropriate Government.

Part IV Standards for energy accounting and audit meters

(1)The energy accounting and audit meters shall be suitable for measurement, recording and display of cumulative active energy with date and time.

(2) The energy accounting and audit meters may also have the facility to measure, record and display one or more of the following parameters depending upon the energy accounting and audit requirement. All parameters excluding instantaneous electrical parameters shall also be stored in memory.

(a) Apparent power

(b) Phase wise kilowatt at peak KVA

(c) Phase wise KVA(reactive) at peak KVA

(d) Phase wise voltage at peak KVA

(e) Power down time

(f) Average power factor

(g) Line currents

(h) Phase voltages

(i) Date and time

(j) Tamper events

(3) The energy accounting and audit meter shall have data storage capacity for at least 35 days in a non-volatile memory.

(4) Energy accounting and audit meters shall have facility to download the parameters through meter reading instruments as well as remote transmission of data over communication network.

Sd/-

(R. Dahiya)
Secretary, Central Electricity Authority

Extract of DERC Supply Code and Performance Standards Regulations, 2007

Chapter V

METERING AND BILLING

Metering

35. General

i No installation shall be serviced without a meter except where specifically exempted by the Commission. All meters shall conform to requirements as laid down in the Regulations issued by the Authority under Section 55 of the Act.

ii The Licensee shall comply with the Regulations referred at sub-clause (i) above for energizing a new connection or for replacement of meter or for other purposes such as energy audit and interface meter. The consumer, if so desired, may procure a meter conforming to the regulations issued by the Authority under Section 55 of the Act and the Licensee shall test, install and seal the meter.

Provided that, if any consumer elects to provide his own meter at any stage, the same shall be procured by Licensee at consumer's cost or the consumer may purchase on his own. Meter purchased by the consumer or on consumer's behalf, shall be tested, installed and sealed by the Licensee. The said meter will, however, have to be consistent with the CEA Regulations published under section 55 of the Act and should have all additional features approved by the Commission. The features approved by the Commission shall be posted on the website of the Licensees. The consumer shall claim the meter purchased by him or paid by him as his asset only after it is permanently removed from the system of the Licensee.

iii The responsibility of keeping the meter under safe custody shall lie with the consumer. The consumer shall provide suitable and adequate space for installation of the meter where the licensee or its representatives may have ready access. The consumer shall promptly notify the licensee about any fault, accident or problem noticed with the meter.

iv It shall be the responsibility of the Licensee to maintain the meter and keep it in working order at all times.

v The Licensee shall evolve a format of Meter Particulars Sheet for recording the particulars of the meters at the time of installation and replacement. A copy of the sheet duly signed by the authorized signatory of the Licensee shall be made available to the consumer under proper receipt. Initial installation and replacement of the meter shall be done by the engineer of the Licensee in the presence of the consumer or his authorized representative after giving one week's notice. The consumer or his authorized representative shall sign the meter particulars sheet.

vi Licensee may also have a provision of such metering system where the display unit is at the consumer premises and where the metering unit is outside the premises such as pole etc. In such cases, the responsibility of safe custody of metering unit shall lie with the Licensee.

vii The treatment of meter seals shall be in accordance with Section 12 of Regulations of the Authority.

36. Wiring

(i) Consumer shall install the wiring at its premises as per the provisions of the Indian Electricity Rules, 1956 and Standards specified by Bureau of Indian Standards.

(ii) At the time of testing of installation, if the Licensee's representative finds that there is a defect in the consumer wiring, he shall serve notice in writing to make such modifications as are necessary to render the installation safe.

(iii) The connection shall be energized only on removal of the defect.

(iv) The licensee shall disseminate information with respect to Earth leakage in internal wiring for consumer benefit, as also about the need to maintain distinct phase and neutral wires per metered network within the premises.

37. Reading of meters

i. The meter shall be read once in every billing cycle. It shall be the duty of Licensee official reading the meter to check condition of LEDs (light emitting device) on electronic meters. In case E/L LED indicator, provided on electronic meters, is found 'ON' he shall inform the consumer that there is leakage in the premises and advise him to get his wiring checked and leakage removed. He shall also inform concerned district manager about the leakage.

ii. The consumer shall extend all facilities to the Licensee to read the meter.

iii. In case, for any reason, meter is not read during any billing cycle, the Licensee shall send a provisional bill based on average consumption of last three billing cycles when readings were taken. Such provisional billing shall not continue for more than two billing cycles at a stretch. The amount so paid shall be adjusted against the bill raised on the basis of actual meter reading during subsequent billing cycles. Alternatively, if the consumer furnishes the meter reading(s) himself, the billing for that billing cycles(s) shall be done based on that/those reading(s) subject to adjustment in next billing cycle.

iv. If the meter is rendered inaccessible on two consecutive meter reading dates, the Licensee shall serve a fifteen days clear notice to the consumer under proper receipt, to keep open the premise for taking meter reading on date and time indicated in the notice. If the consumer does not comply with the notice, the Licensee shall after expiry of the notice period cut off supply of the consumer for so long as such refusal or failure continues.

v. If the provisional billing continues for more than two billing cycles, compensation as specified in Schedule III shall be paid by the Licensee.

vi. When a domestic consumer gives prior information in writing about inaccessibility of the meter to the Licensee due to continued absence from residence, the Licensee shall not send any notice/provisional bill to the consumer provided the consumer pays the fixed charges for such period in advance. Whenever the meter is made accessible by the consumer for taking the meter reading, the entire consumption shall be taken as if the

consumption was for the period excluding the intimated period of inaccessibility. This facility shall be available to the consumer if he has paid up to date dues.

vii. If the consumer desires to have a special reading taken, the same shall be arranged by the Licensee and the charge, as prescribed in this Regulation, shall be included in the next bill of the consumer.

38. Testing of meters

(1) The Licensee shall conduct periodical inspection/testing and calibration of the meters as specified by the Regulations framed by Authority in this regard, in the following manner:

a. *Periodicity of meter tests*

The Licensee shall observe following time schedule for regular meter testing:

Category	Interval of testing
Railways, DMRC	Six months
Bulk supply meters (HT)	One year
LT meters	Five years

b. Should the consumer dispute the accuracy of the meter, he may, upon giving notice/complaint to that effect and after paying the prescribed testing fee, have the meter tested by the Licensee.

c. The Licensee shall, within fifteen days of receiving the complaint, carry out testing of the meter as per the procedure prescribed herein, and shall furnish duly authenticated test results to the consumer. The consumer shall be informed of proposed date and time of testing at least two days in advance.

d. The meter testing team of the Licensee shall ensure testing with resistive load of sufficient capacity to carry out the testing. The testing of meter shall be done for a minimum consumption of 1 kWh. Optical Scanner shall be used for counting the pulses/revolutions. The meter testing report shall be in the format given in **ANNEXE-VII** or as approved by the Commission from time to time.

e. When the meter is found to be fast beyond the limits of accuracy specified by the Regulations framed by the Authority in this regard, the Licensee

/consumer, as the case may be, shall replace/rectify the defective meter within fifteen days of testing. The Licensee shall adjust/refund the excess amount collected on account of the said defect, based on percentage error, for a maximum period of six months or less depending on period of installation of meter prior to the date of consumer's complaint and up to the date on which defective meter is replaced/rectified.

f. When the meter is found to be slow beyond the limits of accuracy, specified in the Regulations framed by the Authority and the consumer does not dispute the accuracy of the test, the Licensee/consumer, as the case may be, shall replace/rectify the defective meter within fifteen days of testing. The consumer shall pay the difference due to the defect in the meter at normal rates, based on percentage error, for a maximum period of not more than six months or less depending on period of installation of meter prior to date of test and up to the date on which defective meter is replaced/rectified.
g. If the consumer or his representative disputes or refuses to sign the test report, the defective meter shall not be replaced and the Licensee shall approach the designated Electrical Inspector or any authorized third party, who shall test the correctness of the meter and give results within one month. The Commission shall notify the third party in accordance with the National Electricity Policy. The decision of the Inspector or such authorized third party shall be final and binding on the Licensee as well as the consumer.
h. The Licensee shall keep record of all such meter tests and submit to the Commission, exception report every six months.

39. Meter not recording

a. If the meter is not recording/stuck as reported by the consumer, the Licensee shall check the meter within fifteen days of receipt of complaint and if found not recording/stuck, the meter shall be replaced by the Licensee/consumer, as the case may be, within fifteen days thereafter.
b. Where the Licensee observes that meter is not recording any consumption for the last two consecutive billing cycles, he shall notify the consumer.

Thereafter, the Licensee shall check the meter and if the meter is found stuck/stopped, the meter shall be replaced within seven days.

40. Burnt meter

a. In case the meter is found burnt upon inspection by the Licensee on consumer's complaint or otherwise, the Licensee shall restore connection in six hours upon receiving the complaint by bypassing the burnt meter after ensuring that necessary corrective action at site is taken to avoid future damage. New meter shall be provided by the Licensee/consumer, as the case may be, within three days.

b. The Licensee shall get the burnt meter removed from site/consumer's premises and test the same. If it is established, based on test results, that meter got burnt due to technical reasons e.g. voltage fluctuation, transients etc. attributable to system constraints, the Licensee shall bear the cost of meter.

In case upon inspection of the consumer's installation and subsequent examination of the meter, it is established that meter got burnt due to reasons attributable to the consumer e.g. tampering, defect in consumer's installation, meter getting wet due to falling of water, connection of unauthorized load by the consumer etc., the consumer shall bear cost of procuring and installing the new meter. The consumer shall also pay to the licensee the cost of the meter less the depreciation at the rate of 6% per annum (or the rate approved by the Commission for ARR purposes from time to time) from the date of installation.

c. In case the meter is found burnt and there is reason to believe that an official of the Licensee gave a direct connection, pending replacement of meter, a case of theft of energy shall not be booked. Consumer's complaint for replacement of burnt meter or the complaint regarding disruption in supply of energy shall be considered sufficient for this purpose. In case a consumer hinders replacement of burnt meter or does not intimate the licensee, the drawl of energy under such circumstances shall be dealt as per Part XIV of the Act.

Billing

41. General

i The Licensee shall notify Billing and Payment Schedule area wise, district wise or circle wise as may be decided by the Licensee.

ii The Licensee shall raise the bill for every billing cycle based on actual meter readings. The bills sent to consumers by the Licensee should reflect details e.g. present and last meter readings, sanctioned load, fixed charges, quantity of electricity consumed during the cycle, rate, total amount to be paid for consumption, Current Security Deposit with the Licensee, and details of past arrears, if any, last date for payment, surcharge for delayed payment, Government subsidy, if any, etc.

iii Delivery of each bill to the consumer shall be effected at least fifteen days before the due date for payment of the bill.

iv Provisional billing (based on average consumption) shall not be for more than two billing cycles. In case meter is rendered inaccessible for two consecutive billing cycles, action as per Para 37(iv) shall be followed.

v Licensee shall provide complete details in the bill of all arrears except for those arising due to non-payment of last bill. Such arrears shall be recoverable in installments alongwith LPSC as given below:

Table 7

Arrear for period	**Amount to be recovered in each installment**
Upto twelve months	50% in first installment and balance in two equal installments
More than twelve months and upto twenty four months	In four equal installments

42. Bill particulars

The following particulars shall be indicated in the bill

1 K.No - This is the unique consumer identification number, which can be referred to for any communication.
2 Book No./DT No./Reading Repository/Binder details - Meter book no. is the book where in the consumers meter reading details taken during the meter reading cycle is noted down /compiled in soft form.
3 Bill Number
4 Bill Month
5 Bill type - Provisional or Regular
6 Meter Number
7 Meter type
8 Supply type
9 Applicable tariff
10 Security deposit with the Licensee.
11 Sanctioned Load
12 Fixed charge
13 Meter Reading of previous billing cycle and date of reading
14 Current Meter Reading and date of reading
15 Billed Units- This shows the total units consumed for the particular billing cycle.
16 Slab Calculation (units, rate, amount)- This gives the breakup of charges for the billed units for each slab of tariff.
17 Energy charge
18 Arrear amount
19 Arrear Details - indicating period for which arrears are due, energy charges, fixed/demand charges, LPSC, electricity tax etc.
20 Amount payable (rounded off) after the due date- net amount to be paid after the due date.
21 Due Date including last date before which the bill has to be paid.
22 Late Payment Surcharge- fees that is charged in case the payment is not made within the due date/ amount payable after due date within one month from due date

23 Amount payable (rounded off) within the due date- net amount to be paid before the due date.
24 Amount payable after due date
25 Government subsidy, if any
26 Compensation to the consumer, if any
27 Previous Consumption Pattern (Bill Month, Units, Status)- This shows the consumption pattern for last six months
28 Other information as applicable to kVAh billing and HT consumers to be appropriately added and unrelated items to be deleted
29 Any other information which the Licensee deems fit.
30 Meter Remark- This indicates the meter status.

43. Billing during the period defective/stuck/stopped/burnt meter remained at site

i The consumer shall be billed for the period the defective/stuck/stopped/ burnt meter remained on site, subject to a maximum of six months, based on the estimated energy consumption by taking the consumption pattern of the consumer for the twelve months prior to the period during which the meter remained defective. The amount already paid by the consumer for the period meter remained non functional or defective, shall be adjusted in this bill. The assessment bill shall be raised within two billing cycles from the date of changing the meter.

ii In cases where the recorded consumption of past twelve months prior to the date meter became defective is either not available or partially available, the consumption pattern for the next twelve months after the installation of new meter would be used for billing purposes.

iii In case, the Maximum Demand Indicator (MDI) of the meter at the consumer's installation is found to be faulty or not recording at all (unless tampered), the demand charges shall be calculated based on maximum demand during corresponding months/billing cycle of previous year, when the meter was functional and recording correctly. In case, the recorded MDI of corresponding month/billing cycle of past year is also

not available, the average maximum demand recorded for the next six billing cycles after changing the meter shall be considered.

44. Complaint on consumer bills

i In case of any complaint being filed, the Licensee shall acknowledge the consumer's complaint immediately, if received in person, or within three days from the date of receipt if received by post.

ii If no additional information is required from the consumer, the Licensee shall resolve the consumer's complaint and intimate the result to the consumer within fifteen days of receipt of the complaint. In case, any additional information is required, the same shall be obtained, the issue resolved and result intimated to the consumer within thirty days of receipt of the complaint. Till the complaint on the bill is resolved, the consumer shall pay the amount based on average consumption of last three consecutive undisputed bills. Amount so recovered shall be subject to final adjustment on resolution of the complaint.

iii In case, the bill is received late and the time available for payment is less than fifteen days, the consumer may apply within two days of receipt of such bill for extension of due date and the Licensee shall extend the due date so as to allow fifteen clear days from the date of communication of grant of such extension.

iv In case of non-receipt of bill by the consumer, the Consumer shall approach the Licensee, who shall furnish duplicate bill immediately with due date for payment extended as above and no late payment surcharge shall be leviable if the complaint is correct.

45. Arrears appearing in bills

(i) If the arrears appear in a bill for the first time, for which payment has already been made within due date, or which are not due to the Licensee, the Licensee shall pay to the consumer compensation at the rate of 10% of the arrear amount subject to a ceiling of Rs. 500/-.

(ii) In case the said arrears are raised again for the second time, compensation at the rate of 15% of the arrear amount subject to a ceiling of Rs.750/- shall be payable to the consumer by the Licensee.

(iii) If the arrears appear in a bill for which payment was made after due date, no compensation shall be paid. If such arrear, for which the payments have been made after the due date, appear in any subsequent bill(s), the case shall be dealt in accordance with clauses (i) and (ii) above.

(iv) The compensation mentioned in clauses (i) and (ii) shall be adjusted at the time of making payment for the bill in which such arrears have appeared. Notice to such effect shall be prominently displayed at all bill collection centers of the Licensee.

(v) In case the arrears, as mentioned in clauses (i) and (ii), appear in a bill for the third time or thereafter, the consumer shall be entitled to make a petition to the Forum and the Forum shall decide the compensation to be paid to such consumer on a case-to-case basis. The provisions of this para shall also apply to the bills, which have been wrongly raised by the Licensee.

46. Change of occupancy/vacancy of premises

i It shall be the responsibility of the consumer to get a special reading done by the Licensee at the time of change of occupancy or on the premises falling vacant and obtain no-due certificate from the Licensee.

ii The consumer shall request in writing to the Licensee for special reading to be taken at least seven days in advance of the said vacancy of the premises by the existing user or change of the occupancy, as the case may be.

iii The Licensee shall arrange for a special reading to be done and deliver the final bill, including all arrears till the date of billing, at least three days before the vacancy of the premises. The final bill thus raised shall mention that no other dues are pending on the premises and the bill is final. The

final bill shall also include payment for the period between the date of special reading and date of vacancy of premises on pro-rata basis.

iv Once the final bill is raised, the Licensee shall not have any right to recover any charge(s), other than those in the final bill, for any period prior to the date of such bill. The Licensee shall disconnect the supply to the premises on its vacancy. It shall be the responsibility of the consumer to make the payment on vacation of the premises and the Licensee shall issue No-demand certificate on receiving such payment. However, in cases of change of occupancy, connection shall not be disconnected and after getting the commercial formalities for change of name, the same shall be affected.

47. Payment on self assessment by the consumer

i In case of non-receipt of bill the consumer may deposit self assessed bill in the format prescribed in ANNEXE-VIII to the Regulations or as approved by the Commission from time to time, for the period for which bill has not been received provided that it is not less than the average consumption of the last six months. The payment so made by the consumer shall be adjusted in the next bill.

ii In case of dispute regarding levy of surcharges, the Licensee shall settle the dispute within one billing cycle from the date of protest by the consumer after giving him an opportunity for reply and personal hearing.

48. Advance payment of anticipated bills by consumer

i If a consumer intends to make advance payment of bills, the Licensee, in the format prescribed at **ANNEXE-IX** to the Regulations or as approved by the Commission from time to time, shall accept the same and the amount so paid shall be adjusted towards energy and other charges in the next bill. Interest at the rate of 0.5% above the Savings Bank rate of State Bank of India as applicable on 1st January and 1st July of the Calendar year, for next six months, payable half yearly on such deposit shall be paid on

balance amount lying unadjusted with the Licensee. Such interest amount shall be adjusted in the future bill of the consumer.

ii The minimum amount to be paid is Rs. 5000/- and multiples of Rs. 1000/- thereafter or six month billing of the consumer, whichever is higher.

iii In case a consumer's premises remains vacant for some duration and he desires to pay fixed charges in advance, then sub clause (ii) above, shall be applicable.

/ ANNEXURE –XI /

Anti tampering features approved by DERC

i) Consumer meters (both single phase and three phase) may have the facilities for logging or recording of happening of an event of tampering including top cover open. This is in line with 3(i) Part III of the Schedule annexed to the CEA Regulations.

ii) Recording of energy proportional to current flowing through it, assuming the applied voltage of 240V, as a measure of anti tempering under abnormal voltage conditions in case of single phase meter, which may arise on account of one wire tamper.

iii) Measurement of neutral current in case of three phase whole current meter as an additional feature, for facilitating detection of theft, especially when it is stated to be without any impact on meter accuracy/bill.

iv) In case of three phase LTCT meter, the proposed anti tampering feature regarding neutral disturbances and only two phase (one phase and neutral missing), logging of the event.

v) In case of proposed anti tampering features regarding application of 35 kV electrostatic discharge and magnetic influence, logging of the event.

R-1044/07

IN THE SUPREME COURT OF INDIA

CIVIL APPELLATE JURISDICTION

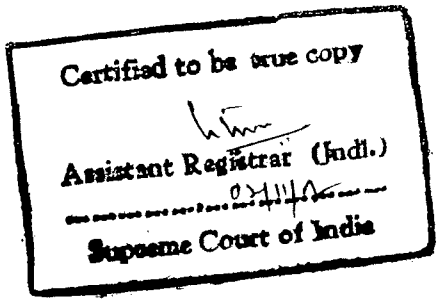
119712

CIVIL APPEAL NO. [illegible] OF 2007
[Arising out of SLP(C) No. 14308/2006]

Suresh Jindal ... Appellant

Versus

BSES Rajdhani Power Limited & Ors. ... Respondents



JUDGMENT

S.B. SINHA, J

1. Leave granted.

2. Appellant is a consumer of electrical energy. Respondent is a licensee. A meter for the purpose of recording consumption of electrical energy was installed at his premise. It was replaced by an electronic meter.

3. The electronic meter was tested by the officials of the respondent and it was found that the same was running fast by about +1.79% which is said

to be beyond the BIS standard, as the meter installed in the premises was of Class-I category. He filed a writ petition before the High Court inter alia contending;

> "4. That the meter installed in the premises of the Petitioner was intact and OK and was recording the consumption as per Section 57 of the Electricity Supply Rules, 1956 and there was no percentage error in the recording of the consumption in the meter earlier installed by the agents of the Respondent in the premises of the Petitioner.
>
> 5. That the Petitioner believing the intention of the Respondent has permitted the Respondent to install the meter of their own choice believing that the meter which was installed in the premises of the Petitioner is of approved design and specification of ISI and also in accordance with the rules and regulations under the Electricity Act, 2003."

In the writ petition, the following prayers were made by him :

> a. A writ, order or direction in the nature of a writ of mandamus, thereby declaring the acts of the officials of the Respondents as illegal and malafide in replacing the correct and working meter of the Petitioner by another meter in respect of electricity connection bearing K.No.2540F320018 installed for 134, First Floor, Sunder Nagar, Delhi.
>
> b. A writ, order or direction in the nature of a writ of mandamus, thereby quashing the meter testing report prepared on 03/03/2005 in respect of electricity connection bearing K.No. 2540F320018 installed for 134, First Floor, Sunder Nagar, Delhi.

c. A writ, order or direction in the nature of a writ of mandamus thereby directing the Respondent to get the meter of the Petitioner tested as per rule 57 of the Electricity Supply Rules 1956 through an independent agency or in any other manner as this Hon'ble Court deems fit in the facts and circumstances of the case.

d. A writ order or direction thereby directing the Respondent to calibrate, seal and install at the premises of the Petitioner, the electro mechanical energy meter of ISI make procured by the Petitioner in respect of electricity connection bearing K.No. 2540F320018 for 134, First Floor, Sunder Nagar, Delhi after replacing the existing meter."

4. The writ petition was dismissed by a learned Single Judge of the Delhi High Court by a judgment and Order dated 14.12.2005. A letters patent appeal was preferred thereagainst and by reason of the impugned judgment, the same has been dismissed. Appellant is, thus, before us.

5. Mr. Sanjay Parikh learned counsel appearing on behalf of the appellant in support of the appeal, inter alia, would submit;

(i) Respondent being a licensee governed by the Indian Electricity Act, 1910 (hereinafter referred as "1910 Act"); the provisions of Electricity (Supply) Act, 1948 (hereinafter referred as "1948 Act") or the subsequent Acts namely Delhi Electricity Reforms Act, 2000 (hereinafter referred to as "2000 Act") or Indian Electricity Act, 2003

being not applicable, the High Court committed a serious error in passing the impugned judgment.

(ii) Rule 57 of the Indian Electricity Rules, 1956 whereupon reliance was placed by the respondents in their counter affidavit is clearly inapplicable and thus reliance placed thereupon by the High Court in this behalf was wholly unwarranted.

(iii) The tariff framed by Delhi Vidyut Board also did not confer any jurisdiction upon the respondents to remove the correct meter and replace the same by another correct meter.

(iv) The only provision which could have been taken recourse to for replacement of a meter being Section 26 of the 1910 Act and the same being not applicable in this case, the impugned Judgment cannot be sustained.

(v) Margin of error in the meter being 1.79% in one case and 3.79% in the other which is in excess of 1 per cent of error provided for in the proviso appended to Rule 57 of the Indian Electricity Rules, the appellant had a legal right to obtain a writ of or in the nature of mandamus directing the respondents not to rely thereupon for the

purpose of calculating the amount of consumption of electrical energy recorded therein.

(vi) In any view of the matter, replacement of the meter having taken place prior to coming into force of the 2003 Act and the regulations framed thereunder, the High Court was wholly incorrect in arriving at its findings.

6. Mr. Arun Jaitley, the learned senior counsel appearing on behalf of the respondents, on the other hand, would principally rely upon Section 20 of the 1910 Act to submit that by reason thereof a general power has been conferred on the licensee to remove a correct meter and replace the same by another meter which records more accurately the actual consumption of electrical energy having regard to the development of technology and thus such an action, being de-hors provisions of Section 26 of the Act, would not be controlled thereby. Appellant being a consumer of electrical energy from Delhi Vidyut Board which was a State Electricity Board within the meaning of 1948 Act and the respondent being its successor in terms of 2000 Act and 2003 Act, the impugned judgment is unassailable.

7. The 1910 Act was enacted on 18th March, 1910

8. The said Act regulated the terms and conditions of supply of electrical energy to the consumers. Licensees in those days used to be private companies. Actual terms of the contract for supply of electrical energy by the licensees to its consumers were governed by the terms and conditions of contract entered into by and between the parties thereto. The said Act provide for powers and obligations of the licensee on the one hand as also the rights and obligations on the part of the consumers on the other. By reason thereof, licensees under the said Act being public utility concerns were bound thereby. It could exercise the statutory powers conferred upon it, which was otherwise not available under the common law or the terms of the contract entered into by and between the parties.

9. Section 20 of the Act confers power on the licensee to enter into the premises, inter alia, for the purpose of inspecting, testing, repairing or altering meters instituted in the premises of the consumers. The said provision *ex-facie* is not controlled by any other provision thereto. Section 21 of the Act empowers a licensee to prescribe any form of appliance in utilising energy supplied by him. All kind of utilisation of appliances is governed by the said provisions. The said provision has nothing to do with installation or testing or replacing any meter. Section 26 ensures installation of correct meter so that the consumption of electrical energy may be

recorded. A meter can be installed either by the licensee or by the consumer. An obligation, thus, to keep the meter correct will be either on the licensee or the consumer, as the case may be. Sub-section (4) of Section 26 empowers the licensee to have access for the purpose of inspecting and testing the meters and for the said purpose the same could be taken off or removed.

10. In case however of any dispute or difference and in the event the meter installed in the premises of the consumer is found to be not correct, in regard to the quantum amount of reasonable expenses for the purpose of taking off or removal of the meter, the Electrical Inspector would be the sole authority to determine the same. The Electrical Inspector as a statutory authority was also empowered to enter into and determine the disputes and differences between the parties not only in regard to the correctness of the meter but also quantify the amount payable by the consumer to the licensee if he comes to the opinion that the meter has ceased to be correct subject of course to the condition that the same would not exceed the period of six months.

11. The principal question which arises for our consideration is as to whether the power conferred upon the licensee under Section 20 of the Act

is controlled by Section 26 thereof. We would deal with the said question a little later.

12. We may now have a quick look at the provisions of the other statutes. The provisions of 1948 Act, which is a post-independence Act, cast a duty on the State to constitute a Board for the purpose of generation, transmission, distribution and supply of electrical energy. It is a body corporate and can sue and be sued in its own name. Section 26 of the 1948 Act provides for conferment of powers and obligations of the licensees in the Board as provided for under the 1910 Act wherefor a legal fiction has been raised. The proviso appended to Section 26 of 1948 Act reads as under:-

> "Provided that nothing in sections 3 to 11, sub-sections (2) and (3) of section 21 and section 22, sub-section (2) of Section 22A and sections 23 and 27 of that Act or in clauses I to V, clause VII and clauses IX to XII of the Schedule to that Act relating to the duties and obligations of a licensee shall apply to the Board:"

13. Section 20 of the 1910 Act was, therefore, made operative under the 1948 Act so far as the Board is concerned and thus the said power was exercisable by it. Rules were made in terms of Section 37 of the 1910 Act only in the year 1957. Rule 57(1) of the Rules reads as under:-

> "57(1) Any meter or maximum demand indicator or other apparatus placed upon a consumer's premises in accordance with section 26 shall be of appropriate capacity and shall be deemed to be correct if its limits of error are within the limits specified in the relevant Indian Standard Specification and where no such specification exists, the limits of error do not exceed 3 per cent above or below absolute accuracy at all loads in excess of one tenth of full load and up to full load:"

14. Although reliance has been placed by the respondents in their counter affidavit on the said rule, ex-facie the same is not very relevant for our purpose. We would, however, deal with the contention of Mr. Parikh with regard to the construction of the said provision at a later stage.

15. The Parliament enacted Electricity Regulatory Commission Act in the year 1998 wherewith we are not concerned It may however be noticed that the National Capital Territory of Delhi enacted the Delhi Electricity Reforms Act, 2000 (hereinafter referred to as "2000 Act").

16. Section 2(e) thereof defines "licence" to mean a licence granted under the Indian Electricity Act, 1910.

17. Section 14 provides for re-organisation of electricity industries; sub-section (1) whereof reads as under:-

> "Sec. 14(1) The Government may, as soon as may be after the commencement of this Act, cause one or more

companies to be incorporated and set up under the provisions of the Companies Act, 1956 (1 of 1956) for the purpose of generation, transmission or distribution of electricity, including companies engaged in more than one of the said activities, in the National Capital Territory of Delhi and may transfer the existing generating stations or the transmission system or distribution system, or any part of the transmission system or distribution system, to such company or companies."

Sub-sections (3) and (6) of Section 14 of the said Act read as under :

Sec. 14(3) The companies incorporated and set up under sub-section (1) shall undertake the functions specified in this section and such other functions as may be assigned to them by the Government.

Sec. 14(6) The Government may convert the companies set up under this Act to joint venture companies through a process of disinvestment, in accordance with the transfer scheme prepared under the provisions of this Act.

18. Section 15 provides for reorganisation of Delhi Vidyut Board and transfer of properties, functions and duties thereof.

19. Delhi Vidyut Board was constituted by the National Capital Territory of Delhi in terms of the provisions of 1948 Act.

20. By reason of sub-section (1) of Section 15 all the powers conferred upon the Companies as had been existing in the Boards under Section 26 of the 1948 Act were saved.

21. By reason of Section 63, the provisions thereof were to prevail over the provisions of 1910 Act and 1948 Act in regard to the matters which were inconsistent therewith or contrary thereto. Sub-section (3) of Section 63 provides that upon establishment of the Commission, the provisions of the 1910 Act and 1948 Act were to be read subject to the modifications and reservations contained therein, the relevant clauses whereof are as under:-

> "(i) All references to State Electricity Board in the Indian Electricity Act, 1910 (9 of 1910) in so far as the National Capital Territory of Delhi is concerned shall be read as references to the Delhi Electricity Regulatory Commission or the companies established under section 14 or other licensees or wherever it relates to general policy matters, to the Government.
>
> (ii) In respect of matters provided in sections 3 to 11, 28, 36(2), 49A, 50 and 51 of the Indian Electricity Act, 1910 (9 of 1910), to the extent this Act has made specific provisions, the provisions of the Indian Electricity Act, 1910 (9 of 1910) shall not apply in the National Capital Territory of Delhi."

So far as 1948 Act is concerned, it is provided :

> "(v) All references to State Electricity Board in the Electricity (Supply) Act, 1948 (54 of 1948) in so far as the National Capital Territory of Delhi is concerned shall be read as references to the Delhi Electricity Regulatory Commission or the companies established under section 14 or other licensees or where it relates to general policy matters, to the Government.
>
> (vi) In respect of matters provided in sections 5 to 18, 19, 20, 23 to 27, 37, 40 to 45, 46 to 54, 56 to 69, 72 and 75 to 83 of the Electricity (Supply) Act, 1948 (54 of 1948), to the extent this Act has made specific provisions, the provisions of the Electricity (Supply) Act, 1948 (54 of 1948) shall not apply in the National Capital Territory of Delhi."

22. Section 26 of the 1948 Act therefore, would not apply only when there exist any corresponding provision in the 2000 Act. It is not disputed that no such provision is in existence. If there does not exist any provision contrary to or inconsistent with Section 26 of the Act, the same would, indisputably, continue to apply.

23. Section 64 of the said Act provides for the saving clause.

24. We may now notice constitution of various entities in terms of the 2000 Act and the Rules framed thereunder. The National Capital Territory of Delhi in exercise of its power conferred by Section 60 read with Sections 15 and 16 of 2000 Act made Rules known as Delhi Electricity Reform (Transfer Scheme) Rules, 2001. The said Rules are statutory in nature.

They provide for transfer and vesting of assets, liabilities, proceedings and personnel of Delhi Vidyut Board in the successor entities and for determining the terms and conditions on which such transfer or vesting shall take effect.

25. In the said Rules, "Board" has been defined to mean Delhi Vidyut Board constituted under Section 5 of the Electricity (Supply) Act, 1948. Rule 2(f) defines "DISCOM 2" to mean "South-West Delhi Electricity Distribution Company Limited", a company incorporated under the Companies Act, 1956 (1 of 1956) with the principal object of engaging in the business of distribution and supply of electricity in the area as specified in Part II of Schedule 'H'.

26. The term "transferee" has been defined in Rule 2(r) to mean 'GENCO', 'TRANSCO', 'DISCOMS' and 'PPCL', as the case may be, in whom the undertaking or undertakings or the assets, liabilities, proceedings and personnel of the Board, as the case may be, are vested in terms of these rules and shall include the holding company;

27. Rule 4(1) provides that assets, liabilities and proceedings transferred to the government under sub-rule (1) of rule 3 shall stand classified as under:

(a) Rights and interests in Pragati Power Project as set out in Schedule 'A'

(b) Generation Undertaking as set out in Schedule 'B'.

(c) Transmission Undertaking as set out in Schedule 'C'

(d) Distribution Undertaking as set out in Schedule 'D'

(e) Distribution Undertaking as set out in Schedule 'E'.

(f) Distribution Undertaking as set out in Schedule 'F'.

(g) Holding Company with assets and liabilities as set out in Schedule 'G'.

28. Rule 5(1)(d) of the Rules provides that the undertaking forming part of the Distribution Undertaking as set out in Schedule 'D', shall stand transferred to and vest in the DISCOM 1, on and from the date of the transfer appointed for the said purpose.

29. Sub-Rule (2) of Rule 5 provides for the consequences of such transfers in the following terms :

> "Rule 5(2) On such transfer and vesting of the undertakings in terms of sub-rule (1), the respective transferee shall be responsible for all contracts, rights, deeds, schemes, bonds, agreements and other instruments of whatever nature, relating to the respective undertaking and assets and liabilities transferred to it, to which the Board was a party, subsisting or having effect on the date of the transfer, in the same manner as the Board was liable immediately before the date of the transfer, and the same shall be in force and effect against or in favour of the respective transferee and may be enforced effectively as if the respective transferee had been a party thereto instead of the Board."

30. Rule 10 provides for the rights and powers of the transferees, sub-Rule (2) whereof reads as under :

> "Rule 10(2) Within sixty days of the effective date of transfer, the DISCOMS shall apply to the Commission for the grant of licence under the Act to undertake the business of distribution and retail supply of electricity in the respective areas of supply as specified in Schedule 'H' :"

31. Indisputably, pursuant thereto and/or in furtherance thereof, applications were made for grant of license by the first respondent herein and such license have since been granted in its favour by the Commissioner.

32. We may also notice that regulations have been framed in terms of Section 61 of the 2000 Act known as The Delhi Electricity Regulatory Commission (Performance Standards – Metering and Billing) Regulations, 2002.

33. Chapter 5 of the said Regulations provide for metering, laying down that all installations subject to exemption shall be serviced with a meter and all the requirements as laid down in Section 26 of the 2000 Act shall be complied with.

34. To complete the narration of the statutory Scheme, we may also notice that Delhi Electricity Supply Company undertaking framed conditions of supply whereupon strong reliance has been placed by the High Court in arriving at its finding. But, we may ignore the same inasmuch as the same are not statutory in nature.

35. Before embarking on other questions raised at the Bar, we would like to place on record that the High Court had placed strong reliance on the rationale of replacing the existing meters with electronic meters, but, we are of the opinion that the same is not at all relevant as in the event it is held that the respondent had no authority to replace the existing meters with electronic meters, rationale or other justifications in support thereof would not legalise an illegal act.

[See Hindustan Times and Others Vs. State of U.P. and Anr. [(2003) 1 SCC 591) Para 30].

36. We have referred to at some details the statutory scheme only for the purpose of showing that there had all along been a continuity in the matter of supply of electrical energy in the National Capital Territory of Delhi either by a private company or by a State Electricity Board, as the case may be. We, at this stage, make it clear that we do not intend to go into the question

of applicability of the provisions of the 2003 Act and the regulations made thereunder, for the reason that regulations made under Section 50 of the 2003 Act came into force on and from 8 4 2007 and Section 55 thereof came into force on 10.3.2006 and, thus, the said Act was not in force at the relevant time.

37. Our attention has also been drawn to Section 49 of the 1948 Act and the regulations and the tariff framed by the Delhi Vidyut Board.

38. At the outset we have noticed that the appellant did not object to the change of the meter. It proceeded on the basis that the change of the meter is permissible in law. He being allegedly unaware of his rights allowed the respondent to enter into his premises and change a correct meter by another one which according to him is also correct. It, therefore, in our opinion does not lie in the mouth of the appellant now to turn round and contend that electronic meters do not record correct consumption of electrical energy. It is one thing to say that electronic meters when tested do not register the actual consumption, as a result whereof, the consumer would have to pay the energy charges more than he is otherwise liable but it is another thing to say that it was legally impermissible. It is not, however denied or disputed that whether meter is installed by the licensee or by the consumer himself, the

same must have the requisite certificate granted in terms of the regulations, the provisions wherefor have been made in the regulations made under the 2000 Act.

39. If Section 20 of the 1910 Act conferred a power which is not otherwise controlled by Section 26 thereof, the question of the respondent acting wholly without jurisdiction or arbitrarily would not arise. Indisputably, after the Electricity Regulatory Commission came into being, it issued certain directions. It had to make tariff. For the purpose of making tariff, certain checks and balances were required to be made. The loopholes then existing in the matter of transmission of electrical energy which resulted in a huge transmission loss was to be taken care of. Therefore, a direction was issued by the Commission that all the existing meters should be replaced by electronic meters. We do not see any illegality therein.

40. Various steps had been taken by the respondent No. 2 to resolve the grievances of the consumers. Grievance Redressal Forum was established in terms of Section 42(5) of the 2003 Act. Regulations made in the year 2002 provided for detailed guidelines in regard to the procedures required to be followed by the utilities for providing new connections, replacement of defective meters etc. The said regulations admittedly were amended in 2003

providing for payment of compensation to consumers in case of repeated levy of arrears for bills already paid. If there had been any violation of the meter and billing regulation, the utilities could be imposed with penalties. It is at that stage, a policy decision was taken for replacement of old electromechanical meters with new electronic meters as a part of the Scheme. The Commission in its Order on Annual Revenue Requirement issued directions with regard to replacement of meters which were carried out pursuant thereto or in furtherance thereof, which reads as under :

> "Replacement of meters is the responsibility of the DISCOMs and the DISCOMs have submitted details of the meter replacement programme to the Commission, the Commission would like to inform the objector that the old electromechanical meters are subject to mechanical wear and tear and tend to record lower consumption over a period of time. Moreover, these meters are also more susceptible to tamper. The replacement of such meters with electronic meters will enable the utility to record the consumption more accurately as well as reduce the chances of tampering. The DISCOMs have submitted that the existing meters are being replaced by the electronic meters which is a good step."

41. Under the 1948 Act, the State had a role to play. Its directions in relation to the policy matters were binding on the State Electricity Boards. Such a power continued to be operative. If, therefore, the Electricity Regulatory Commission which was an independent body could make tariff

and for that purpose had the statutory authority to issue certain directions, no exception thereto can be taken.

42. We, therefore, are required to consider as to whether the authority to make such replacement of meter by the licensee is contained in Section 20 of the 1910 Act or not. Even if a harmonious construction is given to the Scheme of the Indian Electricity Act as was submitted by Mr. Parikh, we do not see as to how Section 26 would govern Section 20 of the 1910 Act.

43. Section 20 operate in one field namely conferring a power of entry on the licensee. The said provision empowers the licensee inter alia to alter a meter which would include replacement of a meter. It is an independent general provision. In absence of any statutory provision, we do not see any reason to put a restrictive meaning thereto. Even under the General Clauses Act, a statutory authority while exercising statutory power may do all things which are necessary for giving effect thereto. There does not exist any provision in any of the statutes referred to hereinbefore which precludes or prohibits the licensee to replace one set of meter by another. If such a provision is read into the statute, the same would come in the way of giving effect to the benefits of new technological development. Creative interpretation of the provisions of the statute demands that with the advance

in science and technology, the Court should read the provisions of a statute in such a manner so as to give effect thereto.

[See State of Maharashtra & Anr. v. Dr. Praful B. Desai & Anr. (2003) 4 SCC 601]

44. Section 26 of the Act operates in different fields. It comes into being only when there exists a dispute. The dispute may be in regard to the quantum of the amount required to be expended for removing the meter or the correctness of the meter. The dispute may also be, in the event, the meter is held to be not recording the consumption of electrical energy correctly, the amount to which the consumer would be liable to pay, in relation thereo.

45. Electrical Inspector acts as a statutory authority. He has been conferred with a quasi-judicial power to determine the disputes of particular kinds. His decision thereupon is final and conclusive. The correctness of such decision can be questioned only before a superior court of law. Subject of course to a decision of a superior court, the decision of the Electrical Inspector is final and binding on the parties.

46. It is correct that the matter at the relevant point of time was not covered by any statutory regulations, but even otherwise, the respondent had the said authority under Section 20 of the 1910 Act.

47. Construction of Section 20 vis-à-vis Section 26 of the 1910 Act came up for consideration before this Court in Belwal Spinning Mills Ltd. And Others Vs. U.P. State Electricity Board And Another [(1997) 6 SCC 740], wherein a Division Bench of this Court clearly opined;

> "37. After giving our careful consideration to the facts and circumstances of the cases in these appeals and the submissions made by Mr. Gupta, Mr. Sen and Mr. Andhyarujina, the learned Solicitor General. it appears to us that Section 20 of the Electricity Act authorises the licensee to enter the premises of the consumer to remove fittings and other apparatus installed by the licensee. Clause (a) of sub-section (1) of Section 20 authorises the licensee to enter the premises of the consumer for "inspecting, testing, repairing or altering the electric supply lines, meters, fittings, works and apparatus for the supply of energy belonging to the licensee". The licensee, therefore, cannot only enter the premises of the consumer for inspecting, testing etc. but the licensee can also alter the meter whenever such alteration is needed. Such power under Section 20 does not depend on the adjudication of correctness of the meter and other apparatus by the Electrical Inspector on a reference under Section 26(6) of the Electricity Act. But such power flows from the statutory duties and functions of the licensee to maintain the correct meter for recording the quantum of electricity supplied to the consumer. Such duty to ensure maintenance of correct meter in the premises of the consumer has been indicated in sub-

> section (1) and sub-section (2) of Section 26. The power of removing the meter under Section 20, however, is circumscribed by the proviso to sub-section (4) of Section 26 only when the dispute as to the functioning of the meter has been referred to the Electrical Inspector under sub-section (6) of Section 26. A licensee is authorised under sub-section (7) of Section 26 to place, in addition to the meter installed in the premises of the consumer as referred to in sub-section (1) of Section 26, other meter or apparatus as the licensee deems fit for the purpose of recording or regulating the amount of energy supplied to the consumer. Such power also does not depend on the existence of any dispute as to the correctness of the meter installed."

48. Reliance on the said decision has also been placed by the High Court. Mr. Parikh, however, would submit that the High Court failed to notice paragraph 48 of the said decision wherein it was laid down that Section 26(6) would apply where the meter is not correct and the power to remove the meter could be exercised only in such a situation and not otherwise.

49. We may, however, notice that the observations made in paragraph 48 were made while considering the question as to whether the decision in terms of sub-section (6) of Section 26 should be limited to a statutory period or not. Observations in paragraph 48 of the said decision having been made in the aforementioned context, the same cannot be said to have any application whatsoever in the instant case.

50. For the reasons stated hereinbefore, we are of the opinion that there is no merit in this appeal. It is dismissed accordingly. There shall be no order as to costs.

.....J.
[S.B. Sinha]

.....J.
[Harjit Singh Bedi]

New Delhi;
October 11, 2007

know the basis of the impugned order. For the above reasons, we are of the opinion that the impugned order of the High Court should be set aside and the matter be remitted back to the High Court for fresh consideration, bearing in mind the observations made in this order. We also think it appropriate to direct the respondent-accused to be continued on bail pursuant to the impugned order in view of the fact that they have been on bail since 16-10-2002. This direction, however, will be subject to the final order that may be made by the High Court after remand.

6. We make it clear that we have not expressed any opinion on the merits of the applications filed by the respondent-accused for enlargement on bail before the High Court as also the contentions advanced on behalf of the parties before us.

7. The appeals are disposed of accordingly.

(2003) 7 Supreme Court Cases 185

(BEFORE S. RAJENDRA BABU AND DORAISWAMY RAJU, JJ.)

BHILAI REROLLERS AND OTHERS .. Appellants;

Versus

M.P. ELECTRICITY BOARD AND OTHERS .. Respondents.

Civil Appeals No. 6508 of 2003† with Nos. 6509 of 2003‡, 6506 of 2003††, 6507 of 2003‡‡, 6510 of 2003†‡ and 6519 of 2003‡†, decided on August 19, 2003

Electricity Act, 1910 — S. 26(7) — Meters — Maximum demand indicator meter (MDI) — Installation of, by the licensee upon the premises of the consumer (rolling mills receiving LT supply in the present case) for adjudging whether at any given point of time the consumer had availed and drawn electricity in excess of the contracted load, held, valid — Further held utility of MDI meter to record effectively and correctly the drawal of power at a continuous block period of 30 minutes in a month is recognised in the field and is in vogue even at the global level — Further held, lock rotor test cannot serve that purpose — In view of the provisions in the General Conditions for supply and Condition 2 of the Low Tension Tariffs notified by the M.P. Electricity Board w.e.f. March 1994 the Board, held, entitled to raise an additional demand on the basis of MDI meter reading — Electricity (Supply) Act, 1948, Ss. 49 and 2(8)

The appellants in the instant appeals were owners of steel rolling mills of various types. The facts in all the appeals were almost similar. For illustration, the appellant in CA No. 6508 of 2003 entered into an agreement dated 24-12-

† Arising out of SLP (C) No. 2123 of 2000. From the Judgment and Order dated 5-10-1999 of the Madhya Pradesh High Court in LPA No. 311 of 1999

‡ Arising out of SLP (C) No. 2300 of 2000

†† Arising out of SLP (C) No. 2794 of 2000

‡‡ Arising out of SLP (C) No. 3079 of 2000

†‡ Arising out of SLP (C) No. 3113 of 2000

‡† Arising out of SLP (C) No. 3115 of 2000

1992 with the respondent Madhya Pradesh Electricity Board (for short "the Board") for supply of energy on a contracted load of 150 HP low-tension A/C 400 volts industrial power at a certain rate per unit in terms of the unit meter reading subject to the terms and conditions set out therein. A meter to measure and record the consumption was installed at the premises in terms of the requirement of Section 26 of the Electricity Act, 1910 and the said agreement. In addition to the said meter, the Board installed a maximum demand indicator meter (for short "MDI") upon the premises of the appellant. The MDI was stated to be a device to measure the maximum demand at a particular half-an-hour cycle of running the machinery in the factory. According to the appellant firm, the total contracted load of machinery in its factory although had been certified to be less than the contracted load capacity of 150 HP, the Board on 12-8-1994 arbitrarily worked out the working load capacity of the machinery as 236 BHP on the basis of MDI meter reading for the months of March 1994 to June 1994 and on that basis demanded the payment of a certain additional amount of money. The appellant challenged before the M.P. High Court the raising of such additional demand on the basis of the MDI meter. The writ petition was dismissed and LPA against that decision was also dismissed. The appellant then approached the Supreme Court by an SLP. The appellant contended that: (*i*) there was no provision for installation of MDI meter on the low tension connection either in the statute or in the agreement, (*ii*) merely on the basis of the working of MDI meter the quantum of load capacity availed of for consumption could not be safely or accurately determined and only the total capacity of the motors as certified by the Board's officials could be relied on for determining the alleged excess utilization over and above the actual contracted load capacity, (*iii*) that such utilization was to be treated merely as the "thrust load" necessarily required by the motor/machinery only when the same was put in motion, and (*iv*) MDI meter could be installed not for the purpose of raising additional bills but only for determining the power factor in the premises of the LT consumer.

Dismissing the appeals, the Supreme Court

Held:

Section 26(7) of the Electricity Act, 1910 envisages the installation of additional meters and checking apparatus, in addition to the meter for ascertaining the amount of energy supplied and quantity consumed. The utility of MDI meter to record effectively and correctly the drawal of power at a continuous block period of 30 minutes in a month by a consumer has come to stay as a reasonably safe method with due credibility and recognition in the field and is in vogue even at the global level. Since in *Orissa State Electricity Board case*, (1995) 4 SCC 320, the reading by MDI meter has been held to provide a sound basis and yardstick for adjudging liability to pay the maximum demand charges/minimum monthly charge, it should be considered to be equally efficacious for the purpose of adjudging the issue as to whether the consumer has at any given point of time, in contravention of the agreement with the Board, availed and drawn electricity in excess of the contracted load. (Para 17)

Orissa SEB v. *IPI Steel Ltd.*, (1995) 4 SCC 320, *followed*

As disclosed from the communication from Bhilai Steel Plant (an undertaking of the Steel Authority of India: a Government of India enterprise) brought on record, the motors used in rolling mills have an overload capacity in the range of 2 to 2.5 times their rated capacity and at times even about 3 times, but only for a very short duration. Hence, it is stated that an MDI meter which

measures the dem
register a demand
rated KW. Theref
overdrawal in ex
making reference
to determine the c
total load demanc
energy.

The actual cc
goes to indicate t
not have been po
number of units a
support the stand
parties is inclusiv
1910, the Electri
framed thereunde
energy made by
time. In view of
Low Tension Tar
Board is entitled

Advocates who apr
Anoop G. Chau
Indu Sharma,
the Appellants
V.R. Reddy and
Agnihotri and

Chronological list o
1. (1995) 4 SCC

The Judgment o:

RAJENDRA

2. The abo
consideration on
together.

CA No. 6508 of

3. The appe
is engaged in re
for the purpose,
with the Madhy:
of energy on a
volts industrial p
reading subject
18-2-1994 the t
enhanced to Rs
charges of 60 u
to measure and
of the requirem

Board (for short "the
) HP low-tension A/C
rms of the unit meter
a
1. A meter to measure
uses in terms of the
the said agreement. In
um demand indicator
t. The MDI was stated
particular half-an-hour
to the appellant firm,
b
ugh had been certified
e Board on 12-8-1994
achinery as 236 BHP
ch 1994 to June 1994
ad[illegible]nal amount of
urt the raising of such
c
he writ petition was
ed. The appellant then
ontended that: (*i*) there
ow tension connection
basis of the working of
sumption could not be
city of the motors as
d
etermining the alleged
oad capacity, (*iii*) that
d" necessarily required
motion, and (*iv*) MDI
ldditional bills but only
consumer.

e

es the installation of
n to the meter for
nsumed. The utility of
ra[illegible] of power at a
co[illegible]mer has come to
recognition in the field
State Electricity Board
been held to provide a
the maximum demand
idered to be equally
ether the consumer has
g
ment with the Board,
ad. (Para 17)

ilai Steel Plant (an
nt of India enterprise)
an overload capacity in
es even about 3 times.
t an MDI meter which
h

measures the demand in KW and integrating over a period of 30 minutes would register a demand value in KW which is either less than or equal to the motor-rated KW. Therefore, it is futile for the appellants to contend that there was no overdrawal in excess of the contracted load. The object of the appellant in making reference to lock rotor test also is not relevant as that test could only help to determine the capacity of the motor and not of the total connected load or the total load demanded and availed of during the course of actual consumption of energy. (Para 18)

The actual consumption of energy during the relevant period unitwise also goes to indicate that with the normal utilization of the contracted load, it would not have been possible for the mills of the appellants concerned to consume the number of units actually consumed and this circumstance also seems to strongly support the stand of the respondent Board. The agreement for supply between parties is inclusive of and also subject to the provisions of the Electricity Act, 1910, the Electricity (Supply) Act, 1948 and notifications, rules, regulations framed thereunder as well as the General Conditions for supply of electrical energy made by the Board and the amendments made to all such, from time to time. In view of clause 31(*f*) of the General Conditions and Condition 2 in the Low Tension Tariffs notified by the Board w.e.f. March 1994, the respondent Board is entitled to raise the demand under challenge. (Paras 19 and 21)

H-M/TZ/28837/C

Advocates who appeared in this case :

Anoop G. Chaudhari and Shanti Bhushan, Senior Advocates (Hemant Sharma, Ms Indu Sharma, Prakash Srivastava and Rakesh K. Sharma, Advocates, with them) for the Appellants;

V.R. Reddy and M.L. Jaiswal, Senior Advocates (Satish K. Agnihotri, Ms Yogmaya Agnihotri and Ms Madhur Dadlani, Advocates, with them) for the Respondents.

Chronological list of cases cited *on page(s)*

1. (1995) 4 SCC 320, *Orissa SEB* v. *IPI Steel Ltd.* 193*f*, 194*c*

The Judgment of the Court was delivered by

RAJENDRA BABU, J.— Leave granted.

2. The above batch of appeals involves identical questions of law for consideration on almost similar factual background and as such are dealt with together.

CA No. 6508 of 2003 [arising out of SLP (C) No. 2123 of 2000]

3. The appellant in this appeal has established a steel re-rolling mill and is engaged in re-rolling of iron or steel. Being a consumer of electric energy for the purpose, the appellant entered into an agreement dated 24-12-1992 with the Madhya Pradesh Electricity Board (for short "the Board") for supply of energy on a contracted load agreement of 150 HP low-tension A/C 400 volts industrial power at the rate of Rs 1.10 per unit in terms of the unit meter reading subject to the terms and conditions set out therein. It is stated that on 18-2-1994 the tariff relating to the supply of low-tension energy had been enhanced to Rs 2.25 per unit for all units which consumed with minimum charges of 60 units per month or part thereof of the contracted load. A meter to measure and record the consumption was installed at the premises in terms of the requirement of Section 26 of the Indian Electricity Act, 1910 and the

terms of the agreement entered into with the Board. The appellant claims that the bills prepared according to the meter readings in the unit meter located in the premises in question were being regularly paid without default and that the working of the meter was also being regularly checked from time to time by the officials of the Board and that at no time there was any complaint regarding the using of any machinery to exceed the contracted load of 150 HP. The grievance of the appellant was with reference to the installation of what is called as maximum demand indicator meter (for short MDI meter), though there was no provision in the agreement enabling them to do so. MDI meter is said to be a device to measure the maximum demand at a particular half-an-hour cycle of running the machinery in the factory, meaning thereby, it measures the maximum demand of electric energy in a cycle of half an hour and not either the actual consumption of electricity or the horse power of motors or any other electrical equipment installed for use. According to the appellant, though electricity actually consumed is recorded in the energy meter, MDI meter showed higher amperage. It is further stated that though the total contracted load of machinery in the factory of the appellant has been certified to be 147.5 HP and not in excess of the contracted load capacity of 150 HP, the Board, according to the appellant, on 12-8-1994 arbitrarily worked out the working load capacity of the machinery as 236 BHP on their own and on the basis of MDI meter reading for the months of March 1994 to June 1994 demanded the payment of an additional sum of Rs 75,825. On threat of disconnection of supply, the said amount was said to have been paid to avoid any inconvenience resulting from such disconnection. When representations in this regard with the authorities did not bring forth any positive results, the appellant filed WP No. 876 of 1995 before the High Court of Madhya Pradesh at Jabalpur, seeking to quash the bills raised for an additional demand of the nature noticed above and also prayed for restraining the Board from raising such bills in future on the basis of MDI meter installed in the premises.

4. The Board opposed the claim contending that not only the installation of such a meter was permissible and the course of action taken by them on the basis of the results of MDI meter reading, raising further demand in respect of utilization of the excess load over and above the contracted load capacity were legal and proper and that the meter readings relating to all these were said to be either in the presence of a responsible representative of the appellant and that no exception could be taken either to the correctness of the readings recorded or the legality and propriety of the additional demand raised on account of such consumption of energy in excess of the contracted load. The learned Single Judge who heard the writ petition along with a batch of other similar writ petitions rejected the claims of the appellant while accepting the stand taken for the respondent Board. Aggrieved, LPA No. 311 of 1999 was filed before the Division Bench and by an order dated 5-10-1999 the Division Bench concurred with the decision of the learned Single Judge and rejected the appeal. Not satisfied, the appellants have approached this Court.

5. Th sum and s
that, there is no prov
connection in the pr
agreement executed b
illegal and cannot be
of the working of M
quantum of load cap
safely or accurately de
capacity of the motor
officials of the Board
excess utilization over
such utilization is to
required by the motor
thereafter what is ac
capacity of the motor
Indian Electricity Rul
supply of electrical en
the purpose of raising
the power factor in th
working of the said m
even went as high as
facie, unrealistic and e
a creditworthy proces
demand on the basis of

6. Per contra, the
entered into an agreen
steel on a connected l
that, an initial inspect
rendering the appellan
load at twice the nor
charges paid as per
18-2-1994 for the prev
load was detected; tha
MDI meter and the s
Board under the relevar
conditions of the contr
the drawal of a load ca
duration of 30 minute
approved method of c
General Conditions for
agreement entered into
of the same, the instal
consumption load exc
permission of the Boarc
and/or if any tariff bec
consumption, the same

pellant claims that
it meter located in
ıt default and that
from time to time
/as any complaint
acted load of 150
the installation of
short MDI meter),
ıem to do so. MDI
and at a particular
meaning thereby,
ı cycle of half an
r the horse power
us according to
ded in the energy
stated that though
ppellant has been
l load capacity of
-1994 arbitrarily
236 BHP on their
of March 1994 to
of Rs 75,825. On
to have been paid
nnection. When
bring forth any
before the High
bills raised for an
ed for restraining
of MDI meter

y the installation
aken by them on
rt demand in
contracted load
s relating to all
representative of
he correctness of
ditional demand
of the contracted
ong with a batch
appellant while
d, LPA No. 311
dated 5-10-1999
ed Single Judge
approached this

5. The sum and substance of the claim on behalf of the appellant is: (*a*) that, there is no provision for installation of MDI meter on the low-tension connection in the premises of the appellant either in the statute or in the agreement executed between the parties and, therefore, it is unauthorized and illegal and cannot be used against the appellant; (*b*) that, merely on the basis of the working of MDI meter which has a limited role, even if it be, the quantum of load capacity availed of for consumption could not either be safely or accurately determined and that the Board has to go only by the total capacity of the motors which was even said to have been certified by the officials of the Board themselves for the purpose of determining the alleged excess utilization over and above the actual contracted load capacity; (*c*) that, such utilization is to be treated merely as the "thrust load" necessarily required by the motor/machinery only when the same is put in motion and thereafter what is actually consumed is said to be only the actual load capacity of the motor/machinery as permitted under the provisions of the Indian Electricity Rules, 1956 and the conditions of supply relating to the supply of electrical energy; and (*d*) that, MDI meter could not be installed for the purpose of raising additional bills but may be only for determination of the power factor in the premises of the LT consumer and that in the actual working of the said meter, as in this case, it was said to have exceeded and even went as high as 236 HP and consequently, the same is said to be ex facie, unrealistic and even impossible to be believed and cannot, therefore, be a creditworthy process for being countenanced, to raise any additional demand on the basis of such materials alone against the appellant.

6. Per contra, the respondent Board contended that, the appellant had entered into an agreement for supply of electricity for re-rolling of iron or steel on a connected load agreement of 150 HP low tension A/C 400 volts; that, an initial inspection disclosed use in excess of the contracted load, rendering the appellant liable to pay for units corresponding to the excess load at twice the normal tariff rate (inclusive of fuel charges and other charges paid as per tariff) as envisaged in the tariff notification dated 18-2-1994 for the previous three months in which the existence of excess load was detected; that, this circumstance necessitated the installation of MDI meter and the same was within the competency and powers of the Board under the relevant provision of the statute as well as the very terms and conditions of the contract relating to supply of energy; that, the recording of the drawal of a load capacity at a particular point of time over a continuous duration of 30 minutes through the device of MDI meter is a technically approved method of certainty; that, having regard to clause 31(*f*) of the General Conditions for supply which is part and parcel of the low-tension agreement entered into between the parties, as well as clauses 15(*a*) and (*b*) of the same, the installation of MDI meter is justified; that, if the actual consumption load exceeded the contracted load capacity without prior permission of the Board, action may be taken either to discontinue the supply and/or if any tariff becomes further payable on account of such excess load consumption, the same has to be paid as supplementary charges based on

such increase and consequently, based on MDI meter reading which records actually the maximum load availed of by the consumer along with the actual energy consumed, the Board is entitled to re-rate the charges to be paid and such re-rating is binding on the consumer; that, MDI meter was installed only in the presence of a responsible member of the management itself; that, as regards the claim on behalf of the appellant based on the "thrust-load" concept, the Board contends that MDI meter records only the excess capacity drawn over a continuous period of 30 minutes' duration at any time during a month; that, reference to the thrust-load concept is nothing but an attempt to confuse the real issue, inasmuch as MDI meter does not record the thrust load experienced by the motor/machinery at the time of starting which hardly is set to take only a few seconds or higher load/maximum load experienced by the motor/machinery for a fraction of time; that, this method and system was being uniformly applied without making any discrimination among different consumers and said to be also a well-recognised and widely accepted one and, therefore, the demand raised was legal, proper and quite in accordance with law and cannot be avoided by the appellant.

7. The grounds raised in the petition and the contentions raised in the counter filed in this Court seem to have evoked further response in the form of a rejoinder by the appellant and additional counter by the Board. By these pleadings the appellant disputes the accuracy of the recording by the device of MDI meter in its actual working of what is stated as drive needle in MDI meter to which the Board replied stating that MDI meter has two needles, one called the pointer needle which shows the load utilized in kilowatts and this pointer is always said to be moved by the carrier needle or drive needle and after completion of 30 minutes' cycle of continuous drawal the carrier needle alone resets automatically to "0" position leaving the pointer needle to remain and retain its position as per the load recorded and new cycles per 30 minutes get repeated by themselves from time to time recording any further fluctuations on the higher side. This method is claimed by the Board to be appropriate and technically precise and a proved one besides being a worldwide approved method of such measurement. It is also urged for the Board in traversing in the claim of the appellant to the contra, that the appellant was billed only as per single-part tariff (Alternative I of LT Tariff F) on the basis of kilowatt recorded by MDI meter and that, as in the case of low-tension consumer (440 volt supply), MDI meter was also being utilized in HT connections (11,000 volt or 33,000 volt supply) in which also, it is stated that there is similar provision for single-part and two-part tariff and consequently, it is claimed that MDI meter can be utilized in single-part opted tariff as well as two-part opted tariff.

CA No. 6509 of 2003 [arising out of SLP (C) No. 2300 of 2000]

8. This appellant has a steel rolling mill in Raipur district and for purposes of the mill he obtained LT electrical power supply by entering into an agreement with the Madhya Pradesh Electricity Board with power load of less than 100 HP. The agreed payment for consumption of energy was said to be at Rs 1.90 per unit up to 100 HP and the rest at Rs 2.25 per unit. As in the

other case, MDI meter
on the basis of the sa
availed in excess of the
been raised, in additio
ordinary meter fixed fo
As in the other case, t
High Court at Jabalpur i
disposed by a common
the writ petition. Thereu
Division Bench also con
appeal. Hence, this appe

9. The contentions c
one noticed in the earlie
the same in great detail.

CA No. 6506 of 2003 [ar

10. This appellant al
the name and style of M
Urla, Raipur district and
the supply of LT electri
Madhya Pradesh Electri
HP. Aggrieved against t
drawal/consumption of
basis of the reading rec
also filed WP No. 304
20-7-1999. Not satisfied
meet with success, resu
issues and contentions, a
appellant is that though
HP, the same is not bei
this case seems to be th
dates viz. 12-2-1993 (ex
excess connected load of

CA No. 6507 of 2003 [ar

11. This appellant cl
Jawahar Nagar, Raipur (
by entering into an agree
a contracted load capacit
load capacity availed of
appellant has also been
over and above the cont
WP No. 3002 of 1994 s
said petition came to
unsuccessfully. In this ap
other appeals are raised b

ıding which records
long with the actual
ırges to be paid and
:r was installed only
ment itself; that, as
n the "thrust-load"
the excess capacity
ıt any time during a
ıg but an attempt to
ɔt record the thrust
a which hardly
m load experienced
method and system
crimination among
gnised and widely
proper and quite in
nt.
ıtions raised in the
:sponse in the form
he Board. By these
rding by the device
rive needle in MDI
:r has two needles,
ed in kilowatts and
:dle or drive needle
drawal the carrier
ıe pointer needle to
l new cycles per 30
cording any further
e Board to be
e besides being a
also urged for the
he contra, that the
ive I of LT Tariff F)
t, as in the case of
also being utilized
in which also, it is
two-part tariff and
ıized in single-part

2000]
ur district and for
ɔly by entering into
with power load of
energy was said to
5 per unit. As in the

other case, MDI meter has been installed in the mill premises in question and on the basis of the said meter recording for the consumption of energy availed in excess of the contracted load, additional demand was said to have been raised, in addition to the regular consumption charges based on the ordinary meter fixed for recording units of consumption of electrical energy. As in the other case, this appellant also approached the Madhya Pradesh High Court at Jabalpur in WP No. 2996 of 1994, which came to be heard and disposed by a common order in a batch of cases, resulting in the dismissal of the writ petition. Thereupon the appellant filed LPA No. 239 of 1999 and the Division Bench also confirmed the order of the Single Judge by rejecting the appeal. Hence, this appeal.

9. The contentions of the parties on either side are almost similar to the one noticed in the earlier appeal and therefore, it is unnecessary to advert to the same in great detail.

CA No. 6506 of 2003 [*arising out of SLP (C) No. 2794 of 2000*]

10. This appellant also claims to have established a manufacturing unit in the name and style of M/s Kishan Steel Rolling Mill at the Industrial Estate, Urla, Raipur district and for purposes of his manufacturing activities availed the supply of LT electrical energy by entering into an agreement with the Madhya Pradesh Electricity Board with the sanctioned contract load of 100 HP. Aggrieved against the action taken by raising a demand for the excess drawal/consumption of energy than the contracted/sanctioned load, on the basis of the reading recorded by MDI meter at the premises, this appellant also filed WP No. 3043 of 1994, which also came to be dismissed on 20-7-1999. Not satisfied, he filed LPA No. 236 of 1996 which also did not meet with success, resulting in the filing of this appeal, raising identical issues and contentions, as in the other appeals. One further grievance of this appellant is that though he sought for enhanced sanctioned load up to 150 HP, the same is not being considered favourably. The admitted position in this case seems to be that the inspecting authorities have found on different dates viz. 12-2-1993 (excess connected load of 148 HP) and on 28-8-1993 an excess connected load of 188 HP.

CA No. 6507 of 2003 [*arising out of SLP (C) No. 3079 of 2000*]

11. This appellant claims to have established M/s Shree Krishna Steels at Jawahar Nagar, Raipur (M.P.) and availed the supply of LT electrical energy by entering into an agreement with the Madhya Pradesh Electricity Board for a contracted load capacity of 100 HP. On the basis of the recording of excess load capacity availed of by the appellant as per MDI meter reading, the appellant has also been called upon to pay for the excess load consumption over and above the contracted load. This appellant also unsuccessfully filed WP No. 3002 of 1994 seeking for relief as in the other cases and, when the said petition came to be dismissed, also filed LPA No. 241 of 1999 unsuccessfully. In this appeal identical contentions as have been raised in the other appeals are raised before this Court.

CA No. 6510 of 2003 [arising out of SLP (C) No. 3113 of 2000]

12. This appellant also had availed of the supply of LT electrical energy for the steel mill in question by entering into an agreement with the Madhya Pradesh Electricity Board for the contracted load capacity of 98 HP and when an action was taken on the basis of the recording of excess drawal of load of electrical energy than the actual permitted load capacity by MDI meter installed in the premises in question resort to the High Court seems to have been made by filing WP No. 326 of 1995. When the same came to be dismissed along with the other group of writ petitions, the appellant filed unsuccessfully LPA No. 240 of 1999, and thereafter filed this appeal, raising contentions identical and similar to those raised in the other appeals.

CA No. 6519 of 2003 [arising out of SLP (C) No. 3115 of 2000]

13. This appellant's steel mills also availed of the supply of LT electrical energy by entering into an agreement with the Madhya Pradesh Electricity Board for the contracted load supply of 150 HP. When, as in the other cases, on the basis of the recording by the MDI meter installed in the premises demand was raised for the excess load capacity of energy drawn, far in excess of the contracted load, this appellant also unsuccessfully filed WP No. 3372 of 1999 and when the further appeal filed before the Division Bench in LPA No. 239 of 1999 came to be dismissed, this appeal came to be filed raising almost identical and similar grounds as have been raised in the other appeals.

14. Shri Shanti Bhushan, learned Senior Counsel, while adverting to the definition of connected load/installed capacity to mean only the sum of the rated capacity of all the energy-consuming devices and apparatus installed at the consumers' premises connected to the installation including portable apparatus and of maximum demand, to mean, unless otherwise defined by the Board, twice the largest number of the kilowatt hours or kilovolt ampere hours supplied to the consumer during any consecutive 30 minutes during the relevant period, contended that calculation of the connected load by the Board on the basis of the maximum demand reading shown in MDI meter is fallacious and the reading so recorded does not suggest or indicate and prove a connected load. Incidentally, it was also urged that the maximum demand in any 30 minutes' cycle may shoot up due to increase of load on the AC motor or several other factors having no real connection with the connected load. It is the further contention on behalf of the appellant that under Alternative I of Tariff F (single-point tariff), there is no provision for billing on the basis of maximum demand reading recorded by MDI meter and that such a thing was permissible only under Alternative II of Tariff F, and if at all, the choice left with the Board is to provide to the mills in question, by-vector meter with MDI indicator and meter their billing compulsorily under Alternative II of Tariff F. Argued the learned Senior Counsel further that the device used by the Board can also result in misuse to the prejudice of the consumer and there is no justification for the impugned demand as long as there in no charge or accusation against the mills of any theft or adoption of

any subterfuge metho
of electrical energy.
appearing on behalf
submissions of Mr S
demand can be made
that such move is not
claimed that what is d
contained in the statut
urged that there is a
orders for determinir
premises and that alc
relying upon the rea
concerned, it needs t
relates to a particular
the name plate det
capacity/rating of the
situation arising in the

15. Per contra,
respondent Board toc
submissions made ab
additional demand ba
excess load energy th
to the Board on sever
Board, the excess dra
inevitably result in gr
maintenance works
overboard and disrupt
system, to ensure
simultaneously of the
reasons only the agre
if the load capacity a
load capacity. Relia
observations of this C
Ltd.[1] Reference has
issued by the Board
Electricity (Supply) A
Low-Tension Tariffs,
applicable to Alternati
case the connected loa
exceed what has bee
corresponding to the
charges, if any, and o
the credibility and co
support of the stand of

1 (1995) 4 SCC 320

any subterfuge method to evade payment of the rate for actual consumption of electrical energy. Shri Anoop Chaudhari, learned Senior Counsel appearing on behalf of the appellant mills, strongly supported the submissions of Mr Shanti Bhushan contending in addition that maximum demand can be made only in respect of HT supply and not for LT supply and that such move is not permitted at all under the agreement. In substance, it is claimed that what is done by the Board is in gross violation of the provisions contained in the statutory agreement entered into between parties. It was also urged that there is a special procedure envisaged by the Board under its orders for determining the rating/capacity of AC motors installed in the premises and that alone should have been done in these cases instead of relying upon the readings of the MDI meter. So far as this aspect is concerned, it needs to be clarified even at this stage that the said circular relates to a particular category of problem or to meet an eventuality where on the name plate details of the big AC motors are not available or capacity/rating of the motor mentioned is doubtful and not to deal with a situation arising in these cases.

15. Per contra, Shri V.R. Reddy, learned Senior Counsel for the respondent Board took pains to deal with and explain every one of the submissions made above to justify the action of the Board in making the additional demand based on the MDI meter reading disclosing the drawal of excess load energy than the permitted/contracted load, causing thereby loss to the Board on several counts. It is strenuously contended on behalf of the Board, the excess drawal of load and consequent excess demand was said to inevitably result in great stress on the whole system adversely affecting the maintenance works and scheme of supply as programmed, throwing overboard and disrupting several factors essential for maintaining the supply system, to ensure smooth supply to various customers availing simultaneously of the supply of energy under the system and it is for such reasons only the agreement itself envisaged levy and collection of penal rate if the load capacity availed of was found to be in excess of the contracted load capacity. Reliance has also been placed in this regard on the observations of this Court in the decision reported in *Orissa SEB* v. *IPI Steel Ltd.*[1] Reference has also been made to the notification dated 18-2-1994 issued by the Board in exercise of its powers under Section 49 of the Electricity (Supply) Act, 1948 and all other enabling powers, revising the Low-Tension Tariffs, in supersession of the existing tariffs and Condition 2 applicable to Alternatives I, II and III of tariffs, which enabled the Board in case the connected load in the consumers' premises at any time was found to exceed what has been agreed to be under the contract to levy penal rates corresponding to the excess load at twice the normal rate (including fuel charges, if any, and other charges payable as per the tariff). While disputing the credibility and correctness of the expert opinion sought to be used in support of the stand of the appellants, it was contended for the Board, that the

1 (1995) 4 SCC 320

formula adopted by the Board and method of determining the excess load availed of over and above the contracted load was the proper and correct method, and in support thereof reliance was placed on the opinion of another expert as well as on a standard textbook on the subject. In traversing the claim based upon what is called "thrust load" the plea on behalf of the Board was that such thrust-load factor has no impact on MDI meter, since the same was said to be so designed that sudden and/or momentary increase in the utilization of load due to short circuit in system or due to high starting current does not count at all and that not only overload but duration for which that load was operating was also said to be equally sensed by MDI meter and that too precisely. Reiterating the stand that the appellants were billed only for the same tariff as contracted under the agreement, it was contended that the demands raised are unassailable and in accordance with law.

16. We have carefully considered the submissions on behalf of parties on either side. This Court, in the decision reported in *Orissa SEB case*[1] though in dealing with the rights of the Electricity Board for enforcing payment of maximum demand charges and minimum monthly charges noticed about the utility of MDI meter also called "trivector meter" and observed as hereunder at para 10: (SCC pp. 326-27)

> "Every such consumer is provided with two meters. One is called the 'trivector meter' and the other is the normal meter which records the total quantity of energy consumed over a given period — which is ordinarily a month. The meter which records the total consumption requires no explanation or elaboration since we are all aware of it. It is the other meter which requires some explanation. Now every large-scale consumer knows the amount of energy required by him and requests for it from the Board. If the Board agrees to supply that or any other particular amount of energy, it makes necessary arrangements therefor by laying the lines to the extent necessary and installing other requisite equipment. It is obvious that if a factory uses energy at a particular level/load and for a particular period, it consumes a particular quantity of energy. The trivector meter records the highest level/load at which the energy is drawn over any thirty-minute period in a month while the other meter records the total consumption of energy in units in the month. Let us take the case of the respondent to illustrate the point. The maximum demand in his case is up to but not exceeding 7778 KVA. That is his requirement. In the normal times, he is entitled to draw energy at that level/load. That is his maximum demand under the agreement. But he may not always do so. Say, in a given month, he draws energy at 6000 KVA level only, even then he has to pay the minimum charges as stipulated in the agreement. But if he draws and consumes energy exceeding eighty per cent of the energy, he pays demand and energy charges for what he utilises. Now, let us notice how the trivector meter i.e. the meter which records the maximum demand works; the meter is so designed that it only records the maximum load/level at which energy is drawn over any thirty-minute period in a month. It only goes forward but never goes back until it is put back manually. To l
> energy at 7770 KV
> month, the meter w
> respondent consume
> month. From this
> conclusion that it is

17. The provisions
Indian Electricity Act, 1
checking apparatus, in
energy supplied and qu
utility of MDI meter to
at a continuous block p
come to stay as a r
recognition in the field
The question as to whe
investigating and deterr
availed of by a consu
agreement is concerned.
reasonable or tenable
utility and purpose of d
device installed could p
Court in the decision
maximum demand cha
be considered to be e
adjudging the issue as
time, in contravention
electricity in excess of t

18. Electrical moto
horse power. At the sa
Bhilai Steel Plant (a
Government of India e
in rolling mills are con
the range of 2 to 2.5 t
times, but only for a
cannot be sustained li
Hence, it is stated that
integrating over a perio
KW which is either les
these cases, MDI mete
futile for the appellants
the contracted load, si
actual over drawal in ex
rated KW as claimed b
object of the appellant
seem to be relevant
determine the capacity

ning the excess load
e proper and correct
he opinion of another
ect. In traversing the
n behalf of the Board
meter, since the same
ntary increase in the
due to high starting
ut duration for which
ed by MDI meter and
ants were billed only
t was contended that
ith law.

n behalf of parties on
case[1] though
enforcing payment of
ges noticed about the
bserved as hereunder

ters. One is called the
hich records the total
which is ordinarily a
umption requires no
of it. It is the other
large-scale consumer
quests for it from the
ner particular amount
by laying the lines to
ite equipment. It is
level/load and for a
tity of energy. The
which the energy is
hile the other meter
nth. Let us take
e maximum demand
at is his requirement.
that level/load. That
e may not always do
KVA level only, even
ed in the agreement.
ghty per cent of the
he utilises. Now, let
which records the
that it only records
er any thirty-minute
s back until it is put

back manually. To be more precise, suppose the respondent has drawn energy at 7770 KVA for a thirty-minute period on the first day of the month, the meter will record that figure and will stay there even if the respondent consumes at 7000 or lesser KVA level during the rest of the month. From this circumstance, however, one cannot jump to the conclusion that it is an arbitrary way of levying consumption charges."

17. The provisions contained in sub-section (7) of Section 26 of the Indian Electricity Act, 1910 envisage the installation of additional meters and checking apparatus, in addition to the meter for ascertaining the amount of energy supplied and quantity consumed. By and large it seems to be that the utility of MDI meter to record effectively and correctly the drawal of power at a continuous block period of 30 minutes in a month by a consumer has come to stay as a reasonably safe method with due credibility and recognition in the field and appears to be in vogue even at the global level. The question as to whether it can also safely be relied upon as the basis for investigating and determining the excess quantity of load said to have been availed of by a consumer over and above the contracted load as per the agreement is concerned, in our view admits of no doubt and we could find no reasonable or tenable and valid objection to exist so far as its relevance, utility and purpose of determination are concerned. If the reading by such a device installed could provide a sound basis and yardstick as accepted by this Court in the decision noticed supra for adjudging liability to pay the maximum demand charges/minimum monthly charge, it should in our view be considered to be equally efficacious for the purpose on hand also in adjudging the issue as to whether the consumer has at any given point of time, in contravention of the agreement with the Board, availed and drawn electricity in excess of the contracted load.

18. Electrical motors are designed to run up to a stipulated capacity of horse power. At the same time as disclosed from the communication from Bhilai Steel Plant (an undertaking of the Steel Authority of India: a Government of India enterprise) brought on record, so far as the motors used in rolling mills are concerned, they are said to have an overload capacity in the range of 2 to 2.5 times their rated capacity and at times even about 3 times, but only for a very short duration and at any rate such a situation cannot be sustained like that continuously for a duration of 30 minutes. Hence, it is stated that an MDI meter which measures the demand in KW and integrating over a period of 30 minutes should/will register a demand value in KW which is either less than or equal to the motor-rated KW. Therefore, if in these cases, MDI meter disclosed such higher rate of demand, it would be futile for the appellants to contend that there was no overdrawal in excess of the contracted load, since such excess drawal stands substantiated by the actual overdrawal in excess from the readings of MDI meter and the motor-rated KW as claimed by the appellants are not either genuine or correct. The object of the appellant in making reference to lock rotor test also does not seem to be relevant since the said test could, it appears, only help to determine the capacity of the motor and not of the total connected load or the

total load demanded and availed of during the course of actual consumption of energy.

19. The agreements entered into with the Board by the consumers like the appellants make mention in respect of particulars relating to electric supply, the maximum demand of the consumer in terms of HP, in addition to giving the connected load, alongside. The actual consumption of energy during the relevant period unitwise also goes to indicate that with the normal utilization of the contracted load, it would not have been possible for the mills of the appellants concerned to consume the number of units actually consumed and this circumstance also seems to strongly support the stand of the respondent Board. The agreement for supply between parties is inclusive of and also subject to the provisions of the Indian Electricity Act, 1910, Electricity (Supply) Act, 1948 and notifications, rules, regulations framed thereunder as well as the General Conditions for supply of electrical energy made by the Board and the amendments made to all such, from time to time. Clause 31(*f*) of the General Conditions reads under the caption "Prejudicial use of supply" as follows:

> "If at any time, the maximum demand of an HT consumer or of an LT consumer availing supply under IT two-part tariff, exceeds his contract demand or if the connected load of LT consumers other than those mentioned above exceeds the connected load mentioned in his agreement or where agreement has not been taken the connected load mentioned in the requisition form, without prior permission of the Board, the Board may forthwith discontinue the supply. Further, if any charges under the tariff applicable become payable on account of such increase the consumer shall be liable to pay supplementary charges based on such increase for such period as the Divisional Engineer of the Board may decide."

20. The Low-Tension Tariffs, notified by the Board with effect from March 1994, stipulate in Condition 2, as hereunder:

> "The foregoing tariffs (except Tariff A-1 and alternative of Tariffs D, E, F and G) are applicable to the extent of connected load for which the agreement subsists between the Board and the consumer. In case the connected load in the consumer's premises is at any time, found in excess of what has been agreed to between the consumer and the Board, the consumer shall have to pay in respect of tariffs other than Alternative III of Tariff C(*ii*) for the units (including minimum charge) corresponding to the excess load at twice the normal tariff rate (inclusive of fuel charge, if any, and other charges payable as per tariff) and in respect of Alternative II of Tariff C(*ii*) at the following rates: (rest omitted as unnecessary)
>
> * * *
>
> The billing of excess supply at twice the normal tariff applicable to consumer is without prejudice to the Board's right to discontinue the supply in accordance with the provisions contained in the Board's General Conditions for Supply of Electrical Energy and Scale of Miscellaneous and General Charges."

DIVISIO

21. The respon
under challenge sinc
of the conditions fo
in excess of the co
supply system under
the installations of t
will experience volt
challenge made on t
shall stand dismissed

(BEFORE
DIVISIONAL CONT

MAHADEVA SHETT

Civil Appe

A. **Motor Vehicle**
Factors in compu
Compensation has t
Tribunal has to be r
the mind, shortening
of the disability, loss
backdrop of age, ma
— Words and phrase

Held:

The damages for
money for loss of any
compensation for inju
accidents were becomi
be borne in mind tha
weighed in golden sc
entitles the claimant t
accordance with the ir
loss of earning capaci
losses. A person becon
her life may have bee
been curtailed becaus
impaired. But at the s
is not expected to be
indicate that the comp
source of profit but th
have a duty to wei
compensation, which

† Arising out of SLP (C)
the Karnataka High Co

e of actual consumption

l by the consumers like
lars relating to electric
ms of HP, in addition to
consumption of energy
ate that with the normal
e been possible for the
umber of units actually
gly support the stand of
veen parties is inclusive
Electricity Act, 1910,
les, regulations framed
ply of electrical energy
uch, from time to time.
he caption "Prejudicial

HT consumer or of an
art tariff, exceeds his
consumers other than
lo[redacted]mentioned in his
en the connected load
ermission of the Board,
Further, if any charges
count of such increase
charges based on such
ieer of the Board may

oard with effect from

lternative of Tariffs D,
ted load for which the
consumer. In case the
y time, found in excess
er and the Board, the
ier than Alternative III
arge) corresponding to
usive of fuel charge, if
respect of Alternative
l[redacted]nnecessary)

nal tariff applicable to
ght to discontinue the
ained in the Board's
Energy and Scale of

21. The respondent Board, therefore, is entitled to raise the demand under challenge since such right has been specifically provided for and is part of the conditions for supply and particularly when such drawal of extra load in excess of the contracted load is bound to throw out of gear the entire supply system undermining its efficiency, efficacy, not only causing stress on the installations of the Board but considerably affect other consumers who will experience voltage fluctuations. Consequently, we see no merit in the challenge made on behalf of the appellants. The appeals, therefore, fail and shall stand dismissed but with no costs.

(2003) 7 Supreme Court Cases 197

(BEFORE DORAISWAMY RAJU AND ARIJIT PASAYAT, JJ.)

DIVISIONAL CONTROLLER, KSRTC .. Appellant;

Versus

MAHADEVA SHETTY AND ANOTHER .. Respondents.

Civil Appeal No. 5453 of 2003†, decided on July 31, 2003

A. Motor Vehicles Act, 1988 — S. 163-A and Sch. II — Compensation — Factors in computation of damages — Historical perspective — Compensation has to be "just", not a bonanza — Hence determination by Tribunal has to be rational based on a judicious approach — Suffering of the mind, shortening of life expectancy, loss of earning capacity, permanence of the disability, loss of amenities of life etc. are to be considered against the backdrop of age, marital status etc. — Mathematical precision not possible — Words and phrases — "just"

Held:

The damages for vehicular accidents are in the nature of compensation in money for loss of any kind caused to any person. The main principles of law on compensation for injuries were worked out in the 19th century, where railway accidents were becoming common and all actions were tried by the jury. It has to be borne in mind that compensation for loss of limbs or life can hardly be weighed in golden scales. Bodily injury is nothing but a deprivation which entitles the claimant to damages. The quantum of damages fixed should be in accordance with the injury. An injury may bring about many consequences like loss of earning capacity, loss of mental pleasure and many such consequential losses. A person becomes entitled to damages for mental and physical loss, his or her life may have been shortened or that he or she cannot enjoy life, which has been curtailed because of physical handicap. The normal expectation of life is impaired. But at the same time it has to be borne in mind that the compensation is not expected to be a windfall for the victim. Statutory provisions clearly indicate that the compensation must be "just" and it cannot be a bonanza; not a source of profit but the same should not be a pittance. The courts and tribunals have a duty to weigh the various factors and quantify the amount of compensation, which should be just. What would be "just" compensation is a

† Arising out of SLP (C) No. 15861 of 2002. From the Judgment and Order dated 4-10-2001 of the Karnataka High Court in MFA No. 3577 of 2000

OPEN STANDARD COMMUNICATION PROTOCOL FOR ELECTRICAL ENERGY METERING

1. Introduction

During 11th plan there is ambitious plan to add 78700 MW of Capacity and in 12th plan another 100000 MW. Consequently number of consumers would be added at a very fast rate. India's Metering Industry is growing and vibrant with a large install base of tariff meters, and numerous Indian and international manufacturers and service providers serving the market.

India Electricity sector has been suffering from large amount of losses, theft and unbilled power at the distribution level, and there is great impetus in bringing these under control. There is large focus both from the government, the utilities and the manufacturers to address the issue of theft. Constant monitoring and tracking of metering assets and usage is becoming key to all utilities. So also is the requirement for a large number of analysis and load management applications to be deployed by utilities for managing its distribution network and making decisions on future investments and immediate corrective actions.

Utilities have been resorting for quite some time to ordering not only the meter, but also the metering software and communication system from a single meter vendor. When multiple vendors exist, a similar duplicate system exists at the utility. Data integration happens at a very higher level, where these different system data gets aggregated in some Management Information System(MIS) /Enterprise Resource Planning(ERP) system. These integrations and the low flexibility and great dependency on the vendors, is resulting in reduced operational agility for the utility as well as increased costs in deploying any new type of higher level management and reporting software's or implementing large scale remote metering systems.

Over the years a number of metering protocols have come to be existent in the Indian market. These are namely the older IEC standard of IEC 1107, the ANSI Standard, the PACT standard and Modbus Standard. The Common Meter Reading Instrument is available from many vendors, which support manufacturer specific programs, which can read and convert the proprietary formats into user readable form.

These protocols have been consistently modified over the period and manufacturers have also brought about many solutions that enable the utilities to deploy AMR, metering applications etc., using their meters.

Earlier the manufacturers have been reluctant to open up their metering protocol for the public, and each manufacturers protocol is private to itself, and drivers where provided to utilities on request. However with the existence of a number of

specific standards and specific addressing in each of the meters, in the long run Utilities are facing problems in getting to communicate with their meters seamlessly, without getting bogged down by technical issues related to proprietary protocols, reading systems and lack of common remote reading capabilities and thereby not able to deploy MIS and management applications with automated metering as input in any fruitful way. Large investment being made by individual metering companies, the system integrators, the software implementers and the utilities themselves in maintaining their own set of communication protocols, drivers, adapters, XML converters, and application solutions could be at risk.

Large government funded projects for AMR are now envisaged in RAPDRP and a need was felt for an open standard protocol. On the issue of adoption of open standard protocol the debate has been going on for last couple of years and finally a high level committee constituted by MOP has recommended adoption of IEC 62056(DLMDS/COSEM) for new meters.

2. What IS DLMS:

DLMS or Device Language Message Specification, is the suite of standards developed and maintained by the DLMS User Association and has been co-opted by the IEC TC13 WG14 into the **IEC 62056** series of standards. COSEM or Companion Specification for Energy Metering, includes a set of specifications that defines the Transport and Application Layers of the DLMS protocol. The DLMS User Association defines the protocols into a set of three specification documents namely Green Book, Yellow Book and Blue Book. **These books are available on website.**

The IEC TC13 WG 14 defines the DLMS specifications under the common heading: "Electricity metering - Data exchange for meter reading, tariff and load control."

- IEC 62056-21: Direct local data exchange (3d edition of IEC 61107) describes how to use COSEM over a local port (optical or current loop)
- IEC 62056-42: Physical layer services and procedures for connection-oriented asynchronous data exchange
- IEC 62056-46: Data link layer using HDLC protocol
- IEC 62056-47: COSEM transport layers for IPv4 networks
- IEC 62056-53: COSEM Application layer
- IEC 62056-61: Object identification system (OBIS)
- IEC 62056-62: Interface classes

3. Features of DLMS/COSEM:

- covers all metering functions and functions are modelled using metering domain specific interface objects. This allows developing meters meeting exactly customer needs, using standard building blocks. It also allows innovation and competition by enhancing

functionality in a standard way as required while maintaining interoperability.

- ensures unique identification of all metering equipment world-wide and unambiguous identification of all data elements.
- allows controlled and selective access by various parties to data data.
- improves efficiency through effective data organisation and encoding.
- provides various levels of security mechanisms.
- covers meters for electricity, gas, water, heat etc.
- opens the way for exchanging data over various communication media, as the meter data model is independent of the communication protocol stack.
- brings interoperability, and therefore lowers costs, as it is based on a standard data model and internationally approved standard protocols.
- provides mechanisms to facilitate installation, as the data collection system is able to learn the data structure of the newly installed meter and to download the parameters as required by application and metering site.
- allows developing a genuine driver, as the meter describes the functions available and sends all information necessary to interpret data. This allows meter manufacturers and data collection system providers to concentrate on the applications relevant for their customers rather than on connectivity and interfaces;
- conformance testing is possible to guarantee interoperability.

Abbreviations:

COSEM – Companion Specification for Electricity Metering
IEC – International Electrotechnical Commission
TC 57 – Technical Committee 57
WG 13 – Working Group 13
AMR - Automated Meter Reading
CPRI - Central Power Research Institute
BIS - Beaureau of Indian Standards
CBIP - Central Board of Irrigation and Power
PSTN - Public Switched Telephone Network

SCHEDULE –III

GUARANTEED STANDARDS OF PERFORMANCE AND COMPENSATION TO CONSUMERS IN CASE OF DEFAULT

Service Area	Standard	Compensation payable to consumer in case of violation of Standard (default shall be considered from the time consumer has made complaint)
1. New Connection		
Release of connection	Within thirty days of receipt of application (along-with prescribed charges)	Rs.10 per Rs 1000 (or part thereof) of the demand charges deposited by consumer for each day of default
2. Billing		
First Bill	Within four billing cycles	5% of the billed amount subject to maximum of Rs. 100/- upto 01.06.2007 10% of the billed amount subject to maximum of Rs. 250/- beyond 01.06.2007
Provisional Billing	For not more than two billing cycles	
3. Network expansion/enhancement required to release supply		
Electrified Areas (where extension of line upto five poles is required)	Fifteen days	Rs.10 per Rs 1000 (or part thereof) of the demand charges deposited by

Electrified Areas (Where extension of lines or augmentation of Distribution Transformer is required)	Sixty days	consumer for each day of default
Electrified Areas (Where new Distribution Transformer is required)	One hundred and twenty days	Rs.10 per Rs 1000 (or part thereof) of the demand charges deposited by consumer for each day of default
Electrified Areas (Where existing 11 KV network needs to be strengthened)	One hundred and eighty days	
Electrified Areas (Where existing 66/33 kV grid sub-station needs to be augmented)	Two hundred and forty days	Rs.10 per Rs 1000 (or part thereof) of the demand charges deposited by consumer for each day of default
Un-Electrified Areas (Where augmentation from nearby existing network is possible)	One hundred and twenty days	10% of the amount deposited by developer per week of default

Un-Electrified Areas/ Green Field Projects (Where new network is to be laid or grid station needs to be established)	Twelve months	
4. Transfer of consumer's connection and conversion of services		
Transfer due to change in ownership/occupancy of property	Within two billing cycles of acceptance of application	Rs. 50 for each day of default
Transfer to legal heir	Within two billing cycles of acceptance of application	
Load reduction	Within ten days of acceptance of application, shall be effective from next billing cycle	
Change of category	Within ten days of acceptance of application, shall be effective from the date of deposit of inspection fee	Rs. 50 for each day of default
5. Meter complaints		
Testing of meter	Within fifteen days of receipt of complaint	Rs. 25 for each day of default
Replacement of burnt meter	Within six hours restoration of supply by bypassing the burnt meter. Meter to be	Rs. 50 for each day of default

	replaced within three days	
Replacement of defective meter	Within fifteen days of declaring meter defective	Rs. 50 for each day of default
6. Power supply failure		
Fuse blown out or MCB tripped	Within three hours for Urban areas Within eight hours for Rural areas	Rs. 50 for each day of default
Service line broken Service line snapped from the pole	Within six hours for Urban areas Within twelve hours for Rural areas	
Fault in distribution line/system	Temporary Supply to be restored within four hours from alternate source, wherever feasible. Rectification of fault and thereafter Restoration of normal power supply within twelve hours	Rs. 50 for each day of default
Distribution transformer failed/burnt	Temporary Restoration of supply through mobile transformer or another backup source within eight hours, wherever feasible	Rs. 100 for each day of default

	Replacement of failed transformer within forty eight hours	
HT mains failed	Temporary restoration of power supply within four hours, wherever feasible. Rectification of fault within twelve hours	Rs. 200 for each day of default
Problem in grid (33 kV or 66 kV) substation	Restoration of supply from alternate source, wherever feasible within six hours Roster load shedding may be carried out to avoid overloading of alternate source. Repair and restoration of supply within forty eight hours	Rs. 200 for each day of default

Failure of Power Transformer	Restoration of supply from alternate source, wherever feasible within six hours Roster load shedding may be carried out to avoid overloading of alternate source. Rectification action plan to be intimated to the Commission within seventy two hours Rectification to be completed within twenty days	Rs. 500 for each day of default per day
Street light faults	Rectification within seventy two hours	Rs. 50 for each day of default

7. Voltage fluctuation		
Local problem	Within four hours	Rs. 50 for each day of default
Tap of transformer	Within three days	
Repair of distribution line / transformer / capacitor	Within thirty days	Rs. 100 for each day of default
Installation and Up-gradation of HT / LT System	Within ninety days	

Note : The provisions from Sr. no. 1 to Sr. no. 5 shall come into effect from 01.06.2007. The provision at Sr. no. 6 and 7 shall come into effect six months thereafter ie. from 01.12.2007

Manner of payment of compensation amount:

1. The Licensee shall register every complaint of a consumer regarding failure of power supply, quality of power supply, meters, bills etc., at the Centralized Complaint Center or Complaint Centers, Commercial Manager and intimate the complaint number to the consumer.

2. The Licensee shall maintain consumer-wise records regarding the Guaranteed standards of performance in order to give a fair treatment to all consumers and avoid any dispute regarding violation of standards.

3. All payments of compensation shall be made by way of adjustment against current and/or future bills for supply of electricity, but not later than ninety days from the date of violation of a Guaranteed Standard.

If the Licensee, however, fails to dispense the compensation amount as laid down in paragraph 3 above the aggrieved consumer(s) can approach the respective Consumer Grievance Redressal Forum for redressal of grievances of consumers to seek such compensation. In such event, additional penalty may be levied on Licensee for not implementing regulations faithfully on a case-to-case basis.

kVAh Billing issues

1. Introduction:

Resistive devices, like electric resistance heaters and incandescent lights transform all power supplied to them and convert heat into useful energy. This power is called active power. The active or real power is actually consumed and converted into useful work for creating heat, light and motion and is measured in (kW) and is totalized by the electric meter in (kWh).

The reactive power that is measured by (kVAR) and is totalized by the meter in (kVARh) unit is the power used to provide the electromagnetic field in inductive and capacitive equipment like motors, air conditioners, fans. These devices in addition to active energy use some power to energize the inductive windings and create a magnetic field. The reactive power is alternately stored and given up by the windings, but is not used to do actual work. The reactive power reduces the useful capacity of system and increases power& energy losses in electricity network due to increase in current. Line supplying power to the device has thus two components, active power and reactive power.

2. Apparent Energy:

Apparent energy is the product of voltage & current (scalar quantities) and is considered as “apparent import” in case the current vector lies in Quadrant 1 or 2, and “apparent export” in case the current vector lies in Quadrant 3 or 4.

Apparent power can either be defined as the *Pythagoras Sum* of *“sum of inductive plus capacitive”* and the *“corresponding active power”****(only one or two utilites are adopting) .*** In the second definition, the apparent can be defined as the *Pythagoras Sum* of *“sum of inductive component only”****(leaving capacitive component as most of the utilities adopting)*** and the *“corresponding active power”* .

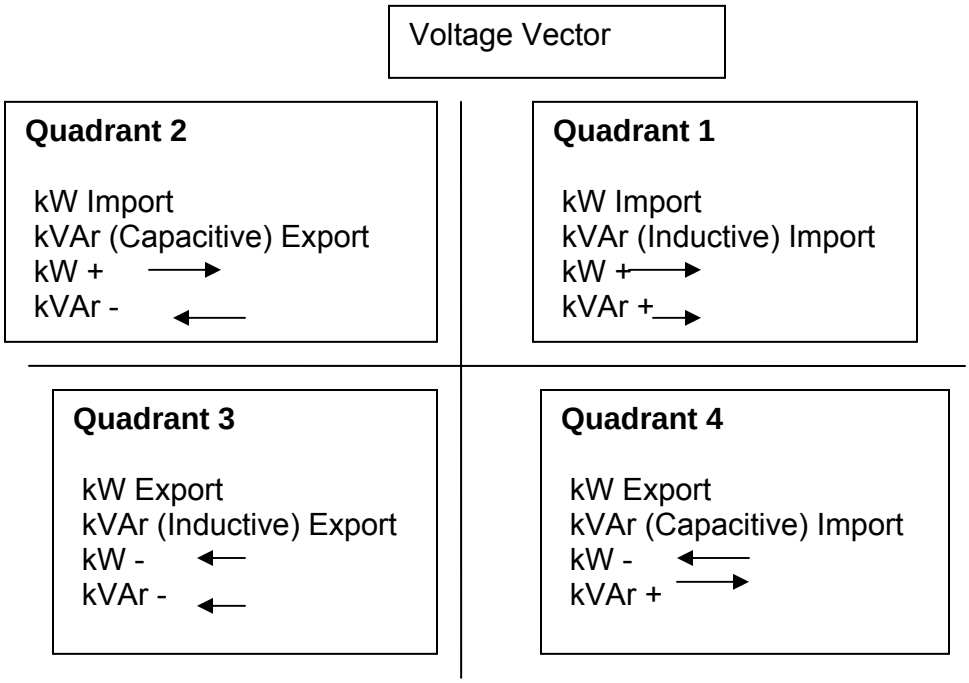
3. Power Flow:

Power flow is always measured with respect to the Voltage, and the Voltage at the point of measurement is taken as reference vector for defining the direction of power flow. The angular position of the current vector with reference to this reference Voltage vector defines the direction of the flow for active, reactive and apparent energy.

When we consider vectors, and we assume that the voltage vector is a reference vector (with the current vector as a variable vector based on the

load), the current vector may assume any position within 360_0 of the voltage vector.

Multiplication of this reactive component of the current with the voltage gives us the reactive power. The integration of the reactive power with time gives us the reactive energy. IEC 62053-23 defines the vector as follows:



4. Multiple Definitions of kVA

Depending on quantities to be measured while measuring kVA following definitions have been used by manufacturers, utilities across the world in the context of three phase measurement. Integration over time gives kVAh. For single phase y and b component will not be present in case single phase loads are connected on R phase.

Three Phase

- Phasor KVA(S)= $\sqrt{(P_R+ P_Y+ P_B)^2+ (Q_R + Q_Y + Q_B)^2}$ **(Without Distortion**) – (i)

- Apparent KVA(U)= $\sqrt{(P_R +P_Y +P_B)^2+ (Q_R + Q_Y + Q_B)^2+ (D_R+D_Y+D_B)^2}$ - (ii)
  (With Distortion)
  =VrmsXArms

- Arithmetic Apparent Power KVA (Ua)
  = $\sqrt{(P_R ^2+ Q_R ^2+D_R ^2)}+ \sqrt{(P_Y ^2+ Q_Y ^2+D_Y ^2)}+ + \sqrt{(P_B ^2+ Q_B ^2+D_B ^2)}$ – (iii)
  = $U_R+ U_Y+ U_B$
  = $V_R X I_R + V_Y X I_Y+ V_B X I_B$ **(Scalar quantitiy)**

Note : Researchers have gone to the extent of simplifying the voltage and current component in calculation and have defined as three phase power based on equivalent voltage and current as follows :

$S_e = 3U_e I_e$ - (iv)

Where $U_e = \sqrt{(U_a ^2/3 + U_b ^2/3 + U_c ^2/3)}$ and $I_e = \sqrt{(I_a ^2/3 + I_b ^2/3 + I_c ^2/3)}$

Where U_{abc} and I_{abc} are the RMS values of the line voltages and currents.

5. KVAh Billing:

Industrial and Non-Domestic Consumers generally maintain poor Power Factor at their end, they are forcing the Network to get overloaded and suffer higher load losses. It also harm to other Consumers as it results into Voltage dips. Further, the Consumers may also be subjected to higher tariff, penalty etc. as made applicable by appropriate ERC from time to time. kVAh metering is a concept mooted to replace the conventional kWh metering and penalty on poor power factor.

At present certain section of consumers in certain states are billed on two type of tarrif i) KWh and ii) power factor penalty. The kVAh metering vectorial or arithmetic sum of active power and reactive power integrated over a time interval. kVAh metering is introduced by many states in India like Delhi, Himachal,Chattisgarh, J&K,UP, Uttarnchal. Power factor(KW/kVAh)penalties are also in vague in states like Maharashtra, WestBengal(DVC),DNH,UP,Tamilnadu,Jharkhand,Punjab,MP,HP,Gujrat, Bihar. Measurement of kVAh and related tariffs will simplify the billing procedure from three parameters to two and is expected to help in reducing reactive currents in the system by commercially motivating industrial and non-industrial consumers to install reactive compensation at their premises.

In the interest of the Power Sector , it would be appropriate to levy KVAh tariff for Industrial consumers and non-domestic consumer above particular load(to be decided by respective ERCs) say 20 KW or above so that they can maintain Power Factor as close to 1.0 as possible. The Power Factor once improved, will result in lower bills (KVAh bill will be lower at Unity Power Factor than KWh bill as tariff rate is lower).

6. Suggestions:

There are two things catered for by the distribution utility (i) capacity (ii) energy. Every consumer is sanctioned a particular capacity based on which the distribution system has been constructed. Violation of the capacity is an offence on the design of the system, and hence deserves a penalty, like demand over-shoot penalties. With power factor penalty there will be basically three tariffs i) maximum demand tariff ii) kwh tariff and

power factor penalty tariff. To make it simpler it can be converted into two part tariff i) maximum demand based on KW or KVA and kVAh tariff. kVAh metering is a measuring system which gives a commercial warning to consumers to use electricity at unity power factor. It does not directly measure the electricity consumed by consumers. kVAh metering tends to imply that consumers are to have a perfect compensation.

i. Separation of two power electric components is unnatural and unnecessary by the electricity supplier like peeling the orange by orange seller and selling. It is generally in the customer interest to maintain a relatively high power factor. To maintain a high power factor:

- purchase equipment with high power factor ratings, such as high power factor lighting ballasts
- avoid or replace dramatically oversized motors, since under-loaded motors have low power factors. If power factor is still a problem, consider adding electrical capacitors.

ii. Power Factor correction equipment with low load or no load causes higher Network losses & Voltages which are harmful to equipment & causes pumping of undesired reactive power into Networks thus, causing failure & disruption to supply. Consumer may be educated about the effect of poor and leading power factor. Capacitors should remain in circuit as long as the load runs and & must be cut-off as soon as the load is switched off.

iii. Calculation of distortion component:

In a non harmonic environment (sinusoidal waveform of current &voltage) the apparent power (kVA) is the vector sum of the active and reactive power and represents the complete burden on the electrical system. But in a harmonic condition that is produced by nonlinear elements and loads the kW/ kVAR spectra do not contain many of the harmonics in current. So, true RMS, harmonic sensing meters still sense relatively few harmonics. At present interface meters are designed to measure only fundamental energy.

iv. Elimination of leading power factors:

There is no difference between leading and lagging power factor in reduction of network capacity and increasing the energy and power losses. But traditionally the power factor penalty is calculated only for lagging power factor because in conventional electromagnetic meters, the rotating disk in lagging or leading states rotates in two different direction and measure net reactive power. it isn't permitted to rotate in leading state by a brake system. Since now static meters are envisaged the measurement of both leading and lagging reactive power is possible.

Utilities are adopting different practices. However most of the utilities are not taking into account the leading component of reactive power to avoid extra burden on the consumer ,the same practice may continue as these consumer who are supporting the grid under low voltage conditions may not be penalized.

Since most of the time the distribution system remains under lagging environment, leading power factor conditions be treated as unity power conditions ie kVAh be calculated based on lagging power factor as being done by most of states. For bulk loads where there is heavy injection of MVAr into the grid and there is threat to grid security kVAh can be calculated based on lagging and leading power factor. It will encourage consumers to use static Var compensators to control the voltage at their intake point and maintain unity power factor. Nationwide uniform policy need to be adopted for measurement of kVAh i.e. whether considering only lag component or lag plus lead.

v. Elimination of threshold power factor limit:

An incentive threshold limit can be defined for lagging power factor between say 0.85- 0.95. This may vary from utility to utility. The power factors greater than the threshold limit are exempted from penalization. While the power factors less than the threshold limit are levied power factor penalty. For example by threshold limit of 90% the customer is permitted to reduce 5% of network capacity without levying penalty. The incentive power factor motivates the consumers to improve their power factors achieving higher power factors. According to kVAh based tariff, the accepted threshold limit of power factor is just 1. therefore wouldn't be any penalty exemption for power factor neither lagging nor leading. Thus kVAh merits consideration over power factor penalty.

vi. Change of Meters:

As is gathered from some of the manufacturers that present meters generally include non-sinusoidal component (except interface meters and HT meters which are based on measurement of only fundamental energy) while measuring KW and KVAR we may continue with the same other wise substantial meter would have to be changed. We may, however would have to measure harmonic content separately as grid standard notified by CEA stipulates requirement of harmonic distribution.

vii. There is no BIS standard for kVAh meters in the country and the accuracy of kVAh measurement is not defined. CBIP in their manual (Publication No.304- July, 2008) has recommended that accuracy attainable for kVArh measurement is one level inferior to that in case of kWh measurement with similar designs of measuring elements. From the web-surfing of

various literatures of meters it is found that same accuracy can be maintained for kwh, kVArh and kVA. However, there may be cost implications. The meters may be tested for prescribed accuracy class for kWh and one class higher accuracy class for kVArh. The errors in the kVAh measurements can automatically be controlled as kVAh is a derived unit. Utilities while procuring energy meters may also specify the accuracy of kVArh, kVAh as some of the utilities are doing.

viii. Since regulations on meters came into existence in 2006 and large number of electro-mechanical meters was replaced in a span of two years, it is suggested that kVAh metering may not be employed for domestic consumers. It can be adopted for consumer having 20 kW and above.

ix. It is to be seen that how kVAh billing would be adopted for pre-paid consumers.

SPECIFICATIONS OF 60 KVAR AUTOMATIC VAR CONTROLLED PANEL

1.Capacitor Panel : Automatic P.F. Correction panel shall be designed for automatic switching of LV capacitor sensing the VAR of system. A microprocessor based VAR controller shall be provided for the same. The VAR controller shall be sensing voltages and current of all 3 phase and shall have display of electrical parameters and stage "ON" indication. It shall have a settable Over & Under Voltage trip.

2. Rating : 60 kVAR at 440 V.

3.Capacitor Type : APP type as per IS:13585 (non self healing type)

4.Voltage class : 440 V. +/- 10 % 50Hz, 3 Phase

5.Capacitor Connection : Delta connected

6. Capacitor Switching : Capacitors shall be switched as per the VAR requirement using either Intelligent or FIFO logic.

7.Panel size : 500 mm (width) X 1100 mm (height) X 500 mm (depth) appox.

8. Panel Enclosure: Panel shall be fabricated out of CRCA sheet metal 2 mm thickness [14 Gauge]Panel enclosure shall be duly processed with surface pre-treatment and duly powder coated [For outdoor panels powder coating shall be polyester based to suit for continuous outdoor duty] Panel shall have bottom cable entry provided with suitable cable gland.

9.Installation : Outdoor/Indoor

10.Mounting : Floor mounting / MS Angle mounting

11.Panel opening : Front door opening /[Front side access for capacitors also] Locking arrangement with riveted MS chain

12.No. of stages kVAR/stage : 3 stages of 20 kVAR,

13.Power wiring : Suitable size copper wire

14.Control wiring : Suitable size copper wire

15.Earthing : Earth terminals on both side of panels shall be provided

16.Caution Board : In English & Gujarati on front door of panel

17.Load C.T. : Will be provided by Torrent Power SECL.

18. C.T. for capacitor currents: CTs of suitable ratio shall be provided in the panel to measure the total capacitor current and also individual capacitor stage current to check healthiness of the particular stage.
19. C.T. terminal block : C.T. terminal block shall be provided for both type of C.T. (Load & Capacitor)
20. Incoming MCCB : TP MCCB of 125 A. with short circuit releases.
21. Bus-bars : Aluminum (200 A.) supported on epoxy bushings
22. Power protection in stage : 63 amp. TP MCB for 20 kVAR stage.
23. Switching Contactors : Contactors suitable for capacitor switching as per IS:13947-4-1 [AC6b Duty] with inrush current limiting resistors.
24. Indicators :
    1. LED indicator for each stage on/off
    2. LED indication for over-voltage condition on the controller
25. Display: Following parameters Instantaneous without any memory & downloading facility.
    1. Line Voltage
    2. Line current
    3. Power factor in three phase
    4. Capacitor current, Capacitor output kVAR
    5. Line frequency
    6. KVA, KW, kVAR [lag/lead]
26. Drawings: Supplier has to submit following drawings/ Wiring diagrams for approval:
    1. GA drawing of the panel showing all the dimensions
    2. Drawing/ wiring diagrams of switching/ sensing/ controlling circuit
    3. Drawings showing the ID/ OD of ring type external Cts
27. Test certificates : Supplier has to submit all the type test certificates, confirming the relevant IS, carried out at CPRI/ ERDA for the following components:
    1. Capacitor Units (All the ratings used)
    2. Power and Control circuit contactors (all the ratings used)
    3. MCB (All the rating used)
    4. MCCB
    5. Internal and External CTs used

28. Bill of materials: Supplier has to submit and get approve the bill of materials showing the make and quantity utilized of every component of the panel along with the drawings.
29. Inspection : Supplier has to offer the following tests during the factory inspection of the panel:
    1. All routine tests as per IS on random sample/ samples of capacitor units selected by our representative.
    2. If required supplier has to arrange for fresh type test of any/all of the components listed in Para. 27 above at any standard test house like CPRI/ ERDA, which our representative may witness.
    3. Load cycle test of the capacitor bank to witness the integrated performance of the bank under simulated loading conditions.
30. Supply, Installation and Commissioning :
    1. Submission of drawings within 2 weeks from the receipt of the final order
    2. Delivery as per the delivery schedule provided with the order or as per the instructions of our materials department.
    3. Panels are to be delivered directly at the predefined distribution transformer locations in consultation with our materials department and Substation Department.
    4. Supplier has to install and commission the panels in consultation with Substation Department.
    5. Torrent Power SECL shall provide the suitable size of power cable and termination accessories only. All other material including CT cable is to be arranged by the supplier.
    6. Substation Department. will arrange the shutdown for the APFC Panel connection to distribution transformer. Supplier has to make all the preparation in advance so that the power interruption should be of minimum duration.
31. Guarantee : The guaranteed output of the capacitor banks shall be 100% in 1^{st} and 2^{nd} year, in 3^{rd} year it should be between 98.5% - 100%, in 4^{th} year it should be between 97% - 100% and in 5^{th} year between 95.5% - 100% and between 6^{th} and 10^{th} year it should be between 95 – 100%. In case the value is less than 95%, supplier should replace the units free of cost.
32. Instruction Manual : Supplier has to provide three copies of detailed instruction manual of the APFC Panel with each unit.

SPECIFICATIONS OF 100 KVAR AUTOMATIC VAR CONTROLLED PANEL

33. Capacitor Panel : Automatic P.F. Correction panel shall be designed for automatic switching of LV capacitor sensing the VAR of system. A microprocessor based VAR controller shall be provided for the same. The VAR controller shall be sensing voltages and current of all 3 phase and shall have display of electrical parameters and stage "ON" indication. It shall have a settable Over & Under Voltage trip.
34. Rating : 100 kVAR at 440 V.
35. Capacitor Type : APP type as per IS:13585 (non self healing type)
36. Voltage class : 440 V. +/- 10 % 50Hz, 3 Phase
37. Capacitor Connection : Delta connected
38. Capacitor Switching: Capacitors shall be switched as per the VAR requirement using either Intelligent or FIFO logic.
39. Panel size : 550 mm (width) X 1100 mm (height) X 500 mm (depth) appox.
40. Panel Enclosure: Panel shall be fabricated out of CRCA sheet metal 2 mm thickness [14 Gauge]Panel enclosure shall be duly processed with surface pre-treatment and duly powder coated [For outdoor panels powder coating shall be polyester based to suit for continuous outdoor duty] Panel shall have bottom cable entry provided with suitable cable gland.
41. Installation : Outdoor/Indoor
42. Mounting : Floor mounting / MS Angle mounting
43. Panel opening : Front door opening /[Front side access for capacitors also] Locking arrangement with riveted MS chain
44. No. of stages kVAR/stage : 5 stages of 20 kVAR,
45. Power wiring : Suitable size copper wire
46. Control wiring : Suitable size copper wire
47. Earthing : Earth terminals on both side of panels shall be provided
48. Caution Board : In English & Gujarati on front door of panel
49. Load C.T. : Will be provided by Torrent Power SECL.
50. C.T. for capacitor currents: CTs of suitable ratio shall be provided in the panel to measure the total capacitor current and also individual capacitor stage current to check healthiness of the particular stage.

51. C.T. terminal block : C.T. terminal block shall be provided for both type of C.T. (Load & Capacitor)
52. Incoming MCCB : TP MCCB of 200 A. with short circuit releases.
53. Bus-bars : Aluminum (200 A.) supported on epoxy bushings
54. Power protection in stage : 63 amp. TP MCB for 20 kVAR stage.
55. Switching Contactors : Contactors suitable for capacitor switching as per IS:13947-4-1 [AC6b Duty] with inrush current limiting resistors.
56. Indicators :
    1. LED indicator for each stage on/off
    2. LED indication for over-voltage condition on the controller
57. Display: Following parameters Instantaneous without any memory & downloading facility.
    1. Line Voltage
    2. Line current
    3. Power factor in three phase
    4. Capacitor current, Capacitor output kVAR
    5. Line frequency
    6. KVA, KW, kVAR [lag/lead]
58. Drawings: Supplier has to submit following drawings/ Wiring diagrams for approval:
    1. GA drawing of the panel showing all the dimensions
    2. Drawing/ wiring diagrams of switching/ sensing/ controlling circuit
    3. Drawings showing the ID/ OD of ring type external Cts
59. Test certificates : Supplier has to submit all the type test certificates, confirming the relevant IS, carried out at CPRI/ ERDA for the following components:
    1. Capacitor Units (All the ratings used)
    2. Power and Control circuit contactors (all the ratings used)
    3. MCB (All the rating used)
    4. MCCB
    5. Internal and External CTs used
60. Bill of materials: Supplier has to submit and get approve the bill of materials showing the make and quantity utilized of every component of the panel along with the drawings.

61. Inspection : Supplier has to offer the following tests during the factory inspection of the panel:
    1. All routine tests as per IS on random sample/ samples of capacitor units selected by our representative.
    2. If required supplier has to arrange for fresh type test of any/all of the components listed in Para. 27 above at any standard test house like CPRI/ ERDA, which our representative may witness.
    3. Load cycle test of the capacitor bank to witness the integrated performance of the bank under simulated loading conditions.
62. Supply, Installation and Commissioning :
    1. Submission of drawings within 2 weeks from the receipt of the final order
    2. Delivery as per the delivery schedule provided with the order or as per the instructions of our materials department.
    3. Panels are to be delivered directly at the predefined distribution transformer locations in consultation with our materials department and Substation Department.
    4. Supplier has to install and commission the panels in consultation with Substation Department.
    5. Torrent Power SECL shall provide the suitable size of power cable and termination accessories only. All other material including CT cable is to be arranged by the supplier.
    6. Substation Department. will arrange the shutdown for the APFC Panel connection to distribution transformer. Supplier has to make all the preparation in advance so that the power interruption should be of minimum duration.
63. Guarantee : The guaranteed output of the capacitor banks shall be 100% in 1st and 2nd year, in 3rd year it should be between 98.5% - 100%, in 4th year it should be between 97% - 100% and in 5th year between 95.5% - 100% and between 6th and 10th year it should be between 95 – 100%. In case the value is less than 95%, supplier should replace the units free of cost.
64. Instruction Manual : Supplier has to provide three copies of detailed instruction manual of the APFC Panel with each unit.

SPECIFICATIONS OF 150 KVAR AUTOMATIC VAR CONTROLLED PANEL

65. Capacitor Panel : Automatic P.F. Correction panel shall be designed for automatic switching of LV capacitor sensing the VAR of system. A microprocessor based VAR controller shall be provided for the same. The VAR controller shall be sensing voltages and current of all 3 phase and shall have display of electrical parameters and stage "ON" indication. It shall have a settable Over & Under Voltage trip.
66. Rating : 150 kVAR at 440 V.
67. Capacitor Type : APP type as per IS:13585 (non self healing type)
68. Voltage class : 440 V. +/- 10 % 50Hz, 3 Phase
69. Capacitor Connection : Delta connected
70. Capacitor Switching : Capacitors shall be switched as per the VAR requirement using either Intelligent or FIFO logic.
71. Panel size : 600 mm (width) X 1200 mm (height) X 500 mm (depth) appox.
72. Panel Enclosure: Panel shall be fabricated out of CRCA sheet metal 2 mm thickness [14 Gauge]Panel enclosure shall be duly processed with surface pre-treatment and duly powder coated [For outdoor panels powder coating shall be polyester based to suit for continuous outdoor duty] Panel shall have bottom cable entry provided with suitable cable gland.
73. Installation : Outdoor/Indoor
74. Mounting : Floor mounting / MS Angle mounting
75. Panel opening : Front door opening /[Front side access for capacitors also] Locking arrangement with riveted MS chain
76. No. of stages kVAR/stage : 6 stages of 25 kVAR,
77. Power wiring : Suitable size copper wire
78. Control wiring : Suitable size copper wire
79. Earthing : Earth terminals on both side of panels shall be provided
80. Caution Board : In English & Gujarati on front door of panel
81. Load C.T. : Will be provided by Torrent Power SECL.
82. C.T. for capacitor currents: CTs of suitable ratio shall be provided in the panel to measure the total capacitor current and also individual capacitor stage current to check healthiness of the particular stage.

83. C.T. terminal block : C.T. terminal block shall be provided for both type of C.T. (Load & Capacitor)
84. Incoming MCCB : TP MCCB of 400 A. with short circuit releases.
85. Bus-bars : Aluminum (400 A.) supported on epoxy bushings
86. Power protection in stage : 63 amp. TP MCB for 25 KVAR stage.
87. Switching Contactors : Contactors suitable for capacitor switching as per IS:13947-4-1 [AC6b Duty] with inrush current limiting resistors.
88. Indicators :
    1. LED indicator for each stage on/off
    2. LED indication for over-voltage condition on the controller
89. Display: Following parameters Instantaneous without any memory & downloading facility.
    1. Line Voltage
    2. Line current
    3. Power factor in three phase
    4. Capacitor current, Capacitor output kVAR
    5. Line frequency
    6. KVA, KW, kVAR [lag/lead]
90. Drawings: Supplier has to submit following drawings/ Wiring diagrams for approval:
    1. GA drawing of the panel showing all the dimensions
    2. Drawing/ wiring diagrams of switching/ sensing/ controlling circuit
    3. Drawings showing the ID/ OD of ring type external Cts
91. Test certificates : Supplier has to submit all the type test certificates, confirming the relevant IS, carried out at CPRI/ ERDA for the following components:
    1. Capacitor Units (All the ratings used)
    2. Power and Control circuit contactors (all the ratings used)
    3. MCB (All the rating used)
    4. MCCB
    5. Internal and External CTs used
92. Bill of materials: Supplier has to submit and get approve the bill of materials showing the make and quantity utilized of every component of the panel along with the drawings.

93. Inspection : Supplier has to offer the following tests during the factory inspection of the panel:
    1. All routine tests as per IS on random sample/ samples of capacitor units selected by our representative.
    2. If required supplier has to arrange for fresh type test of any/all of the components listed in Para. 27 above at any standard test house like CPRI/ ERDA, which our representative may witness.
    3. Load cycle test of the capacitor bank to witness the integrated performance of the bank under simulated loading conditions.
94. Supply, Installation and Commissioning :
    1. Submission of drawings within 2 weeks from the receipt of the final order
    2. Delivery as per the delivery schedule provided with the order or as per the instructions of our materials department.
    3. Panels are to be delivered directly at the predefined distribution transformer locations in consultation with our materials department and Substation Department.
    4. Supplier has to install and commission the panels in consultation with Substation Department.
    5. Torrent Power SECL shall provide the suitable size of power cable and termination accessories only. All other material including CT cable is to be arranged by the supplier.
    6. Substation Department. will arrange the shutdown for the APFC Panel connection to distribution transformer. Supplier has to make all the preparation in advance so that the power interruption should be of minimum duration.
95. Guarantee : The guaranteed output of the capacitor banks shall be 100% in 1st and 2nd year, in 3rd year it should be between 98.5% - 100%, in 4th year it should be between 97% - 100% and in 5th year between 95.5% - 100% and between 6th and 10th year it should be between 95 – 100%. In case the value is less than 95%, supplier should replace the units free of cost.
96. Instruction Manual : Supplier has to provide three copies of detailed instruction manual of the APFC Panel with each unit.