

# Evolving measures for the effective implementation of Prepaid Metering in the country



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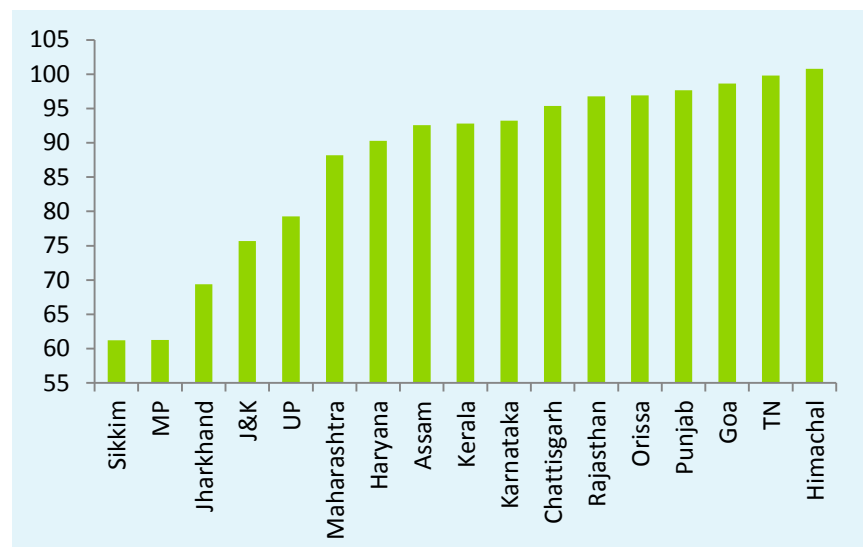
# 1 Introduction

## Background of the Study

1.1 Pre-paid metering is currently at a nascent stage in the Country. Most of the distribution utilities in the country are reeling under heavy Aggregate Technical & Commercial (AT&C) losses which have even registered an increase in many states over the last few years. The high incidence of theft and illegal tapping by consumers is not the sole contributor to these AT&C losses. Many utilities are not even able to recover the amount that they bill. Although utilities like NDPL, distribution companies of Gujarat and Andhra Pradesh etc. have been able to achieve collection efficiencies around 100%, there are many utilities in the country which are operating at far below the expected levels.

1.2 As depicted in the adjoining figure, a large number of states are not even able to recover 100% of the energy billed by them. Except utilities operating in Delhi, Gujarat and a few other states, most of the states/ utilities are able to recover in a range of 90% to 96% of the total billed energy whereas in many states like Sikkim, MP, Jharkhand, J&K and UP the collection efficiency levels fall in the range of 60% to 80%.

**Figure 1: Collection efficiency of states (Source: PFC report of performance of state power utilities, 2008-09)**



1.3 The reasons for poor collection efficiency can be manifold. Pre-paid metering, which operates on the concept of 'pay before you use', just like the pre-paid telecom connections, offers a rewarding alternative to the conventional post-paid metering system which would inherently address the issue of low collection efficiency by eliminating the need for collection itself.

1.4 However, considering the fact that the Indian power sector has been operating on the post-paid mechanism for several decades, and in the absence of specific guidelines on pre-paid metering in the country, the few/ pilot cases of implementations of pre-paid technology in the country have been fraught with practical operational difficulties.

1.5 Implementation of pre-paid metering also has the potential of significantly impacting the operational cost of distribution utilities by eliminating the need for meter reading (except for energy audit), billing, bill printing and bill distribution. From state to state, these costs contribute substantially to the overall operation and maintenance expenses of the distribution utilities. It would be pertinent to note that any improvement in efficiencies and reduction in overall cost structure of

utilities would ultimately percolate down to the consumers through the ARR determination exercise, thereby bringing down the tariffs in the long run.

- 1.6 In recent times, many utilities in the country with support of the respective SERCs have moved ahead with pre-paid metering and have started its implementation in specific consumer categories or areas. However, the implementation efforts in many states like Maharashtra and West Bengal have hit a roadblock for one reason or the other. The current study aims to evaluate the impediments in implementation of pre-paid technology and also the possible measures for their resolution.

## Objectives of the study

- 1.7 As stated above, pre-paid metering efforts are facing several impediments in the few pilot/ small scale implementations in the country so far, many of them being common to all the states and a few being specific to the utilities/ areas/ consumer categories.

- 1.8 Furthermore, as demonstrated in the adjoining box, the legal framework in place in the country recognizes pre-paid metering in all its guiding legal/ policy documents. Despite this recognition, there is a dearth of guidelines/procedures for adoption of the technology.

- 1.9 Moreover, there is significant level of subjectivity surrounding pre-paid metering practices in the country. Due to lack of specific guidelines, many Govt. and private distribution utilities have been implementing pre-paid metering based on their own interpretation of the Act, policies and regulations. Furthermore, many states are refraining from adopting the technology primarily due to the obscurity surrounding pre-paid metering.

- 1.10 In light of the above facts, it is imperative that the merits of pre-paid metering should first be evaluated, within the country as well as overseas, and all expected impediments to its large scale implementation should be streamlined. There is also a need to understand the various legal and regulatory provisions specific to metering and their implications on pre-paid metering and also how the various distribution utilities are interpreting the same. In case it is felt that large-scale adoption of pre-paid metering can be beneficial to the power sector utilities, there is a need to adopt a uniform and pre-planned approach for pre-paid implementation in the country. Such approach should evolve out of the experiences of the various pilot implementations across the country and also after incorporating the learnings from other countries which have accepted pre-paid metering in their mainstream. Such initiative shall be helpful in developing the framework necessary for wide scale implementation of prepayment metering in the country.

### Electricity Act 2003

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

### National Electricity Policy

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

### National Tariff Policy

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

1.11 With the above objectives in mind, the Forum of Regulators, a body constituted by the Government of India in terms of Section 166 (2) of the Electricity Act, 2003, with an objective of harmonization, coordination and ensuring uniformity of approach amongst the Electricity Regulatory Commissions across the country, has initiated a study on pre-paid metering. The Forum has appointed Deloitte Touché Tohmatsu, India (P) Ltd. as its consultants with an aim of conducting a detailed study and preparing a report that elaborates the legal and regulatory issues in pre-paid metering and making recommendations for the effective implementation of the system in the country.

### Scope of the current assignment

1.12 The scope of work identified by the Forum of Regulators is as under:

- (a) Study the existing legal, policy, regulatory and institutional framework and bring out the issues in the implementation of prepaid metering system.
- (b) Study the tariff related issues in the prepaid metering system.
- (c) Study the current status of prepaid metering in the country and the issues which states and utilities are facing in its implementation.
- (d) Compare the environment for implementation of prepaid metering system in the country with other countries where it has been implemented on a large scale and make suitable recommendations for our country.
- (e) Submit a detailed report covering the above aspects with suitable recommendations for the effective implementation of the prepaid metering system in the country.

1.13 In accordance with the above outlined scope, Deloitte Touche Tohmatsu India Private Limited in the current report provides the findings with respect to (a) review of legal and policy framework (b) review of prepayment experiences in the country and (c) review of international experience on prepayment metering and its recommendations for wide scale implementation of prepayment metering in the country.

## 2 Common features of pre-paid meters

### Prepaid metering at a glance

- 2.1 In all the utilities where the pre-paid metering study was undertaken, the features of the meters were found to be largely similar. Based on the age of the meters, there were certain variations too in the features; however such variations were limited and have been explained in detail in subsequent sections.
- 2.2 In order to acquaint the reader with the basic features of pre-paid meters and the technology, current section explains the key features of the pre-paid meters and how those features benefit the consumers or the utility.
- 2.3 It is to be noted that most of the modern day prepaid meters come with all the features of an AMI smart meter. The key difference is the presence of a real time (continuous) communication unit in the AMI smart meter which is not there in a conventional standalone pre-paid meter. A pre-paid single phase as well as three phase meter records all the parameters like MDI, instantaneous load, consumption in kWh and kVAh, power factor, current etc. Owing to the feature of auto disconnection upon exhaustion of recharge amount, the pre-paid meter is also provided with switches which are signalled by a PLC (Programmable Logic Controller), which switches the supply to 'ON' or 'OFF' based on the input signals received by it from recharge of the meter.
- 2.4 The following table discusses in detail the specific features of the key pad based pre-paid meters being used in India:



**Table 1: Feature of Pre-Paid Meter (PPM)**

| Sl. | Feature                | Description  |
|-----|------------------------|--|
| 1.  | Recharge               | Recharge in all of the pre-paid meters surveyed during the study is done through a recharge coupon which is issued by the utility by accessing software that is maintained and provided by the meter supplier. The recharge coupon is generated using the consumer account number and the intended amount of recharge. The recharge coupon is a numeric code designed to have details like the amount of recharge, applicable tariff schedule, sanctioned load and category of consumer. Most of the utilities have imposed a limit on the maximum and minimum amount that can be recharged by a consumer in a single instance. Further, in order to prevent theft or unauthorized use of the coupons, the encryption of the recharge coupons is done in such a way that they can be used for a particular consumer or meter only. |
| 2.  | Friendly credit period | Most utilities have provisioned for friendly credit periods. These periods usually comprise of those hours which lie outside the working hours of the utility. Also, covered in friendly credit period are public holidays and weekends. The logic   |

| Sl. | Feature                                 | Description   |
|-----|---|---|
|     |   | <p>behind providing friendly credit period is that the supply of a consumer should not get disconnected in a period in which he cannot purchase a recharge coupon and get his supply restored. Hence, in case the credit in the account of a consumer is exhausted at 11:00 PM on a particular day, his supply will not get interrupted till the beginning of the working hours on the subsequent working day and therefore he shall have sufficient time to purchase a credit coupon and have his account recharged and hence avail uninterrupted supply. It is to be noted that the utility has the flexibility of changing the friendly credit period as per its convenience and hence the same can be customized for different consumer categories.</p>   |
| 3.  | Connect-Disconnect                      | <p>As stated above, the modern pre-paid meters are provided with the facility of connecting and disconnecting the supply based on the credit amount available in the meter. The meters are provided with switches for connecting and disconnecting the supply. These switches are the biggest contributor to the cost of the pre-paid meters<sup>1</sup> and are the main reason for pre-paid meters coming at significantly higher costs compared to normal post-paid type energy meters.</p> <p>In addition to cutting off the supply when the credit in a consumer account is low, the meter also trips whenever the load of the consumer exceeds the contract/sanctioned load for a period longer than a specified limit (which can be set by the utility). In case the meter trips due to exceeding demand, it can be switched on only after certain duration of time. This duration can also be controlled to grow longer with every additional tripping within a single billing period. Although this feature is provided in the meters, many utilities do not use it for varying reasons.</p> |
| 4.  | Tariff revision                         | <p>Tariff revision in case of all the meters can be effected through the same recharge voucher which the consumers purchase from the outlets of the utility. Whenever there is a tariff revision in any month, the meter supplier or the professionals of the utility update the same in the token generating software of the meters. So the next token that a consumer purchases has an in-built coding which when punched into the meter would automatically update the meter with the latest tariff schedule. Thereon, the deductions in amount in the meter shall be made based on the revised tariff.</p> <p>The tariff revisions are normally effective only from the day the recharge coupon is punched by the consumer in the meter. There is also a provision for tariff revision from back date, but utilities have not been using the same due to the possibilities of litigation with consumers.</p>  |
| 5.  | Extra credit limit and security deposit | <p>In addition to the benefit of friendly credit period mentioned above, utilities also have the flexibility of providing extra credit limit to its consumers against a deposit made by the consumer. As soon as the credit balance of the meter becomes zero, the extra credit limit gets activated and the meter keeps operating till the extra credit limit gets exhausted. In case a particular consumer exhausts even the extra credit available with him, whenever he recharges his meter next, only the</p>  |

<sup>1</sup> As per discussion with meter manufacturers

| Sl. | Feature               | Description  |
|-----|-----------------------|--|
|     |                       | differential amount (recharge amount minus extra credit utilized) reflects in his meter. The rest of the amount is used up in replenishing the extra credit limit of the consumer.   |
| 6.  | Cost                  | <p>The meters are currently available within a price band of Rs.2500 to Rs.6000 based on the specifications and size (volume) of the order. However, the above figures are subjective and discussions held with select manufacturers could not establish the exact reasoning for the cost approach adopted for prepaid meters. It was felt that the meter manufacturers operate in a highly competitive market which could have affected their ability to share sensitive information on pricing/ costing related aspects.</p> <p>The main contributors to the cost of prepaid meters are the switches provided in the meter for connecting and disconnecting the supply. The pre-paid meter is provided with far greater tamper features as compared to the normal post-paid type meters (like magnetic influence withstanding ability etc.) further increasing the cost of the meters.</p> <p>For implementation of pre-paid metering, in addition to the meters, a substantial infrastructure in terms of software and server etc. is also required to be maintained by the utility. As a result, in case the number of pre-paid meters is less, this cost gets loaded on to a small number of meters/ consumers. However, in case prepaid meters are implemented on a large scale, the cost would get distributed over a large consumer base and would register significant reduction.</p> |
| 7.  | MRI port              | Pre-payment type meters by specific manufacturers also come with an MRI port which can be used for data downloading.   |
| 8.  | Data logging          | Pre-payment type meters come with significant storage facilities. The meters can store 64 different tariff structures and any one of them can be activated by the utility based on the consumer category on which the meter is installed. In addition, the meters also come with provision of recording and storing various operational parameters like phase currents and voltages, power factor, MDI, consumption in kWh and kVAh, instantaneous load etc. The meters can also store ToD tariffs if required.  |
| 9.  | In house display unit | In addition to the display screen at the metering unit, the pre-payment type meters are also provided with an additional display unit and punch pad/ Key Pad which can be installed inside the consumer premises so as to enable the consumers to access their meter information at any hour. Through the display unit and punch pad, the consumers can also recharge the meter, check their balance, consumption, instantaneous and maximum recorded load etc.  |

## Implications of prepayment meters for distribution licensee & the Consumer

- 2.5 The two main attributes of prepayment meters that distinguish these meters from standard credit meters are:



- (a) The requirement for the customer to pay for electricity before consumption is to take place; and
- (b) More active involvement of customers in their electricity consumption.

These attributes of prepayment meters have important implications for distribution licensees and the customers.

## Distribution Licensee

2.6 Although more expensive than standard credit meters, prepayment meters can improve licensee’s cash flow and can reduce retail operating costs through avoiding meter reading costs and reducing the incidence of bad debts. On a standard two month billing cycle, the distribution licensee ordinarily extends credit to customers on an average for a period of around 43<sup>2</sup> days. Prepayment meters would allow payments to be received in advance of supply reducing the working capital requirements of distribution licensee.

### Pre-payment metering benefits to Utility

- 1) Simplification of MBC activities and reduced associated costs (meter readings, billing, bill despatch etc.);
- 2) Decrease in bad debt/ 100% collection efficiency;
- 3) Effective arrear recovery tool;
- 4) Reduced working capital requirement;

2.7 Prepayment is also likely to reduce a distribution licensee’s operating costs. As no accounts or bills need to be issued, the costs associated with sending out bills, reminder notices and final notices are all avoided. Customer account queries would also be significantly reduced. Prepayment for electricity may negate any requirement to read customers’ meters to record consumption. Avoiding meter reading costs may further reduce the distribution licensee’s retail operating costs. However, distribution licensee’s may be obliged to continue to have prepayment meters read in order to meet statutory obligations, or may choose to do so in order to detect meter tampering, conduct energy auditing etc. In any event, unless there is a large concentration of customers with prepayment meters in a specific geographical location, the avoided meter reading cost may not be significant, as neighbouring meters will need to still be read.

2.8 Discom may not need to perform some retail functions for prepayment meter customers that they do for customers with standard electronics meters. These functions include issuing bills and disconnecting and reconnecting customers that have failed to pay their electricity bills. The use of prepayment meters will also reduce the costs of working capital for electricity retailers because:

- (a) prepayment meter customers will pay for their electricity up-front rather than in arrears; and
- (b) Prepayment meters will reduce the value of bad debts;

2.9 Finally, the prepayment of electricity by prepayment meter customers also means that these accounts cannot fall into arrears, effectively eliminating bad debts. At worst, bad debts would be

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<sup>2</sup> Electricity bills issued by electricity retailers generally cover two months (say, 61 days) of consumption. The average length of credit is therefore almost 31 days. In addition, retailers might set a due date for payment that is twelve days after the date the bill is issued. Based on these assumptions, the average period of credit is around 43 days (31 + 12).

limited to the amount of emergency credit that is provided. As bad debts are effectively eliminated, costs that may otherwise be incurred in recovering overdue amounts are also avoided.

- 2.10 Improvement in customer service orientation and elimination of physical disconnection associated with events of payment default will positively impact the image of the utility and create awareness and accountability amongst consumers.

## Consumer

- 2.11 Customer benefits from prepayment meters comprises greater flexibility in payment of electricity costs and, potentially, more informed control of electricity consumption.

### Pre-payment metering benefits to Consumers'

- 1) Flexibility in frequency and amount of each recharge to be decided by consumers;
- 2) Increased ability to monitor and adjust their consumption (DSM Approach);
- 3) Freedom from periodic billing/ payment cycle for electricity connection;
- 4) Elimination of late payment, defaults and disconnections etc.

- 2.12 Prepayment meters provide greater flexibility to customers than standard credit meters, by allowing customers to determine both the frequency and amount of each payment. The more frequent payment of electricity bills is also likely to assist customers in adjusting electricity-consumption behaviour. The increased ability for customers to monitor and adjust their consumption, and avoid large bills by paying more frequent smaller amounts are two of the key customer benefits of prepayment meters.

- 2.13 In order to continue to remain connected to the electricity supply, customers need to keep prepayment meters in credit or, at least not exhaust the amount of emergency credit. Other than this, prepayment meter customers are at liberty to pay for electricity at times and in amounts of their choice. This provides customers with flexibility to pay in a manner that suits them rather than being 'locked into' a payment cycle set by the distribution licensee.

- 2.14 The requirement to pay for electricity ahead of consumption may also establish a stronger and immediate link between decisions about electricity consumption and the resulting frequency and amount of prepayment. This may aid the customer in managing their household budget, and could also act as a driver for consumers to reduce their electricity bills by limiting electricity consumption.

- 2.15 Research conducted for the Office of Gas and Electricity Markets (Ofgem) in the United Kingdom indicated that these meters supported better budgeting, as: "...a PPM limits how much energy a customer can use in relation to what can be afforded. This is instead of using energy constantly and not being able to afford the bill. The lack of bills and that PPMs prevent you falling into debt or having problems with your bank".

- 2.16 Similarly, in Australia it was found that: The main reasons why people arranged for pre-payment meters to be installed [in Tasmania] were to avoid receiving large bills and to keep control of household spending on electricity.

- 2.17 In the United Kingdom, prepayment meter customers generally top up their meters weekly, although younger customers with families top up their gas and electricity prepayment meters two to three times a week. Greater control over finances was nominated as a key benefit of prepayment meters, as: ...there is flexibility in the amount you can choose to top up your meter with and when you pay.

- 2.18 There are payment options available to customers with a standard credit meter other than simply paying bills in arrears. For example, in Western Australia, electricity customers may make periodic prepayments towards future bills using a Budget Card or through CentrePay (payment gateway). Although the amount of the prepayments under these options streamlines the customer's payments, it is not directly linked to the electricity consumption. These payment options do not provide the same immediate link between electricity consumption decisions and the resulting frequency and amount of prepayment.
- 2.19 Prepayment meters also change the relationship that exists between customers and the distribution licensee, with customers assuming greater responsibility for managing their own electricity usage. For example, a customer with a standard credit meter that falls into payment arrears may negotiate with the distribution licensee for additional time to pay. While any extension would be at the discretion of the distribution licensee (subject to the distribution licensee's statutory obligations), such an option is not available to prepayment meter customers, who would be automatically disconnected on the expiry of any emergency credit amount.
- 2.20 Thus an important implication of prepayment meters is that it is the customer who 'decides' to disconnect their electricity supply rather than the distribution licensee, as would be the case under a standard credit meter. Further, in cases where the prepayment meter permits only one-way communication (from the distribution licensee to the meter), disconnection of the customer and the duration of disconnection would occur without the knowledge of the distribution licensee. Nevertheless, a benefit for prepayment meter customers is that the customer is generally not liable for fees that might be ordinarily be charged by the distribution licensee for reconnecting the electricity supply, as the distribution licensee is not required to arrange for the physical disconnection of the electricity supply.

### Prepayment system under AMI/ Smart Metering

- 2.21 Though Smart Metering/ Advanced Metering Infrastructure has not yet been implemented by any utility in the country, the global trend indicate that it is the way forward for upgrading the electricity distribution/ supply business. Therefore, it is felt essential to understand the prepayment metering/ billing in the context of the Smart Metering/AMI technology.
- 2.22 With Advanced Metering Infrastructure (AMI) and Smart Grid in place, power distribution utilities do not require prepaid meters to serve the prepaid customers. A smart meter with remote connect-disconnect switch can perform the function of prepaid meter. With powerful interval data available at utility's disposal, utility application(s) can calculate the credit left on the prepayment account and can initiate necessary actions like generating alerts, performing disconnect/reconnect etc.
- 2.23 When supported by smart technologies, prepay may be linked with a two-way communication channel between the power distribution utility and the consumer. Energy consumption data is made available to suppliers in regular intervals (fifteen-minute, hourly, daily, etc.), which allows for different types of pricing structures. Consumers may also opt to receive communications regarding payment and account updates, price signals (potentially using dynamic pricing), and energy management options. Prepay enabled by smart grid/ AMI is thus a billing option with a consistent feedback loop delivered via SMS, email, web-based portal, in-home display, or perhaps a combination of these options. The information flow allows consumers to monitor their usage, thereby creating opportunities to reduce energy consumption and costs. With prepay, moreover, the usage data is tied to the payment transaction in real time, so consumers can directly relate energy consumption with the cost of energy.

- 2.24 Some of the advance feature of AMI which can enhance the applicability of pre-paid system capabilities are as below:
- (a) Smart/AMI meter installed at customer's premise can operate on credit mode or prepayment mode. Such smart meters will be equipped with remote connect-disconnect switch.
  - (b) Customer can opt to be on credit-billing or prepayment billing and this will be performed at the Utility application - Customer Information System (CIS) and/or prepaid application.
  - (c) AMI meters provide interval reads on a daily basis and is stored in Meter Data Management System (MDMS).
  - (d) The rate at which the customer will be billed is stored in Customer Information System (CIS).
  - (e) MDMS feeds interval reads to Customer Information System (CIS) and Pre-paid application. These two applications in conjunction calculate the bill periodically (daily or twice a day) and deduct the bill amount from the available credit.
  - (f) When the available credit reaches a threshold, alerts can be sent to the customer. Alerts can be sent via SMS gateway or IVR's outbound calling system or email or In-Home Display units (IHD).
  - (g) When the available credit reaches zero, additional alerts are sent. Certain regulations recommend an emergency credit to be available. In such case, when the credit reaches the emergency credit threshold or when the credit reaches zero (in case where there is no concept of emergency credit), Customer Information System (CIS)/ Pre-paid system issues remote disconnect request to the AMI meter.
  - (h) Customers can make the required payment using existing infrastructure like web payments, payment kiosks, check payments, IVR payments etc. Once Customer Information System (CIS) system receives the payment/memo; it issues a reconnect request to the AMI system.
  - (i) Certain Customer Information System (CIS) systems have the capability of performing the prepaid application. In such case, a separate prepaid application is not required.

### Benefits of Smart Prepayment system

- 2.25 Some of the benefits of implementing a smart prepayment system that is controlled by the utility applications are:
- (a) Utilities don't need to invest on separate hardware cost (purchase of prepayment meters) and the maintenance and field force cost associated to it;
  - (b) Customers have the luxury to switch between credit meters and prepaid meters on the fly without additional overhead of field visit;
  - (c) Prepayment customers have the luxury to change their rate plan and opt for attractive rate plans like Time of Use billing, Critical Peak Pricing and real time pricing. The billing is performed at the utility application instead of the meter hardware, hence attracting prepaid customers to participate in energy conservation rate plans;

- (d) Customers don't need to carry smart cards or tokens or need to be at the meter location to recharge the prepaid meter. Customers can use SMS, phones, web or call centre, application to recharge the prepayment account;
- (e) Since the overhead on the hardware and field force is reduced, cheaper prepaid rate plans would attract the customers;
- (f) Existing payment mechanisms will be used to charge the prepaid accounts. No additional payment mechanism is required;
- (g) Customers with medical conditions can still enrol into smart prepayment and the CIS/prepaid application can handle the issue of not issuing disconnect for special customers;
- (h) Actual consumption data for appropriate deduction/ charging of tariff is available with the utility on a real-time basis unlike the standalone meter based prepaid metering system;
- (i) Utility doesn't need to put in additional infrastructure to provide this functionality. Existing AMI infrastructure would be leveraged.
- (j) With regulations permitting, there would be no reconnect charges.

2.26 Power distribution utilities in different countries are embarking on Smart Metering deployment strategies; replacing conventional meters with smart AMI meters. With the increase in awareness of prepaid metering systems, it is required to implement a prepayment system that is independent of the meter hardware, providing attractive rate plans to such customers. Hence, Utilities can exploit the AMI infrastructure and interval data to provide the prepayment function instead of procuring and maintaining smart prepaid meter hardware. This would provide a meter agnostic solution which could be extended to other functions too. This would provide a win-win proposition to the utility, regulators and the customer.

## 3 Pre-paid metering: Legal Opinion of Key Issues

- 3.1 As has been explained earlier, many utilities in the country have been cautious in adopting pre-paid metering primarily because of the obscurity surrounding the legal aspects of the technology. The primary bone of contention was the provision under the Electricity Act, 2003 which states as under:

**Section 56 (1) (a), (b)**

*“Where any person neglects to pay any charge for electricity or any sum other than a charge for electricity due from him to a licensee or the generating company in respect of supply, transmission or distribution or wheeling of electricity to him, the licensee or the generating company may, after giving not less than fifteen clear days’ notice in writing, to such person and without prejudice to his rights to recover such charge or other sum by suit, cut off the supply of electricity and for that purpose cut or disconnect any electric supply line or other works being the property of such licensee or the generating company through which electricity may have been supplied, transmitted, distributed or wheeled and may discontinue the supply until such charge or other sum, together with any expenses incurred by him in cutting off and reconnecting the supply, are paid, but no longer: Provided that the supply of electricity shall not be cut off if such person deposits, under protest (a) an amount equal to the sum claimed from him, or (b) the electricity charges due from him for each month calculated on the basis of average charge for electricity paid by him during the preceding six months, whichever is less, pending disposal of any dispute between him and the licensee.”*

- 3.2 There was an inherent lack of clarity amongst certain utilities regarding the above provision of the Act. It was felt that pre-paid metering, with its characteristic feature of disconnecting the supply upon exhaustion of the credit in the account of a consumer would infringe on the above provision of the Act.

- 3.3 The Maharashtra State Electricity Distribution Company Ltd. had petitioned the Hon’ble Maharashtra State Electricity Regulatory Commission to allow installation of pre-paid meters and also to seek clarifications on practical implications of implementing pre-payment technology. Against the said petition, the Hon’ble MERC passed an order dated April 26<sup>th</sup>, 2010 which stated as under:

*“The Petitioner has submitted that, given the very nature of prepaid metering, the statutorily required minimum fifteen (15) clear days’ notice in writing for cutting off the supply is not possible to be given to the erring consumer once the amount of credit paid by the consumer has expired. With regard to this submission, the Commission is of the view that under the prepaid meter system, the meter is recharged according to the credit bought by the consumer. Consumers can buy the credit according to their requirement. Thus, they can keep a control over the consumption. This requires him/her to make an advance payment before using the electricity. If the available credit is exhausted then the supply is automatically cut off by a relay circuit. Taking into account the doubt expressed by the Petitioner over the requirement to serve notice under Section 56 of the Act, the Commission advises the Petitioner to approach the competent authority, i.e., Ministry of Power for suitable clarifications or removal of difficulty orders. In view thereof, the Commission does not wish to express any opinion as regards the need to carry out any amendments to the EA 2003 at this stage.”*

- 3.4 In the absence of any conclusive direction/ opinion from the respective Commissions with regard to the above stated clause of the Electricity Act-2003, the utilities have abstained from undertaking large scale implementation of prepaid metering.
- 3.5 Hence, it was felt that, in order to remove difficulties in pre-paid implementation the first step was to determine if the concept in itself was counter to the provisions of the Electricity Act 2003 mentioned above. Accordingly, as part of the current assignment, legal opinion was sought from a renowned expert, Mr. M.G. Ramachandran, on key legal issues pertaining to the power sector. The basic points on which the legal opinion was sought are as under:
- (a) In pre-paid technology, there is no provision/possibility of providing a written disconnection notice of 15 clear days to the consumer as required by Section 56(1)(a)(b) of the Electricity Act, 2003. In light of these facts, does implementation of pre-paid metering by a utility violate the Section 56(1)(a)(b) of the Electricity Act, 2003? It is important to note that the Electricity Act, 2003 recognizes the existence/use of pre-paid metering technology, which has been in existence since long in other parts of the world, as it finds a mention in Section 47(5) of the Act.
  - (b) In case an event of automatic disconnection of supply by a pre-paid meter violates the above-mentioned section of the Act, will a documentary consent taken from the consumer at the time of installation of pre-paid meter at his premises or before protect the interests of the utility/licensee? Is there any other mechanism in which the interests of the utility can be saved in this context?
  - (c) Is there any provision in the Electricity Act, 2003 which prevents the utility/licensee/regulator to enforce supply mandatorily through pre-paid meters on the consumers?
- 3.6 The legal opinion from the legal expert is as provided below:

1. "The concept of prepaid electricity meters gives an opinion to the consumer to pay for and buy units of power by making advance payment. When the said units get exhausted, the consumer can by further units/ recharge by inserting the coupons in the prepaid meter. Inherent in the above is that the connection is given for specified number of units for which the advance payment is made. The contract between the parties is itself for supply of limited units and the contract comes to an end automatically once the units purchased are exhausted. The contract of supply of electricity in such cases expires by efflux of time related to consumption of the specified units.
2. The issue now arises whether Section 56 of the Electricity Act, 2003 in any manner affects the concept of prepaid meters. Section 56 reads as under:

*"Section 56. (Disconnection of supply in default of payments: - -*

*(1) Where any person neglects to pay any charge for electricity of any sum other than a charge for electricity due from him to a licensee or the generating company in respect of supply, transmission or distribution or wheeling of electricity to him, the licensee or the generating company may, after giving not less than fifteen clear days' notice in writing, to such charge or other sum by suit, cut off the supply of electricity and for that purpose cut or disconnect any electric supply line or other works being the property of such licensee or the generating company through which electricity may have been supplied, transmitted, distributed or wheeled and may discontinue the supply until such charge or other sum, together with any expenses incurred by him in cutting off and reconnecting the supply, are paid, but no longer:*

*Provided that the supply of electricity shall not be cut off if such person deposits, under protest, (a) an amount equal to the sum claimed from him, or (b) the electricity charges due from him for each month calculated on the basis of average charge for electricity paid by him during the preceding six months, whichever is less, pending disposal of any dispute between him and the licensee.*

*(2) Notwithstanding anything contained in any other law for the time being in force, no sum due from any consumer, under this section shall be recoverable after the period of two years from the date when such sum become first due unless such sum has been shown continuously as recoverable as arrear of charges for electricity supplied and the licensee shall not cut off the supply of the electricity.*

(Emphasis Supplied)

3. The above provision proceed on the basis that there would be a sum or charge of money due from a person to the licensee/generating company. However in, the case of prepaid meter, the consumer has already paid in advance for the electricity he 'will be consuming thereafter. Therefore, there is "no neglecting to pay any charge for electricity due from a consumer to licensee". In such case there is no contract to supply and accordingly neither an obligation on the licensee to supply electricity nor on the consumer to pay for future supply. Every purchase of electricity by advance payment is an independent contract. If no payment is made for purchase of units, there is no connection to supply electricity and therefore is no occasion for any disconnectin.
4. In the above premise, section 56 will have no application in the case of prepaid meters. The contract with the consumer in the case of pre-paid meter for supply of electricity ends by efflux of use of the units already paid for by the consumer.
5. Further, the fact that the prepaid meters have been given in selected areas and classes of consumers to begin with is not violative of the Electricity Act, 2003. Section 62(3) of the Act allows the Commission to differentiate between the consumers "according to the consumer's load factor, power factor, voltage, total consumption of electricity during any specified period or the time at which the supply is required or the geographical position of any area, the nature of supply and the purpose for which the supply is required." Therefore, if the offer of the prepaid meters has been made to the consumer categories based on any of the above, the same will be compliant with the provisions of the Electricity Act, 2003.

- 3.7 Signed copy of the legal opinion on the matter (from Mr. M.G. Ramachandran) received has been attached as Annexure-B to the current report.
- 3.8 The key takeaways from the legal opinion are:
  - (a) There is no contradiction with Section 56(1)(a)(b) of the Electricity Act, 2003 in case of auto-disconnection of supply by a prepaid meter on the event of exhaustion of credit available in the meter; and
  - (b) The respective SERC's can recommend introduction of prepaid metering to any consumer category/ group/ class in accordance with Section 62(3) of the Act;



# 4 Review of Indian Prepaid Metering Experience

## Visits to select utilities

- 4.1 As part of the study, field visits were conducted to the offices of select distribution utilities, where pre-paid metering has been implemented in sizeable numbers, in order to understand the nuances of pre-paid metering. The prime objectives of the visits were to probe the problems plaguing the utilities in pre-paid implementation and also the response of the consumers and the utility to the initiative. Furthermore, the visits also tried to gauge the reasons behind adoption of pre-paid technology by the utility and the benefits realized so far. During the visits, interactions were also held with select State Regulatory Commissions with the aim of understanding the regulatory interventions endorsed for pre-paid implementation.
- 4.2 The table below outlines the utilities that were visited during the study along with details of the key officials who extended their support to make all necessary information available:

**Table 2: Utilities considered for PPM study**

| Sl. | State        | Utilities and sites visited  | Officials met  |
|-----|--------------|--|--|
| 1.  | NCT of Delhi | North Delhi Power Ltd. <ul style="list-style-type: none"> <li>Delhi, Head office</li> <li>Consumer premises – Domestic and Government Connections</li> </ul>         | <ul style="list-style-type: none"> <li>Mr. Kaushik Sanyal, HOG (KCG), NDPL</li> <li>Mr. Neeraj Kumar, Assistant Manager, NDPL</li> </ul>   |
|     |              | BSES Rajdhani <ul style="list-style-type: none"> <li>Delhi, Head Office</li> </ul>   | <ul style="list-style-type: none"> <li>Mr. Rajesh Bansal, AVP (BSES-Rajdhani)</li> </ul>   |
| 2.  | Gujarat      | Madhya Gujarat Vij Company Ltd. <ul style="list-style-type: none"> <li>Vadodara (Head Office)</li> <li>Umreth (Division)</li> <li>Limkheda (Sub-division)</li> </ul> | <ul style="list-style-type: none"> <li>Mr. V. B. Pandya (Executive Engineer, Anand Division, MGVCL)</li> <li>Mr. S. B. Mistry (Divisional Engineer, Anand Circle, MGVCL)</li> <li>Mr. Babhor (Divisional Engineer, Limkheda division, MGVCL)</li> <li>Mr. N.N. Goswami (Junior Engineer, Anand Division, MGVCL)</li> <li>Mr. N. D. Bidhalkar (Junior Engineer, Anand Circle, MGVCL)</li> </ul> |
|     |              | Gujarat Electricity Regulatory Commission  | <ul style="list-style-type: none"> <li>Mr. Dharmendra Parmar, Jt. Director Tariff, GERC</li> </ul>   |

| Sl. | State               | Utilities and sites visited  | Officials met   |
|-----|---------------------|--|---|
| 3.  | Maharashtra         | Maharashtra State Electricity Distribution Company Ltd. <ul style="list-style-type: none"> <li>• Mumbai (Head Office), Reliance Infra – D</li> <li>• Mumbai (Head Office)</li> </ul> | <ul style="list-style-type: none"> <li>• Mr. Madhusudan Wadhe, Executive Engineer, Commercial, MSEDCL</li> <li>• Mr. Vivek Mishra, R-Infra, Regulatory Team</li> </ul>  |
| 4.  | West Bengal         | West Bengal Power Distribution Company Ltd. <ul style="list-style-type: none"> <li>• Head Office, Calcutta Electric Supply Company Ltd.</li> <li>• Head Office</li> </ul>            | <ul style="list-style-type: none"> <li>• Mr. A Brahma, Chief Engineer (IT), WBSEDCL</li> <li>• Mr. Udayan Ganguly, CESC, Kolkata</li> </ul>   |
|     |                     | West Bengal Electricity Regulatory Commission  | <ul style="list-style-type: none"> <li>• Mr. Tapas Chakraborty, Director, WBERC</li> </ul>  |
| 5.  | Meter Manufacturers | Secure Meters<br>Genus Meters  | <ul style="list-style-type: none"> <li>• Mr. Madhur Shrivastava, Sr. Manager, Secure Meters</li> <li>• Ms. Swati Doshi, Business Development Manager, Secure Meters</li> <li>• Ms. Varsha Tandel, Secure Meters (Resident team at Gujarat)</li> <li>• Mr. Rohit Swami, Marketing Manager, Genus Meters</li> </ul> |

- 4.3 As listed in the table above, in addition to the distribution utilities, interactions were also held with State Regulatory Commissions and meter manufacturers in order to bring all the stakeholders on board for comprehensive assessment of the problems being faced by pre-paid metering.
- 4.4 During the visits to each of the utilities, it was observed that certain problems faced by pre-paid implementations efforts were common to all utilities. Moreover, a common trend that was observed was that pre-paid implementation in most of the states was as a result of State Government directives, and in some cases through directives from the Regulator. In the subsequent sections, we discuss these problems and also the possible solutions suggested by the Utilities/Regulatory Commissions or meter manufacturers.

### Basis of choosing the states for field visits

- 4.5 As part of the current study, a compilation of the pre-paid metering status in the different states across India was undertaken. The information for the same was collected from secondary sources like the websites of the utilities and regulators, tariff orders, public documents issued by competent authorities, tariff regulations etc. On studying the compiled information, it was found that most of the states had undertaken pre-paid implementation only on a pilot basis and the number of consumers in most cases was limited to a few hundreds.
- 4.6 In order to develop a deeper understanding about pre-paid metering experience in the country, it was essential to undertake a detailed study of the utilities and SERCs which have already gathered considerable experience in prepayment metering through pilot implementations in sizeable

numbers. It was important to ensure that the visits to these Utilities yielded both, benefits, as well as the shortcomings/ issues surrounding pre-paid implementations so far. Moreover, it was imperative that the visits should also bring out the consumer acceptance/feedback about the technology and also the steps required for creasing out the roadblocks in the implementation process.

4.7 With the above objectives in mind, we had shortlisted the following states for our study:

**Table 3: States identified for PPM study**

| State        | Basis of selection   |
|--------------|--|
| NCT of Delhi | <ul style="list-style-type: none"> <li>Substantial number of consumers covered under pre-paid metering</li> <li>Directive from State Government for adoption of pre-paid metering for Government connections</li> <li>Regulator also approved pre-paid adoption</li> </ul>                         |
| Gujarat      | <ul style="list-style-type: none"> <li>Directive from State Government for pre-paid meter installation on a specific consumer group</li> <li>Multiple pilots undertaken</li> <li>Expansion of pre-paid metering implementation planned by the utility based on outcome of pilot studies</li> </ul> |
| Maharashtra  | <ul style="list-style-type: none"> <li>Sizeable installation (approximately 25,000) planned by MSEDCL</li> <li>MERC has issued specific guidelines for pre-paid metering as part of its order on case no 76 of 2009 dated 26th April 2010.</li> </ul>  |
| West Bengal  | <ul style="list-style-type: none"> <li>WBSERC has issued a directive for pre-paid implementation on specified categories in its terms and conditions of tariff regulation</li> <li>WBSERDCL plans large scale pre-paid installation in New Town area of Kolkata</li> </ul>                         |

## Objectives of the visit

4.8 In the first place, the objective of the visits was to understand the reasons behind adoption of pre-paid metering by the utilities. As would emerge later, different utilities had their own specific objectives behind adopting the technology. Further, as explained earlier, due to the lack of specific guidelines for pre-paid implementation, it was important to understand how each of the utilities/regulatory commissions are treating pre-paid metering and interpreting the provisions of the Act and the policies. It was also important to understand the operational difficulties faced by the utilities while implementing prepaid metering and also any post-implementation issues faced by them. The lessons learnt by the utilities and regulators in pre-paid metering could also be vital for widespread implementation of the technology across the country.

4.9 The consumer response/feedback for the technology is also an important attribute of the success or failure of the technology in the pilot implementations so far. Accordingly, the same has been evaluated, wherever possible. With the above objectives in mind, a set of questions was compiled for seeking structured responses from the utilities and regulators. The same has been attached as Annexure A to this report. The following section highlights the prepaid metering related experience of each of the distribution companies visited.

## Madhya Gujarat Vij Company Ltd. – Gujarat

4.10 MGVCL is one of the four distribution companies operating in Gujarat. It has been at the forefront of implementing pre-paid metering in the State. All the pre-paid installations in MGVCL have been under specific funded schemes from different agencies. Pre-paid metering was launched in the year 2007 in Umreth division of MGVCL as part of a USAID funded DRUM project. The pilot project was initiated targeting a specific class of consumers within the domestic category. The study was initiated only on those consumers who were willing to adopt pre-paid technology and give up their post-paid meters on their own. It is to be noted that in Gujarat, the concept of pre-payment has not been enforced on the consumers either by the government or the regulatory commission. It has been initiated only after the due consent of each and every consumer.

4.11 For voluntary implementation of pre-paid metering, the officials in Umreth division identified certain groups of consumers like NRIs, households with low paying capacity, consumers in remote areas etc. who would be interested in pre-paid technology because of the elimination of frequent visits to the bill payment outlets of the utility. Once this was established, a demonstration board (refer picture alongside) was installed at the Umreth divisional office on which the pre-paid meter was installed with its in-house display. All the appliances of the room were connected to the pre-paid meter and their control panel was installed alongside as displayed in the picture.

Figure 2: Demonstration kit of pre-paid meters



4.12 In order to spread awareness about pre-paid metering amongst consumers, a similar movable demonstration kit was also used by the officials for demonstrating the technology in the target consumer localities so as to persuade consumers to voluntarily adopt pre-paid metering.

4.13 With these efforts, the officials of Umreth division were able to persuade 150 consumers in Umreth division for implementation of the pilot project. However, it is to be noted here that despite the implementation of the pilot project in Umreth, it was entirely the prerogative of the utility to provide the facility of pre-payment to its consumers.

### Specific case of Limkheda sub-division

4.14 On successful implementation of the prepaid system in Umreth, the utility took up a second pilot project under a State Government funded scheme for pre-paid installation on tribal households in Limkheda sub-division of MGVCL.

4.15 The tribals in Limkheda are largely itinerant migrant labourers, who in search of work stay outside their homes for close to three quarters of a year and are home only for 2-3 months. As a result, the distribution utility was in a unique predicament. Most of these tribal households were electrified

under RGGVY scheme implemented by the utility and consequently almost all of them had been given BPL domestic connections under the scheme.

- 4.16 However, considering the fact that these tribals used the electricity for around 3-4 months only during the year, their default rate was quite high. A significant number of households in this group used the electricity for the period and failed to pay their dues. Once they left their houses in search of work, these dues would remain unpaid for the rest of the year till they came back.
- 4.17 The problem was further compounded because once the people of the area would return to their homes they were served with huge bills which including the original dues and delayed payment surcharge. As a result, most of the consumers either surrendered their connections and started 'hooking' on the system or refused to pay up leading to mounting discontent among consumers in the area.
- 4.18 Even the consumers, who were willing to pay the electricity bills on a regular basis, were discouraged by the long distance travel to the nearby offices of MGCVL. Their contention was that if they go for depositing their bills to MGCVL offices they end up spending more on the to and fro journey than their outstanding dues to MGCVL.
- 4.19 Owing to these reasons the area was witnessing increasing dissatisfaction in the consumer base as well as mounting dues for MGCVL. In order to counter the problem, the State Government came up with a pilot project for the tribal households which would be scaled up in other areas and categories of consumers if the results of the same were found to be satisfactory and in line with the objectives of the project. As part of this pilot project, a total of 912 meters were installed in Limkheda sub-division of Gujarat.

### Need for pre-paid meters in Umreth and Limkheda

- 4.20 Although pre-payment technology was being introduced in Gujarat with an objective of analysing the technology in terms of its relevance in the specific context, the officials of MGCVL were of the view that certain problems that they were facing could be readily solved by pre-paid meters. The problems which the utility envisaged to solve through pre-paid metering are as under:
- (a) **Bad debt:** In economically weaker sections of the society, typically amongst the below poverty line connections, the utility had an obligation to supply electricity. However, the rate of default in these consumer categories was significant. More than the intent of the consumers, the reason for default was the poor level of income of such households. The financial condition of these households being a limiting cause for remittance of payments to the utility, it was felt that if these households were provided with the ability to control their electricity consumption, and hence control their monthly bill, it would be beneficial for the consumers as well as MGCVL. Pre-paid metering appeared to offer the right solution for the objective.
  - (b) **Frequent disconnection:** In case of non-payment of bills, the Utility had to resort to disconnection. Furthermore, on clearance of dues after disconnection, it was also required to reconnect the consumer. Considering the high costs involved in connection and disconnection of such consumers residing in far flung remote areas and also the increasing grievances amongst consumers due to disconnection of supply, pre-paid metering was suitably placed to address both the issues.
  - (c) **Cost disconnect with consumers:** A large section of the customer base was disgruntled due to the perception that the utility was overbilling. This was largely due to the reason that the

consumers were not able to correlate their energy consumption with the consumption in value terms. Since pre-paid technology ensures a real time reference for consumers to compare their consumption and the amount deducted in their meters, the technology is ideally placed to address the issue.

- (d) **Indifference of consumers:** A large number of NRI consumers who have shifted outside the country were indifferent to prompt payment of electricity bills. Further, tribal consumers residing in far-flung areas, who had been connected to the distribution system under RGGVY, were also largely unresponsive to payment of electricity bills due to logistical constraints and their inability to commute to the collection centres of the utility. Such consumers were also planned to be covered under the pre-paid scheme.

- 4.21 In light of all the above issues, the pre-paid pilot projects were implemented in the Umreth and Limkheda divisions of MGCVCL.

### Salient points of pre-paid metering in Gujarat

- 4.22 As has been mentioned earlier, pre-paid implementation in each state has been undertaken in a manner specific to that state alone. Likewise, in case of Gujarat as well, many features of pre-paid metering are unique to the state.
- 4.23 In Gujarat, the main motive behind implementing pre-paid metering was to manage the bad debt of the utility. As explained earlier, the second pilot project, funded by the state government was aimed at targeting the tribal consumers.
- 4.24 Since the pre-paid implementation was a pilot, and it was up to the consumers to adopt the same or not, all consumers who adopted the technology voluntarily, were also allowed to revert back to the post-paid method of billing if they were dissatisfied by the technology. However, the other way round was not possible, meaning that all consumers who wanted to move to a pre-payment system were not provided pre-paid meters. The decision in this regard was taken by the utility based on various factors such as the availability of meters, manpower, category of consumer etc.
- 4.25 The below chart enlists the key features of pre-paid metering in Gujarat:

### Billing

- Both the pilot projects in Umreth and Limkheda were implemented using similar hardware, software and meters. Almost all the meters for the pilot projects were supplied by Secure Meters (1012 out of 1062) and the rest of the 50 meters were supplied by Genus Meters. The billing of consumers was done for the purpose of collecting fuel surcharge and other statutory duties. It is to be noted that the security deposit of the consumers was not refunded when they moved from a post-paid regime to pre-paid one. The same was retained by the utility. However, to balance that out, each of the consumers was given an additional credit called 'Happy Credit' of Rs.500 which would allow them to use electricity even when their account had run out of balance. However, upon the next recharge, this amount of Rs.500 would first get replenished and only then would the consumer be allowed the use of electricity.

### Recharge and Alarm

- In pre-paid meters, tariff changes are extremely difficult to be implemented from back date, and also the tariff changes are incorporated in the meter only after a recharge is done after the tariff changes. Almost all the utilities have imposed a maximum limit on the amount of recharge that consumers can purchase. In case of MGVCL, the maximum recharge amount is Rs.5000/- and the minimum recharge amount is Rs.100. Furthermore the recharges can be done in denominations of Rs. 100/- only. The credit recharges can be done by purchasing recharge vouchers from the divisional office of MGVCL against payment of the recharge amount. In lieu of the payment, the consumer is given a digital code which when entered in the meter, recharges the meter with the purchased amount.
- The meters also have a provision for sounding a low credit alarm, which goes off whenever the credit in a consumer's account goes below a certain level. The level can be set by the consumer himself and can be changed at any time.

### Friendly hours

- The consumers are given friendly hours starting from 6:00 PM to 11:00 AM everyday. The friendly hours are also extended to public holidays and the days on which the office of MGVCL remains closed. During friendly hours, the meter does not disconnect the supply even if the balance in the account of the consumer becomes zero. Simultaneously an alarm provided in the meter goes off to continuously remind the consumer to have his account recharged. If the consumer goes to the office of the Discom, purchases and recharges a coupon before 11:00 AM next day, he can avail uninterrupted power, failing which his supply is self-disconnected by the meter at 11:00 AM the next day.

### Tariff structure

- Like most of the other states who have implemented pre-paid metering, the tariff structure in MGVCL for pre-paid consumers was the same as for other post-paid consumers falling in the same consumer category. A major difference was however in the treatment of Fuel surcharge and other statutory levies. As a practice, MGVCL reads the meter of the consumer on a monthly basis just like business as usual scenario. Based on the consumption recorded in the meter of the consumer, an additional supplementary bill for fuel surcharge and other statutory duties (ED, Cess etc) is issued to the consumer at the end of each month. This bill is to be deposited by the consumer at the office of the utility within the due date specified. On the other hand, the consumer is also required to get his meter recharged as per the balance in his account. Due to low awareness amongst the consumers, this practice appears to bill them twice leading to dissatisfaction amongst the consumers.

## Security

- The target customer base for pre-paid implementation in MGVCL was largely BPL consumers. Out of a total of 1062 consumers, 30 consumers belonged to commercial (non-domestic) category and the rests of them were domestic BPL consumers. Considering the target customer base was largely illiterate, sufficient security features were added in the coupons and the meters as well. In case a consumer loses his coupon, it cannot be used by any other consumer in any meter. Further, entering the wrong code more than three times in a meter would stop the meter from accepting any additional recharges for a day thereby preventing theft of the codes.

## Issues in pre-paid metering in Gujarat

- 4.26 In addition to the above features reported by the officials of MGVCL, there were certain issues identified as well. Many of these issues are common to other states where the study was carried out. However, a few of them are specific to Gujarat alone. The below chart enlists the issues cited by the officials of MGVCL:

### Operational issues

- Applicability:** In the specific case of MGVCL, it was felt that applicability of pre-payment technology was not relevant for all categories of consumers. Furthermore, it was felt that pre-payment type meters are most aptly suited for temporary connections.
- Vending Infrastructure:** Owing to the need for getting a recharge coupon on a regular basis, it was optimum for only those areas located near a recharge/centre or MGVCL office.
- High Cost of Meters:** Unless mass deployment brought down the costs significantly, the meters cannot be effectively used in domestic and non-domestic categories.
- Educating the consumers:** In many cases, the consumers being illiterate were unable to have their recharges done by themselves and the utility had to send its personnel for recharges thereby increasing the costs. Furthermore, many consumers entered the wrong coupon code several times, thereby rendering it ineffective and unusable and they had to come back to the office of the utility to renew the same, hence increasing consumer dissatisfaction with the technology.
- Supplementary bill:** Due to issuance of supplementary bill for recovery of Fuel surcharge and statutory taxes/duties, the consumers felt that they were being charged twice for their electricity.

### Issues relating to meter suppliers/manufacturers

- Software sharing with utility:** In case the computer on which the software for pre-paid metering is installed is damaged or undergoes some repair, the consumers who come for recharge need to be turned away. This had caused problems to MGVCL and the same needs to be looked into while implementation of the technology elsewhere.
- Cost of each recharge:** As per the current arrangement between MGVCL and the meter supplier, the utility has to pay an amount of Rs.14 to the supplier for each recharge coupon generated by the utility. It is felt that the savings achieved through doing away with bill printing and bill distribution have been more than offset by this cost. Hence, the utility is not able to fully reap the benefits of pre-paid technology.
- Supply of spare meters for replacement:** Considering the small number of meters deployed by MGVCL, the company was always in short supply of pre-payment meters. As a result, in case the meter of any consumer failed, the same had to be replaced by a normal post paid meter. Considering the logistical constraints, the availability of spare meters cannot be ensured unless the meters are deployed in significant numbers.



## BSES Rajdhani – National Capital Territory of Delhi

### Background of pre-paid metering in Delhi

- 4.27 Serving one of the largest areas in the National Capital Region, the experiences of BSES are extremely relevant to the current study. BSES own two of the five distribution utilities (including MES) operating in NCR, with BSES supplying power to close to 28.5 lakh consumers through BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL).
- 4.28 The adoption of pre-paid metering by BSES was part of an initiative of the State Government. Taking cues from the mounting arrears of the private utilities with government departments and other government utilities, on representation by the power utilities, the State Government had passed an office memorandum on 11<sup>th</sup> June 2007 to convert all the government office connections below 45 kW to pre-paid metering. The same has been attached as Annexure-C. In compliance to the said memorandum, BSES had initiated conversion of all the Government connections from post-paid to pre-paid type in 2007.
- 4.29 Considering that the whole process was to be undertaken for close to 8000 connections (in the areas of BRPL and BYPL), it was significantly better organized compared to other small pilot implementations in the country. As part of the initiative, the old meters from all the Government office premises were removed and new pre-paid meters installed in their place.
- 4.30 Unlike Gujarat, where the security deposit of the connections was retained by the utility, the security deposit in case of BSES was refunded to the consumers or settled partially against arrears. Considering that the initiative was largely for government connections, which have long standing arrears with the utility, the initiative was primarily aimed at reducing these arrears and not at any DSM initiative. Since the directive for pre-paid metering had come from the State Government, BSES and other utilities in NCT of Delhi did not face the problem of convincing the consumers.
- 4.31 Regarding the right of pre-paid metering, the officials from BSES were of the view that the utility should have the prerogative to deploy pre-paid meters as per their requirement, with due approvals from the SERC.
- 4.32 Looking at the success of pre-paid implementation in the Government connections, BSES also plans to convert all Government Colony residences into pre-payment type consumers. The primary reason for this is that in government colonies, in case any consumer has a connection, he/she is supposed to settle all his dues when he is transferred and he vacates the house. However, due to several administrative issues, many such consumers vacate their houses even without clearing their electricity dues. Due to this issue, the utility is not able to release any new connection on the same premises and the house is rendered unusable. Owing to this, the utility and the Government alike are mulling over the proposal for pre-paid metering on government residential premises.
- 4.33 Moreover, in case of government departments frequent transfers are a norm. As per the present practice, as soon as a house is vacated by a government official, the utility removes the old meter and a new meter is installed at the site as and when a fresh connection is issued against the same premises. The meters currently being used are such that they cannot be reused (due to thermal seal) and hence are discarded leading to wasteful addition to the costs of the utility. In case pre-paid meters are installed at these premises, the need for replacement of meters with every transfer would not be there and the technology can be effectively deployed to reduce replacement costs of meters for these consumers.

- 4.34 The biggest achievement of pre-payment mechanism implementation in Delhi has been that the utility does not have to run to each and every government office to collect its bills, which it had to do earlier. Now that most of the government offices have been converted into pre-paid metering, the utility receives a list on a monthly basis which provides details of the amount of recharge to be done for each of the offices for that particular month. This list is issued from the concerned government departments (Head office of Police department for all police stations, for instance) along with the amount of recharges to be made against each connection/ premises and a cheque for the total value of the same. When the recharges are done, the utility sends a consolidated bill to the concerned. The effort that BSES had to put in for collection of dues from each of these offices has reduced significantly in the process.
- 4.35 The chart below highlights the specific features of pre-paid metering in BSES:

#### Billing

- Pre-paid consumers do not require to be billed by nature of the proposition itself. However, in case of the government consumers in NCR, bills are issued on a six monthly basis. These bills are based on the recharges done by the consumers and are dispatched to the respective addresses of the Government premises. The need for billing arose because of representations made by several government consumers to be provided with a proof of their electricity expenses, since the same was to be furnished for maintenance of the accounts of the offices. In compliance with the same, BSES started issuing half yearly bills to these consumers.

#### Settlement of arrears

- Since all the pre-paid meters are currently deployed on government connections which had huge outstanding arrears, the utility had initially offered several options to the consumers. The consumers were allowed to settle their outstanding dues in one go at the time of shifting from post-paid to pre-paid billing or they have the option of having a certain percentage of their recharge amount deducted from their account against arrears till all the arrears were settled. Initially 25% of each recharge was deducted for these consumers and the same has been revised to 50% now till their arrears are settled in full.

### Recharge and tariff structure

- The maximum recharge amount allowed at one instance in the current system is Rs.10000/-. The limit has been imposed due to specific reasons. As detailed out before, the tariff revision in case of pre-paid consumers is to be done through a recharge coupon only. Hence, in case a consumer recharges his account with a significantly large amount so much so that he may not have to get it recharged for the next two years, he would not be effected by any mid year tariff revisions, since he would never go to the utility office for a recharge, thereby the tariff structure in his meter remaining at the older level. To counter this, the maximum limit of Rs.10,000 per recharge has been imposed.
- The tariff structure for pre-paid consumers is the same as that for other consumer in the same category. However, these consumers are offered a rebate of 2%, as approved by the DERC, on their energy billed to promote pre-paid technology. However, in case of tariff revisions, the tariff for prepaid consumers becomes effective from the date of their first recharge after the notification of the new tariff structure, unlike other consumers.
- In addition to above features, the meters also have provisions for ToD and kVAh based tariff structures.

### Friendly period and alarm

- As in the case of Gujarat, the meters in BSES also offers friendly hours and days. In case the consumer has not recharged his account and his balance runs out, the meter does not disconnect the supply on non-working days and on any other day between 5:00 PM to 5:00 AM. Moreover, the consumers are given a friendly credit of Rs.1000, meaning that the consumers can go to a balance of -1000 (minus) in their account without the fear of disconnection. However, on the next recharge, the friendly credit of Rs.1000 would first get replenished and if there is additional balance after that, only then will the supply get restored.
- The meters also have alarm system. The meter has inbuilt features of calculating the estimated days left in a consumer's account based on his current rate of consumption. When the meter detects that the remaining amount is less than that required for sustenance of 15 days, it starts giving alarms. These alarms prompt the consumer to get his account recharged immediately.

- 4.36 Despite the many benefits cited above, the utility is cautious of moving ahead with pre-paid metering as it feels that the per unit cost of the pre-payment type meter compared to the normal post-paid type meter is prohibitively high to make the technology sustainable or cost effective. It is felt that the current cost of pre-payment meters (approximately Rs.5000 per unit as quoted by officials of BSES) is close to smart AMI meters which find greater resonance amongst the officials of the utility.
- 4.37 Moreover, in view of the utility, the technology finds relevance only in specific consumer categories and cannot be mass deployed for all consumers. As stated earlier, it can be deployed for all government connections and in specific pockets of domestic and small non-domestic consumers and for temporary connections but not for all domestic consumers.

### Issues in pre-paid metering in BSES – Delhi

- 4.38 During the implementation of pre-payment technology, and during the operationalization phase, BSES had faced certain problems. The below chart provided below enumerates the same:

### Operational issues

- **Recovery of taxes and duties:** Currently, utilities in Delhi do not recover fuel surcharge. However, considering that the statutory duties and taxes need to be recovered based on the consumption recorded and in case of pre-payment meters, consumption cannot be predicted beforehand, thereby this poses a major challenge to the utilities. As of now the utility recovers the taxes/ electricity duty at the currently prevalent rates. However, in case of revisions of the rates, it would be difficult to impose the taxes and duties from back date.
- **Lack of training to staff:** During the initial phase, the staff of BSES was not provided any training by the meter vendor. As a result, on many occasions the utility had to face several problems. It was essential that the support staff of the utility is given requisite training for pre-paid implementation.

### Issues relating to meter suppliers/manufacturers

- **Dependence on vendor:** Currently the utility is entirely dependent on the meter vendor for token generation. Although the process is initiated at the end of BSES, but the process uses the server of the vendor to generate the token. In case the server is not functioning or the vendor expresses its inability to work with the utility at any stage, BSES would be left in a limbo. Moreover, BSES pays Rs.14/- for each recharge by a consumer. This has offset the costs saved through doing away with meter reading, billing, bill distribution and bill correction. This is also a major cause of concern for the utility.
- **Limited vendors:** Due to very few vendors in the market, the utility feels that the cost of the meters is very high due to lack of competition. As a result, the per unit landed cost of the metering units is extremely high at present.

## Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) – Maharashtra

### Pre-paid metering in MSEDCL

- 4.39 In the state of Maharashtra, two utilities were contacted for the prepaid metering study, one being R-Infra (erstwhile BSES) and the second one being MSEDCL. R-Infra-D has not deployed any pre-paid meters in areas under its jurisdiction and doesn't have any future plans for the same as well. However, MSEDCL has initiated a pilot study of 25,000 meters to be deployed in a phased manner.
- 4.40 Of all the utilities that we have studied, MSEDCL is amongst the few utilities which have adopted pre-payment technology as their own initiative. As part of its pilot implementation, the utility has installed 200 meters as of now, out of a total planned installation of 25,000 meters in a phased manner. As of now, owing to non-availability of interface cables, the utility is not able to deploy greater number of prepaid meters.
- 4.41 The meters have been installed currently on LT domestic consumers only. However, in its long term plan, MSEDCL intends to cover LT single phase commercial and temporary connections as well in addition to LT single phase domestic consumers.
- 4.42 Currently MSEDCL has initiated pre-paid installation from Lonavala and Satara areas of Maharashtra. These areas have a significant number of premises as “second homes” of people. Since these premises are utilized only occasionally and hence payment of monthly bills for such homes is cumbersome for the consumers and it also adds to the operational cost of the utility owing to regular meter readings, bill generation and distribution and vigilance checks. Conversion of these consumers to pre-payment type makes a win-win proposition for the utility as well as for the consumers and consequently such consumers are being targeted in the first phase of implementation.
- 4.43 In addition to the above benefits for consumers who maintain a second home, pre-paid metering also offers the following benefits:
- (a) Decrease in meter reading, billing and disconnection and reconnection costs;
  - (b) The fact that payment is made prior to consumption implies both a significant improvement in the collection of revenues and a reduction in working capital requirement.
  - (c) Prepayment is expected to result in a better understanding of how much energy is being consumed, thereby inducing more control of energy use and budget management by consumers leading to demand side management.
- 4.44 The prepaid metering initiative is not being enforced by MSEDCL. Consumers are being shifted to pre-payment technology only after receiving an application from the consumers in writing. Moreover, in case after using the pre-payment system the consumer is not satisfied by the level of service being offered, he always has the option of reverting back to post-payment mechanism. Depending upon the response that it receives from the initial deployment of 25,000 meters, MSEDCL plans to deploy 1 lakh prepaid meters in the long run.
- 4.45 During the field visit to the MSEDCL office, it was attempted to estimate the benefits that have accrued to the utility through deployment of prepayment meters. However, the utility is in very initial stages of implementation and as such it is difficult to estimate the benefits at this stage. The utility has however planned an investment of Rs.16.5 crores, out of which an approximate Rs.8 crore has already been spent on the initiative.

- 4.46 It can be said that pre-payment efforts are in the most advanced stage in Maharashtra as in addition to providing pre-paid connections to any willing consumer, the utility has also developed sufficient enabling environment for the same. Consumers have the option of recharging the meters by purchasing the recharge coupon from the offices of MSEDCL, through vending machines and also through online payment, which is a significant step forward in comparison to the developments seen in other utilities.
- 4.47 MSEDCL Consumers are also being provided training in use of pre-paid meters at the time of installation. They are also provided with help booklets for future use. However, since HPL Socomac (the vendor) is installing the meters, the officials from the utility have not been provided any training on wide/ large scale so far.
- 4.48 The chart below discusses specific features of pre-paid meters currently being used in MSEDCL:

#### Recharge options

- As stated earlier, MSEDCL offers the maximum number of modes of recharge to its consumers. The consumer can get his account recharged by either directly approaching the nearest office of MSEDCL and purchasing a recharge coupon, or by paying the recharge amount online and generating a token himself or through vending machines installed by MSEDCL.
- At present MSEDCL has installed 2 vending machines in 2 circles. However as part of the long term plan, 20 vending machines shall be deployed in 20 circles.

#### Settlement of arrears and security deposit

- Since the consumers being targeted in MSEDCL are LT single phase domestic consumers, the arrears were low as compared to other categories. Consequently, in case any consumer wants to shift from post paid to pre-paid, he is required to settle his outstanding dues in full and only then move to pre-payment metering.
- However, all such consumers were not required to provide any security deposit to the utility. And in case of all consumers moving from post-paid to pre-paid, the security deposit of the consumers was either settled against their outstanding dues or refunded to the consumer.

### Recharge and tariff structure

- MSEDCL is currently using meters made by HPL Socomac. Just like other utilities, the tariff structure in these meters is also stored within the meters. Moreover, the tariff structure is the same as that of other post payment consumers falling in the same category. However, in order to promote pre-paid metering, the utility is offering a discount of 5% (as approved by the MERC) on the energy charges for all consumers voluntarily adopting pre-paid meters.
- Recovery of fuel cost adjustment and electricity duty is a complex task in MSEDCL as well. The utility is currently using the same rates of recovery as were prevalent in the last year. The sliding average of FAC from last years data is used for computation of FAC to be recovered from consumers for the current year. Similarly, ED is also recovered on the currently prevailing rates. The same are calculated on a normative basis at the time of recharge itself and the projected amount deducted from the recharge amount of the consumer and the remaining amount alone is credited to his account.
- Furthermore, just like other utilities, in case of tariff revisions, the same get reflected in the meters only after the first recharge in the meter from the date of tariff revision.

### Friendly period and alarm

- The meters in Maharashtra also offer friendly days. The supply of consumers is not disconnected on National holidays and weekends. The alarm system of the meters is programmed by default to give an alarm when the balance amount in a consumer's account becomes less than 10% of the last recharge. The limits of 10% can be customized as per the need of the consumer or the utility.

4.49 As already stated, the pre-paid initiative in MSEDCL was started only about a couple of months back. Hence, it is in a very nascent stage of implementation. Moreover, the MSEDCL is facing a shortage of supply of interface cables due to which only 200 pre-paid meters have been deployed till the time the survey for this study was undertaken. In light of this, it would be very premature to judge the benefits or issues in the implementation at this stage. Accordingly, it would not be justifiable to evaluate the same in the current report.

## West Bengal State Electricity Distribution Company Ltd. – West Bengal

### Pre-paid metering in WBSEDCL

- 4.50 In the context of pre-paid metering, West Bengal is a unique state in the sense that it is the only state where the SERC has driven the initiative for implementation of pre-paid metering in specific categories and areas. Unlike other states where the concept was either enforced by the State Governments or the utilities for targeting specific categories, WBERC launched the initiative on its own targeting the temporary connections.
- 4.51 The SERC has made it mandatory for release of new temporary connections on pre-paid mechanism only. This is primarily motivated by the fact that in case of temporary connections, it is difficult to monitor the consumers. Also, the demand of temporary consumers is difficult to project in advance. Consequently, in order to meet the requirements of these consumers, the state utility has to purchase power on a short-term basis. Hence, by adopting pre-paid metering, these consumers essentially pay for their power in advance, thereby reducing the burden on the state distribution utility.
- 4.52 Pre-paid metering in the state was initiated way back in 2007. As per the **West Bengal Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2011**, the Hon'ble Commission has made pre-paid metering mandatory for the following categories of consumers:
- (a) Commercial plantation
  - (b) Short term irrigation supply
  - (c) Short term supply for commercial plantation
  - (d) Short term supply
  - (e) Emergency power
  - (f) Construction power supply
  - (g) Common services for industrial estate
- 4.53 In addition to the pre-paid scheme applicable for the above categories, the Commission has also notified optional pre-paid tariff schemes for several other categories subject to the availability of vending infrastructure in the area where such a connection is sought.
- 4.54 In compliance with the Act, the SERC has also notified that the consumers adopting pre-paid tariff schemes shall not be required to deposit any security amount with the distribution utility.
- 4.55 Before implementation of pre-paid metering in the state, the Commission had directed WBSEDCL to undertake a pilot study in the New Town area of Kolkata based on the outcome of which it was decided to enlarge the scope of implementation keeping in mind the interest of the utility as well as the consumers.
- 4.56 In the initial phases of implementation, the Commission had also allowed a rebate of 2% on the energy charges so as to promote pre-paid metering. However, in the tariff order for FY 2010-11 the same was revoked as under:
- “3.2.14 For pre-paid tariff scheme with pre-paid meter no rebate on energy charge will be allowed with effect from 01.08.2010 except for public water works.”*
- 4.57 As part of the current study, the team of consultants interacted with officials from Calcutta Electric Supply Company as well as WBSEDCL. In case of CESC, the utility had deployed 30 pre-paid consumers way back in 2003-04. All these installations were in LT Domestic category. However, due



to the high cost of the metering unit and also the lack of the vending infrastructure the utility had shifted all the consumers to post-paid structure. Even in case of WBSEDCL, despite the above initiative on the part of the Regulatory Commission, the distribution utility has not been able to take significant steps in prepaid implementation. The prime reason being the high capital cost of the meters as compared to conventional post-paid meters.

4.58 The WBSEDCL was also facing operational issues in implementation for pre-paid metering. The same have been highlighted in the tariff order for FY 2010-11 by the Hon'ble Commission. The issues cited are as under:

- (a) Managing multiple slab structure in the pre-paid metering software as per existing Tariff of WBSEDCL.
- (b) Managing Electricity Duty (ED) component separately from energy charge component after necessary adjustment which in turn being merged with existing balance of the consumer is creating positive or negative balance at month end and thereby perplexes consumers to calculate and plan for actual energy charge.
- (c) Managing any type of retrospective/ arrear component like ED, FPPCA etc. with prepaid software.
- (d) Inability to encourage competition among vendors due to absence of common protocol for the pre-paid meter. Subsequently, different instrument for down loading or up loading of data from the pre-paid meter need to be procured which generate complications.

4.59 The key features of pre-paid implementation in the state of West Bengal are:

#### Reasons for pre-paid implementation

- At present WBSEDCL has approximately 2,500 pre-paid consumers, all in the domestic category. The prime motive of WBSEDCL behind introducing PPM was to reduce the operational costs through reduction of meter reading costs, bill dispatch costs and for improving the collection efficiency of the area. The initiative also aimed at increasing awareness amongst consumers for energy conservation by sensitising them to the cost of power through pre-paid meters, as the consumers would be able to monitor their consumption on a real time basis in these meters. In addition to the above reasons, the initiative was also looked upon as a means of reducing the errors in billing and other billing related consumer grievances.

#### Tariff structure

- As already stated, the WBSEDCL had expressed its inability to promote pre-paid metering because of the complex tariff structure involving fuel cost adjustment, ED, cess etc. in addition to the fixed and energy charges levied on the consumers. In light of the same, the Hon'ble Commission has approved simplified tariff for pre-paid consumers and has notified flat rate tariffs for the various categories being billed on pre-paid basis.
- Initially the SERC had also notified a discount/rebate of 2% on the energy charges for pre-paid consumers. This was for promoting the technology. However it was revoked in the tariff order for the year FY 2010-11.

### Recharge options

- At present WBSEDCL has provided only one option to the consumers for recharging his account/ meter in case of PPM. The consumer is required to visit the counter (only one counter is currently operation at head office in Kolkata) where tokens are issued by the WBSEDCL authorities. On payment of the requisite amount by the consumer and furnishing the consumer number and ID proof, the consumer is provided with a token. The number appearing on the token is then punched by the consumer to recharge his meter.
- In view of the limited recharge options available with consumer, WBSEDCL is exploring other options of recharge like recharge through IVRS (phone), online recharge through internet, kiosks etc. However, these are under nascent stage and would take time to materialize.

### Friendly credit hours

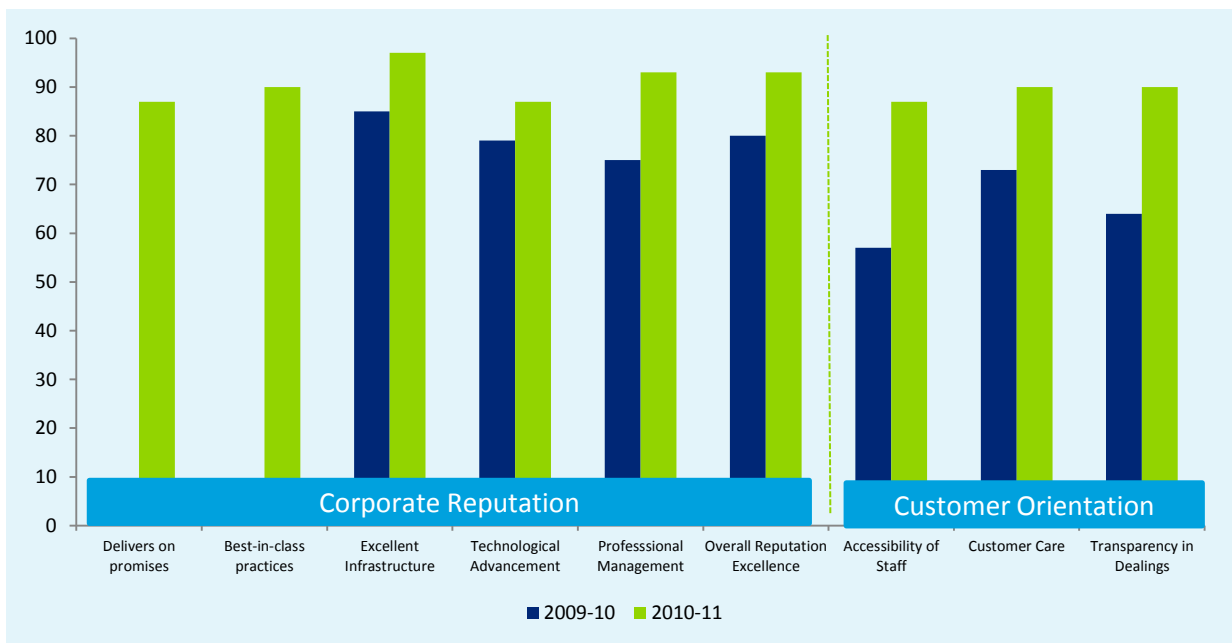
- Like other states, WBSEDCL has also provided the facility of friendly credit to its consumers. In WBSEDCL, the supply of a consumer cannot get disconnected on Sundays, public holidays and during out of office hours.

A few shortcomings in pre-paid implementation in case of West Bengal have already been identified above. In addition to them, the biggest deterrent faced by the utility in pre-paid implementation was the huge cost of the meters. It was felt by the utilities that due to lack of competition in the market, the existing manufacturers were providing the meters at a significantly high cost in comparison to the conventional meters.

# 5 NDPL experience in Prepaid Metering

- 5.1 NDPL had initiated pre-paid metering way back in 2005, much prior to the directive of the Government of NCT of Delhi through its memorandum dated 11<sup>th</sup> June 2007. Since then NDPL has installed close to 3200 meters in the LT domestic category of consumers and approximately 2500 meters on government connections. NDPL is probably the biggest success story for pre-paid implementation in the country. As a part of the current study, the team of Consultants from Deloitte have undertaken detailed interactions with officials from NDPL, government consumers as well as residential consumers in NDPL’s area of supply for gathering feedback on their experience with prepaid metering.
- 5.2 The high levels as well as the consistent improvement in the customer satisfaction levels for the Government & Institutional consumers, results of the customer satisfaction survey conducted by NDPL as produced in the chart below, are an indication in the improvement of customer service orientation of NDPL.

Figure 3: NDPL Government & Institutional Consumers Satisfaction Survey Results



- 5.3 NDPL has clubbed all Government and Institution consumers together, irrespective of consumer category for billing purposes, for providing single desk services to all installations pertaining to Government as well as private sector corporates/ bodies.
- 5.4 The first stage of the pre-paid initiative was implemented on private/ residential installations. However, the meters installed were found to be prone to theft and could be easily tampered with.

Using a magnet, the disconnection switch in the meter could be manipulated to ensure that the supply could not get disconnected even after the credit in the consumer's account got exhausted. In order to sort this problem, the meter manufacturer was asked to supply meters which would be immune to high magnetic fields. Accordingly, the prepaid meters that are presently being sourced by NDPL have undergone the necessary design/ specification improvement and have high magnetic field withstand capabilities and also several other tamper recording features.

5.5 The chart provided below highlights the features of pre-paid metering in NDPL:

#### Recharge options and arrear adjustment

- At present NDPL has only one option for recharge of prepayment meters. The consumer is required to visit the vending outlets of NDPL and purchase a recharge coupon. The coupon has a numeric code printed on it which is unique and can be used in one meter only. The consumer is then required to punch the code in his freedom unit for recharge. Presently NDPL has 20 vending outlets for purchasing the recharge coupon. The consumers can recharge their meters with a minimum amount of Rs.100 and a maximum amount of Rs. 1 lakh in a single recharge. However, a significant difference between NDPL and other utilities is that in case of NDPL, out of the total amount recharged by the consumer a percentage of the same would be deducted for clearance of arrears. During the initial stage of pre-paid implementation, NDPL was deducting 25% of the total amount recharged by the consumers towards settlement of arrears till all the arrears were recovered. However the percentage has now been hiked to 50%.
- As a result of recovery of arrears by the above mechanism, NDPL has been able to reduce its arrears in the government connections from more than Rs.400 crores about four years ago to less than Rs.6 crores today. By all standards, this has been a massive achieve of pre-paid metering.

#### Tariff structure

- The currently applicable tariff structure for the pre-paid consumers is the same as that for other consumers in the same category. However, pre-paid consumers get a rebate of 2% on the energy charges, as approved by the DERC. It is to be noted here that since there is no provision for fuel surcharge adjustment in the tariff structure of the utilities in Delhi, as of now, NDPL does not face any problems with the same. Regarding adjustment of Electricity Duty etc., the meter readings are taken on a monthly basis and based on the actual meter readings the amount of ED, cess etc is deducted from the immediately following recharge of the consumer.

#### Friendly credit and load control

- The pre-paid meters in the case of NDPL also provide friendly credit period just like other utilities. The meter does not disconnect the supply on weekends and public holidays and also between 6:00 PM to 11:00 AM working days.
- The meter also has provisions for cutting off supply in case the load exceeds the contract demand but the same is not activated. However, in order to bill the consumers based on their actual demand, when the meter reading is taken from the meter, the load in the meter automatically gets registered. This load information is then updated in the vending software. When the consumer of that particular meter comes for a recharge, the enhanced load is encoded in the vending coupon and the same gets updated in the meter of the consumer and he starts getting billed based on the updated load.

#### Meter reading and alarm system

- The pre-paid meters being used in NDPL have a provision through which they generate an "ABC" code. This ABC code actually contains information of the consumption recorded by the meter since the last ABC code was generated, maximum load recorded in the interval and also the balance in a consumer account.
- This ABC code is recorded by the meter reader and the same is input into the vending system which updates the load and consumption information of the consumer. Based on the updated information, the statutory duties and taxes are deducted from the recharge amount of the consumer and the fixed charge is levied based on the enhanced load.
- The provisions related to alarms are similar to those implemented in other utilities.

- 5.6 After developing a detailed understanding of the modalities of pre-paid implementation in NDPL, it was important to gather the consumer response towards the initiative to correctly judge the acceptability of the technology amongst the target consumer group. With this objective in mind, the team of consultants in consultation with NDPL identified the All India Radio colony for a detailed survey. The colony houses a few offices of AIR and has many residential pre-paid consumers as well.

### Background of pre-paid implementation in AIR

- 5.7 After the Government of NCT of Delhi had passed an order directing all government connections to be converted to prepaid type, the All India Radio (AIR) approached NDPL for release of connections in its colony strictly on pre-paid basis.
- 5.8 AIR colony is located in the Kingsway camp area of Delhi. Recently, the colony was expanded to accommodate greater number of employees. Earlier, the colony had taken a single point HT connection with a 400 kVA transformer from NDPL and it was billed on the same. Beyond the 400 kVA transformer the responsibility of power distribution was with the electrical department of AIR. However, in this arrangement, although AIR had to pay the complete amount that NDPL billed it, it was not able to recover the entire amount from its consumers due to many reasons ranging from high T&D losses, unmetered consumers, old and sluggish meters etc. Due to these reasons the AIR had slowly lapsed into the practice of billing a large majority of its consumers on average basis. This was not only causing huge revenue loss to the AIR but also making it very difficult to estimate the T&D losses in the area.
- 5.9 Another problem plaguing the organization was that on many occasions in the past, due to administrative reasons, an employee who had been allotted a house would retire or get transferred and would vacate the house without proper clearance of electricity dues. As a consequence, AIR was unable to allot that particular house to any employee till the dues were cleared and hence on several occasions it had to trace the employee and recover the dues from him.
- 5.10 Due to both the above problems, AIR had approached NDPL with the intent to surrender its HT connection and requested NDPL to directly supply to its employees through pre-paid meters. Pre-paid metering was being looked upon as a solution to both the above mentioned problems of AIR. Consequently, NDPL has converted all the government office connections in the AIR colony to pre-paid type.
- 5.11 Under this initiative, NDPL has installed close to 45 connections in the residential category of consumers and has converted all the offices in the AIR colony to pre-paid type. We interacted with the government officials as well as the residents of the colony to evaluate their experience and

satisfaction with pre-paid metering and also to judge their expectations from the distribution utility in this regard.

## Interactions with consumers

### Domestic category

5.12 The team of consultants interacted with five consumers as part of the study. In order to ensure that the consumers interviewed were independent from any influence from NDPL, the Consultants visited the colony of AIR and chose at random households with pre-paid meters for interviews. Accordingly the following consumers were interviewed for the study:

**Table 4: PPM Consumer's feedback**

| Sl. | Name  | Observations   |
|-----|---|--|
| 1.  | Mr. J.S. Rana;<br>Executive<br>Engineer, All India<br>Radio | <p>Mr. J.S. Rana, an executive engineer with the All India Radio, has a pre-paid meter at his premises ever since it was allotted to him. Mr. Rana did not have any problems with pre-paid meters.</p> <p>Being a salaried professional, he felt that payment of bills to the Discom during the working hours of the distribution company was a major cause of concern every time a bill was served to him. He was forced to take leave or arrange for someone to deposit the bill on his behalf. This was of great inconvenience. However, upon implementation of pre-paid metering, he has the freedom of choosing the time of purchase of credit as per his convenience and recharging his meter conveniently through the same. This, as per him is a major improvement on the system.</p> <p>Despite this benefit, Mr. Rana had a notion in mind that a pre-paid meter <i>“registers more consumption than a conventional post-paid meter”</i>. When asked if he had got his meter checked for the same, he had replied in the negative.</p>   |
| 2.  | Ms. Uttara<br>Shrivastava; Home<br>maker                    | <p>Ms. Uttara Shrivastava, a home maker in the AIR colony had a pre-paid meter at her previous residence. However, recently when they moved residence within the colony, they were forced to apply for a new connection as the newly allotted house did not have an electricity connection. Ms. Uttara was extremely satisfied by the pre-paid technology and had applied for the same for the new connection as well. However, due to constraints on the part of NDPL, a post-paid connection was provided to her.</p> <p>Based on her experience with both the pre-paid and post-paid modes of billing, Ms. Uttara was very clear on her requirements. She felt that with pre-payment technology, she was better able to control her electricity budget through close monitoring of the daily consumption and balance in the meter. Just like Mr. Rana, she was very happy with the convenience offered by pre-payment system for recharge. She was not dependent on anyone for the payment of bills as she could purchase the coupon from the designated outlet as per her convenience. She felt that the feature of low credit alarm provided in the meter was very beneficial as it helped her in controlling her electricity consumption.</p> <p>She was very happy with pre-payment technology in all respects but just like Mr. Rana, she was of the opinion that the meter was <i>“fast”</i> as compared to the post-paid meters. She had also not got her meter tested for the same however.</p> |
| 3.  | Mr. Rizwan Ali<br>Khan; Deputy                              | Mr. Rizwan Ali Khan, a deputy director with All India Radio, had also had experience   |

| Sl. | Name  | Observations  |
|-----|---|---|
|     | Director  | with pre-paid as well as post-paid metering systems. After having used both the modes of billing, he opted for pre-payment for the flexibility offered by the technology. However, he stated that he was satisfied by both the modes as each of them offered some benefits as compared to the other. For example, in case of post-paid billing, the consumer had to go to the utility office once in two months for payment of bill, whereas, in case of pre-paid metering frequent recharges are required. Mr. Rizwan also felt that the freedom unit (display) installed at the premises of the consumer offers the consumer ability to monitor his consumption on a regular basis. This, in his view not only assisted the consumer in saving on his electricity bill but also assisted the utility through reduced demand from consumers. With all the above benefits, Mr. Rizwan was happy to adopt either of the two technologies.                  |
| 4.  | Mr. S.D. Zaidi;<br>Executive<br>Engineer-Electrical | Mr. Zaidi is extremely happy with pre-payment metering currently deployed at his residence. He strongly advocates the use of pre-paid meters in case of domestic consumers. He feels that the pre-paid meters record electricity accurately and hence are very useful for the consumers to assess their consumption and consequently reduce overall consumption. Furthermore, the freedom unit is extremely helpful in recharges and in real-time monitoring of the load and consumption of the consumer.<br><br>Mr. Zaidi enthusiastically supports pre-paid metering because he feels that <i>“pre-paid meter me imaandari ki Bijli hai”</i> . He also felt that in the long run, pre-payment would be beneficial to the environment as each and every pre-paid consumer would tend to save energy to reduce his/her energy bill and would ultimately lead to demand reduction thereby indirectly reducing CO <sub>2</sub> emission in the environment. |
| 5.  | Mr. R.D. Bakshi;<br>Station Engineer                | Mr. Bakshi is not a user of pre-paid metering system. He currently has a post-paid connection at his residence. However, in order to evaluate the perception of pre-paid metering amongst the peers of the pre-paid users we also interviewed him. Mr. Bakshi was unwilling to adopt pre-paid metering because had formed an opinion, based on feedback from his neighbours, that pre-payment type meters record more in comparison to the conventional meters. When asked if he knew any of the consumers who had reported this and had got their meter tested, he replied in the negative.  |

5.13 After interactions with the consumers, it was felt that it is only a perception of the consumers that the pre-paid meters are fast as compared to conventional meters. It might be due to the psychological weight borne by the consumer because they see a reduction in their credit amount on a real time basis. Also, most of the consumers who had adopted pre-paid metering were happier with the technology and wanted to continue with the same.

## Government connections

5.14 As stated earlier, as part of the State Government initiative, NDPL has installed pre-paid meters on close to 3200 connections out of a total of approximately 8000 Government & Institutional connections. NDPL has expressed its inability to convert all the Government connections due to resistance from the officials of the respective Government Departments. However, it is making all efforts to convert the Government Connections below 45kW into pre-paid type in a phased manner.

- 5.15 In order to assess the receptiveness of pre-paid technology by Government Departments, the team of Consultants interacted with specific government consumers from All India Radio as well as Delhi Jal Board. The below exhibit tries to analyse the same.



### Interaction with officials from All India Radio

Person Interviewed: Mr. R. K. Mishra (Office of Executive Engineer (Civil) All India Radio Colony)

When contacted for the study on pre-paid implementation in the AIR Colony and also on all the government offices being converted to pre-paid metering, Mr. Mishra expressed his satisfaction from the scheme. He stated that earlier, in case of the post-paid connection the AIR office was dependent on availability of finances for payment of its electricity dues. As a result, very frequently it happened that due to lack of funds in the respective offices, the payments were made after due date. As a result late payment surcharge was also imposed in the subsequent bills. Even though the bill for the office could not be paid due to non-availability of funds with the office, but being a government organization, it was difficult to explain the reasons for imposition of late payment surcharge. Moreover, the due date for various AIR Official connections within the AIR colony was different. As a result, a junior staff had to be sent repeatedly to the NDPL office

for collection/ deposition of bills. This problem was successfully addressed by pre-payment technology. In case of pre-payment metering, the staff was sent once to the vending outlet and he could purchase credit for all the connections at the same time. Thereafter, the purchased credit could be easily transferred to the meters.



**Figure 5: Mr. Mishra with a conveyor pipe for PPM**

AIR started giving pipe ducts from the location of meter installation to each of the consumer premises in the multistoried buildings. Once this was done, the licensee used these pipes to draw the wire connecting the freedom unit to the meter to the premises of the consumers and it also ensured the safety of the freedom unit and the associated wiring.



**Figure 4: Mr. Mishra with the pre-paid connection in AIR colony**

However, there were some practical problems being faced in pre-paid implementation in the All India Radio colony. When the licensee installed a pre-paid meter in a multistoried building for a specific consumer, the freedom unit (display unit) was not installed at the consumer premises but it was installed at the location of the meter itself (normally in the common areas of the building like lobby, staircase etc.). This was primarily done because of the inability of the licensee to stretch the wire connecting the meter with the display unit to higher floors. As a result, on many occasions the freedom unit of the meter was stolen or lost. In a lot of cases, the consumers took their freedom units with them, leaving the meter behind. This caused problems for the next occupant of the premises. In order to address this issue, the civil department from

### Interaction with officials Delhi Jal Board

Person Interviewed: Mr. Goodwin, Delhi Jal Board

The team of Consultants held interactions with an official of the Delhi Jal Board (DJB) who was responsible for 59 pre-paid connections of Delhi Jal Board. During the interactions, officials from NDPL were also involved so as to take inputs of the stakeholders. The DJB officials were not very happy with the initiative. This was because they had faced 15 meter burning cases in the 59 connections.

During the course of the interactions it was discovered that in case of DJB, the actual load of motors installed at the connection site (boosting stations and sewerage stations) is far more than the sanctioned load. Owing to the same, there were very frequent cases of the meter getting burnt. In one such case, the meter of a particular boosting station was burnt and the consumer had recently recharged his meter with an estimated amount that should have sufficed him for the full month. Since the meter was burnt, it was not possible to estimate the balance in the meter at the time of the event. Hence the Discom released a new pre-paid meter with a nominal balance of Rs.1000 in the meter.

However, considering the substantial consumption of the boosting stations/sewerage pumping stations the balance of Rs.1000 was extremely insufficient to meet the requirement of the connection. As a result, the pre-paid nature of the meter threatened to disconnect the supply as soon as the credit balance of Rs.1000 was exhausted. Being a government organization, the consumer was also not able to get additional amount sanctioned from his office for the recharge of his meter at such a short notice. It was reported that this was not a one off case. Many DJB meters were getting burnt and a similar situation could arise in future as well. In light of the same, it was requested by the DJB that essential services should not be supplied through pre-payment mechanism as the same may cause disruption of essential services to consumers due to such unforeseen circumstances.

However, it was felt by NDPL that the process of declaration of the actual connected load/ enhancement of sanctioned loads for all connections and timely planning for purchase of prepayment credits could easily solve the issues being faced by such installations.

## Inferences

- 5.16 Based on the interactions with the above consumer groups it can be inferred that in case of NDPL, pre-paid metering is successfully attracting the consumers with its benefits of energy conservation, convenience and accuracy. In case of government connections as well, the concept has successfully helped in recovery of outstanding arrears and has been well accepted by the consumers. However, in case of essential services like DJB, the technology has not been able to penetrate significantly due to reasons as explained above and it is felt that transition to the pre-paid metering regime needs adequate steps to be taken up by such institutions to gear up and become proactive in adoption of such technology.

## 6 Cost-benefit analysis of Pre-paid metering

- 6.1 In this section, estimates are provided of the costs and benefits from expected from the use of prepayment meters in the Indian Context. These costs and benefits have been estimated relative to the base case of use of standard post-payment type meters for the consumers, considering various cases with varying the collection efficiency/ debtors in day's level. On-going operational and maintenance costs associated with the existing metering infrastructure include the cost of Meter Reading, bill Generation/ Printing cost, Cost of Bill Distribution/ dispatch, Dis-connection/ Re-connection cost and Bill correction cost.
- 6.2 The Cost-Benefit analysis presented considers the following cases, which are based on the existing tariffs as approved by the DERC for FY2011-12, for the purpose of illustration:

**Table 5: Base Case Assumptions for Cost Benefit Analysis**

| Parameter   | LT Commercial                       | LT Domestic                        |
|---|-------------------------------------|------------------------------------|
| Connected Load for Sample Calculation                                       | 2 KW                                | 2 KW                               |
| Load Factor   | 50% Load in use for 12 Hrs in a Day | 40% Load in use for 8 Hrs in a Day |
| Per Consumer Avg. Annual Consumption (kWh)                                  | 4380                                | 2336                               |
| Average Tariff (Rs./ kWh), at Rates notified by DERC for FY12, excluding ED | 8.24                                | 3.39*                              |
| Billing Cycle   | Bimonthly/ 60 Days (upto 10kW Load) | Bimonthly/ 60 Days                 |
| Meter Reading to Billing Date (Days)  | 10                                  | 10                                 |
| Billing to Due Date (Days)  | 15                                  | 15                                 |
| Vending Cost per Recharge in Prepaid (INR)                                  | 16                                  | 16                                 |
| Number of prepaid recharges per consumer/ per month                         | 0.63                                | 0.63                               |
| Cost per manual meter reading (INR)   | 7                                   | 7                                  |
| Cost of Bill Printing (INR)   | 0.64                                | 0.64                               |
| Bill Distribution/ Dispatch (with acknowledgement), (INR)                   | 2.42                                | 2.42                               |
| Bill Distribution/ Dispatch (without acknowledgement) for PPM, (INR)        | 1.65                                | 1.65                               |
| Disconnection/ Reconnection expenses, per case, (INR)                       | 85                                  | 85                                 |
| Bill Correction Charges per case, (INR)                                     | 50                                  | 50                                 |
| Faulty Billing Cases, (INR)   | 1.67%                               | 1.67%                              |
| No. of Disconnections (average), (INR)                                      | 0.7%                                | 0.7%                               |
| Interest Rate (As per State Bank PLR)                                       | 11%                                 | 11%                                |
| Typical Cost of conventional meter (with tamper recording features)         | 1200                                | 1200                               |
| Typical cost of prepaid meters (for load upto 5 kW)                         | 4500                                | 4500                               |
| Typical cost of prepaid meters (for load above5 kW upto 45 KW)              | 5500                                | 5500                               |

\* Average Tariff for Domestic Category Changes with change in connected load and usage, as per tariff order

- 6.3 The analysis is based on the following generalizations/ assumptions, which are based on actual data/ information collected from field visits to utilities:
- (a) Prepayment meters have a higher cost than standard credit meters, with the difference between the cost of a prepayment meter and a standard credit meter in the range of Rs. 3300 per meter, considering an average cost of Rs. 1200 for a standard meter and Rs. 4500 for a prepayment meter;
  - (b) Prepayment meters have the potential to allow discom to avoid meter reading costs completely, given no bills are required to be sent to customers. However, it has been assumed that reading prepayment meters and bills dispatch to the consumers will continue to be necessary to meet the requirements of the regulatory provisions (specifically, the obligation to provide consumption data to customers on request), and may also be desirable to monitor meters for evidence of illegal tampering. Accordingly, it is assumed that these activities will take place on quarterly basis for pre-payment consumers.
  - (c) There is no difference in meter maintenance requirements, so the installation of prepayment meters does not result in any change in meter maintenance costs. Prepayment meters do not result in additional meter testing, so the installation of prepayment meters does not result in a change in meter testing costs.
  - (d) Prepayment meters are 'credited' by using the vending system of the meter manufacturer, which cost around Rs. 16 per recharge per consumer.
- 6.4 Further to the above, the approach to quantification of the potential financial benefits to the discom from conversion of a postpaid electricity connection to a prepaid one and calculation thereof is as outlined below:
- (a) Benefits due to elimination of outstanding dues beyond the due date: Under the present post payment system there are several cases of defaults in payment of electricity bills by consumers beyond the due dates given in electricity bills being served to consumers. Such cases of delayed/ non-payment of bills are quantified in terms of debtors in days for sale of power and also collection efficiency levels. The cost benefit analysis considers different scenarios of such outstanding debtors in days/ collection efficiency levels for assessing the potential of benefits that may be realized from elimination of the possibility of payment defaults/ delays by consumers through installation of prepaid electricity meters.
  - (b) Opportunity Cost Benefit Due to elimination of consumption to due date cycle: The billing for a commercial consumer and a residential consumer (in Delhi), is generally, done on a bi-month (for commercial consumer with load above 10kW the billing is on monthly basis). Further, under the post payment system, the discom typically issues bills to different categories of consumers in around ten (10) days from the average date of reading of consumers. Additionally, the regulatory provisions provides for customers to be given at least 15 days due date to pay their bills. Accordingly, with pre-payment meters, revenue can therefore be considered to be brought forward by 55 days ( $60/2+10+15$ ) in case of a residential and commercial consumer with load upto 10kW. This leads to a benefit to the discom in terms of lowering the working capital requirement. Therefore, there is a financial benefit in terms of avoided working capital cost, which has been estimated at a nominal interest rate of eleven per cent per annum.
  - (c) Interest earned on advance payment by consumers: Apart from the above, the discom shall also earn interest on advance payment by the consumers. Considering the case where on an

average, a consumer recharges his pre-payment meter for approx. eight (8) times a year, his each recharge has a capacity of 48 days in terms of days it can supply the electricity to the consumer. As a result, average recharge that shall be available with the discom as advance in terms of days would be 24 days.

## Base case benefits & payback period assessment

6.5 The recurring benefits of prepaid metering over the conventional post payment type metering have been estimated as the operational efficiency improvement that can be achieved through implementation of prepaid metering. Such benefits are estimated after due consideration of additional recurring costs associated with introduction of prepaid metering.

**Table 6: Estimation of Operating Cost Benefit for Base Case**

| Parameter  | LT Commercial/ Non-Domestic | LT Domestic/ Residential |
|--|-----------------------------|--------------------------|
| <b>O&amp;M Expenses of post-paid system</b>        |                             |                          |
| Cost of Meter Reading                              | 42.00                       | 42.00                    |
| Bill Generation / Printing cost                    | 7.68                        | 3.84                     |
| Cost of Bill Distribution/ dispatch                | 29.04                       | 14.52                    |
| Dis-connection/ Re-connection cost                 | 3.47                        | 1.73                     |
| Bill correction cost                               | 9.99                        | 5.00                     |
| <b>Total Cost on Post Paid system</b>              | <b>92.18</b>                | <b>67.09</b>             |
| <b>O&amp;M Expenses of Prepaid System</b>          |                             |                          |
| Vending infrastructure charges for each recharge   | 121.91                      | 121.91                   |
| Cost of Meter Reading                              | 14.00                       | 14.00                    |
| Bill Generation / Printing cost                    | 0.64                        | 0.64                     |
| Cost of Bill Distribution/ dispatch                | 1.65                        | 1.65                     |
| <b>Total Cost on Prepaid system</b>                | <b>138.20</b>               | <b>138.20</b>            |
| <b>Annual Operating Cost Benefit under Prepaid</b> | <b>(46.02)</b>              | <b>(71.11)</b>           |

6.6 As can be seen from the above table, there is substantial increase in operating costs for the domestic category consumer as well as commercial consumer with load upto 10kW presently being billed on a bi-monthly basis. It may be noted that there is a reduction in all cost elements in transitioning from the post payment to the prepaid system, however, the high vending cost of Rs.16 per recharge is the primary cause for the high operating costs under the prepaid system.

6.7 There is a reduction in working capital requirement through reduction/ elimination of the billing and collection cycle and an opportunity to earn interest on the average advance payment lying with the utility under the prepaid metering system as detailed earlier.

**Table 7: Estimation of Payback Period for Base Case**

| Parameter   | LT Commercial/ Non-Domestic | LT Domestic/ Residential |
|---|-----------------------------|--------------------------|
| Opportunity Cost Benefit Due to collection before Consumption: Consumption to Due Date (In Rs.) | 499.49                      | 131                      |
| Interest Earned on Advance Payment (In Rs.)   | 218                         | 57                       |
| Annual Operating cost benefit (In Rs.)  | (46)                        | (71)                     |
| <b>Total Benefits (In Rs.)</b>  | <b>671</b>                  | <b>117</b>               |

| Parameter                       | LT Commercial/<br>Domestic | Non- LT Domestic/ Residential |
|---------------------------------|----------------------------|-------------------------------|
| Additional Cost of PPM (In Rs.) |                            | 3,300                         |
| Pay-back period (in Years)      |                            | 4.92                          |
|                                 |                            | 28.19                         |

## Sensitivity to collection efficiency

6.8 The benefit from prospective elimination of outstanding dues beyond the due dates due to poor collection efficiency for the consumers shifting to prepaid metering have been assessed by assuming opportunity loss on the outstanding dues for the given number of days at the bank rate of interest.

**Table 8: Payback period sensitivity to collection efficiency improvement for Commercial Consumer**

| Payback period assessment for Commercial Consumer                   | Base Case | Case-II | Case-III | Case-IV | Case-V | Case-VI | Case-VII | Case-VIII | Case-IX |
|---|-----------|---------|----------|---------|--------|---------|----------|-----------|---------|
| Payment Cycle from Due Date (Annual Average Debtors in Days)        | -         | 15      | 30       | 60      | 120    | 180     | 240      | 300       | 360     |
| Collection Efficiency against current billing                       | 100%      | 96%     | 92%      | 84%     | 67%    | 51%     | 34%      | 18%       | 1%      |
| Benefits due to elimination of outstanding dues beyond the due date | -         | 136     | 272      | 545     | 1,090  | 1,635   | 2,180    | 2,724     | 3,269   |
| Cost Benefit for Base Case  | 671       | 671     | 671      | 671     | 671    | 671     | 671      | 671       | 671     |
| Overall Net Annual Benefit  | 671       | 807     | 943      | 1,216   | 1,761  | 2,306   | 2,851    | 3,395     | 3,940   |
|   |           |         |          |         |        |         |          |           |         |
| Additional Cost of Prepaid  | 3,300     | 3,300   | 3,300    | 3,300   | 3,300  | 3,300   | 3,300    | 3,300     | 3,300   |
|   |           |         |          |         |        |         |          |           |         |
| Payback period  | 4.92      | 4.09    | 3.50     | 2.71    | 1.87   | 1.43    | 1.16     | 0.97      | 0.84    |

**Table 9: Payback period sensitivity to collection efficiency improvement for Domestic Consumer**

| Payback period assessment for Domestic Consumer                     | Base Case | Case-II | Case-III | Case-IV | Case-V | Case-VI | Case-VII | Case-VIII | Case-IX |
|---|-----------|---------|----------|---------|--------|---------|----------|-----------|---------|
| Payment Cycle from Due Date (Annual Average Debtors in Days)        | -         | 15      | 30       | 60      | 120    | 180     | 240      | 300       | 360     |
| Collection Efficiency against current billing                       | 100%      | 96%     | 92%      | 84%     | 67%    | 51%     | 34%      | 18%       | 1%      |
| Benefits due to elimination of outstanding dues beyond the due date | -         | 36      | 71       | 143     | 286    | 429     | 572      | 715       | 858     |
| Cost Benefit for Base Case  | 117       | 117     | 117      | 117     | 117    | 117     | 117      | 117       | 117     |
| Net Annual Benefit  | 117       | 153     | 189      | 260     | 403    | 546     | 689      | 832       | 975     |
|   |           |         |          |         |        |         |          |           |         |
| Additional Cost of Prepaid  | 3,300     | 3,300   | 3,300    | 3,300   | 3,300  | 3,300   | 3,300    | 3,300     | 3,300   |
|   |           |         |          |         |        |         |          |           |         |
| Payback period  | 28.19     | 21.60   | 17.50    | 12.69   | 8.19   | 6.04    | 4.79     | 3.97      | 3.38    |

6.9 As may be seen from the tables above, the benefits realized from introduction of prepaid metering substantially increase if implemented for consumers with lengthy payment cycle/ poor collection efficiency on current demand, thereby significantly reducing the payback period.

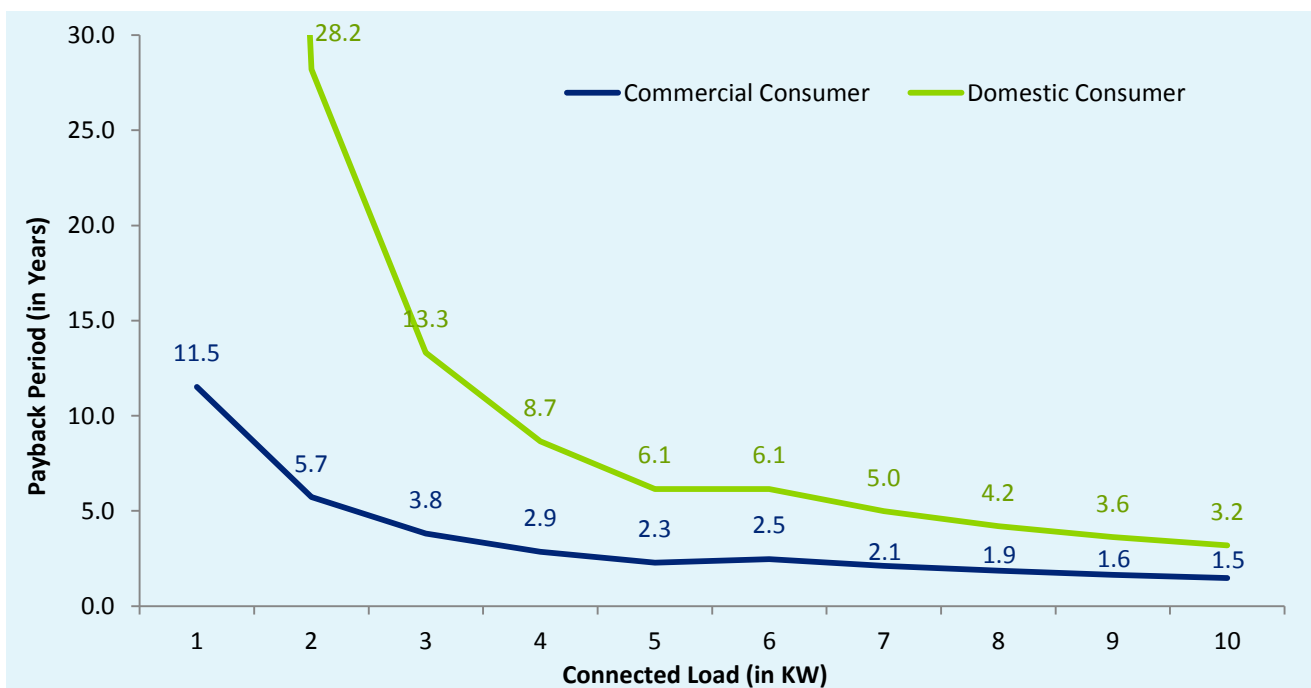
6.10 Therefore, in order to best realize the potential benefits from introduction of prepaid meters it would be essential to first implement such initiative for consumer categories/ groups/ class who have a prolonged payment cycle. As gathered from the field visits conducted, connections pertaining

to the State Government departments/ establishments are amongst those with the lengthiest payment cycle and therefore must be targeted for conversion to prepaid on priority.

### Sensitivity to connected load/ annual average consumption

6.11 The sensitivity of the payback period for introduction of prepaid meters for the commercial and domestic consumer category as presented below have been worked out using the same load factor and hours of usage as in the base case for the respective categories and by only varying the connected load. It may be noted that, as per the DERC tariff order, the applicable tariff (fixed and energy charges) and its impact on the average per unit tariff changes for the domestic category with change/ increase in load. For the commercial category, the tariff remains same for all consumers upto 10 kW.

Figure 6: Sensitivity of Connected Load/ Annual Avg. Consumption to Payback Period of Prepaid Metering (on Base Case)



6.12 As is clear from the chart above, there is a substantial improvement in the payback period with increase in connected load/ annual average consumption of the consumer in both the commercial as well as the domestic category.

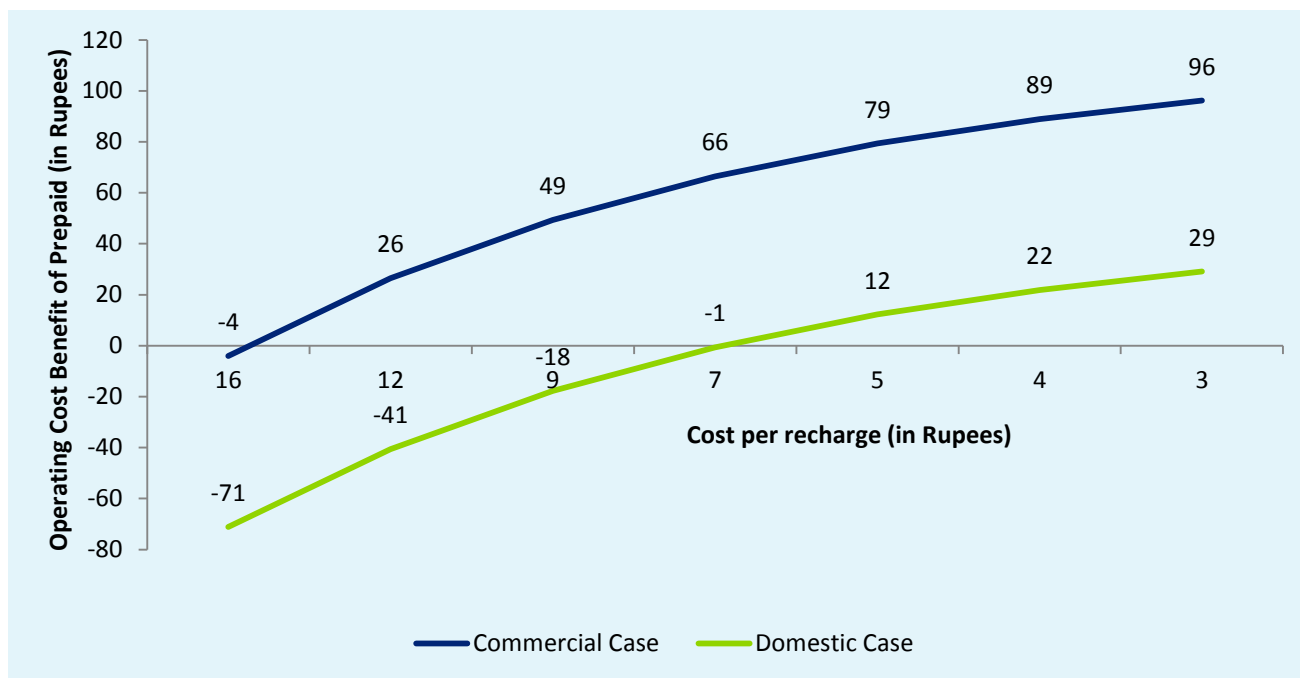
6.13 It is inferred from the analysis that it shall be beneficial for utilities to identify consumers in the sequence of their connected load/ average annual consumption for conversion to prepaid metering. The utilities may put a minimum connected load cut-off of 2 kW for commercial category and 5 KW for domestic category for introduction of prepaid metering.

### Sensitivity to Vending Cost

6.14 The per recharge vending cost charged by the meter manufacturers is coming out to be the most significant operating cost (metering, billing, collection related) to be incurred by the distribution utilities under the prepaid metering system. The benefits of reduced/ elimination of meter reading, bill generation, bill distribution costs etc. in the prepaid system is getting offset by the high vending

cost of Rs. 16 per recharge being charged by the meter manufacturers to the utilities for generation of recharge codes by accessing software/ system being maintained and hosted by the manufacturers.

Figure 7: Sensitivity of Vending Cost to Operating Cost Benefit of Prepaid (On Base Case)



6.15 As may be seen from the chart above, a reduction in the vending cost per recharge will eventually lead to operating cost benefit from transition to prepaid metering. It is recommended that the meter manufacturers may together under the guidance of CEA or any other apex planning body in the electricity sector in the country develop a common protocol for generation of recharge codes for key pad based prepaid meters to be installed in the country. Such software may be made available to the utilities on upfront basis for reducing the per-vending/ recharge cost and improving the operational cost benefit/ viability of prepaid meters.

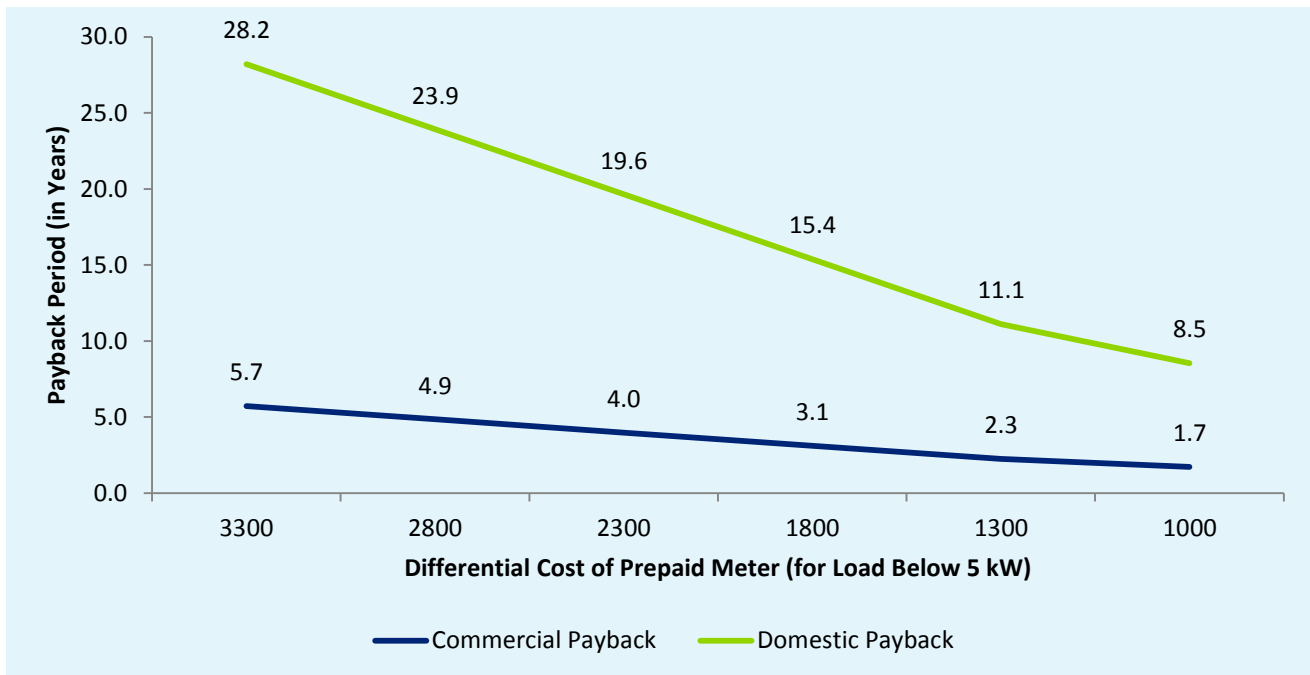
### Sensitivity to Meter Cost

6.16 The key pad based prepaid meter, for a consumer with a load of up to 5 KW, comes at a typical price of around Rs. 4,500 per meter whereas the conventional meters with a similar features comes for around Rs. 1,200 per meter thereby leading to a differential capital cost implication of around Rs. 3,300 per meter.

6.17 The sensitivity of the differential cost of prepaid meters on the payback period for introduction of such meters has been calculated as below for the Base Case scenario by varying/ reducing the differential cost of prepaid meter with respect to the conventional meters.



Figure 8: Sensitivity of Differential Cost of Prepaid Meter on Payback Period (on Base Case)



- 6.18 As is evident from the graph above, the payback period is directly proportional to the differential cost of the prepaid meters, given other parameters remain same.
- 6.19 It is important to note that the prepaid metering system shall become viable for consumers with lower/ subsidized tariffs and lower consumption levels only when the differential cost of prepaid meters is reduced over time.
- 6.20 From the interactions held with vendors, during the conduct of the study, it is inferred that the average/ per unit cost of prepaid meter could be reduced substantially if prepaid metering is adopted at a large scale in the country.

### Evaluation of option of tariff rebate to pre-paid consumers

- 6.21 In order to promote prepaid metering in the country and to best utilization of expected saving from implementation of pre-payment metering, in the overall interest of consumers, is to offer a tariff rebate to the consumers willing to shift/ opt for a prepaid connection.
- 6.22 Worldwide, it is not a general practice to offer consumers opting for or being supplied through a prepaid connection. However, if prepaid metering is not mandated by the respective SERCs, which has been found to be permissible as per the legal opinion attached, it would be difficult for utilities to persuade consumers to shift to prepaid metering in the absence of any discount.
- 6.23 The net annual recurring benefits realized through introduction of prepaid metering are fairly constant for all parameters except for the variations in per recharge vending cost and improvement in collection efficiencies that may be achieved through introduction of prepaid metering in specific consumer categories/ groups etc.
- 6.24 Therefore, the following charts present the sensitivities of the percentage benefits, with respect to the revenues at normal tariffs that may be achieved through introduction of prepaid meters.

Figure 9: Sensitivity of PPM Benefits over Revenue at Normal Tariff (Commercial Case)

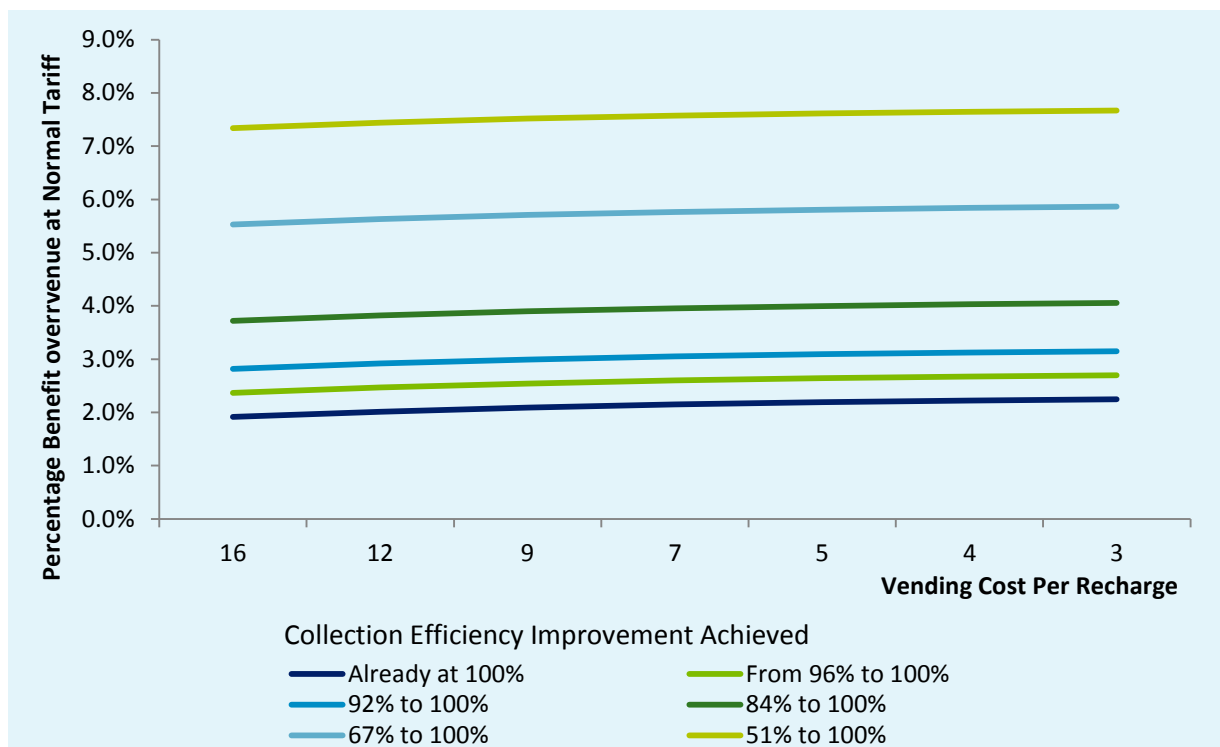
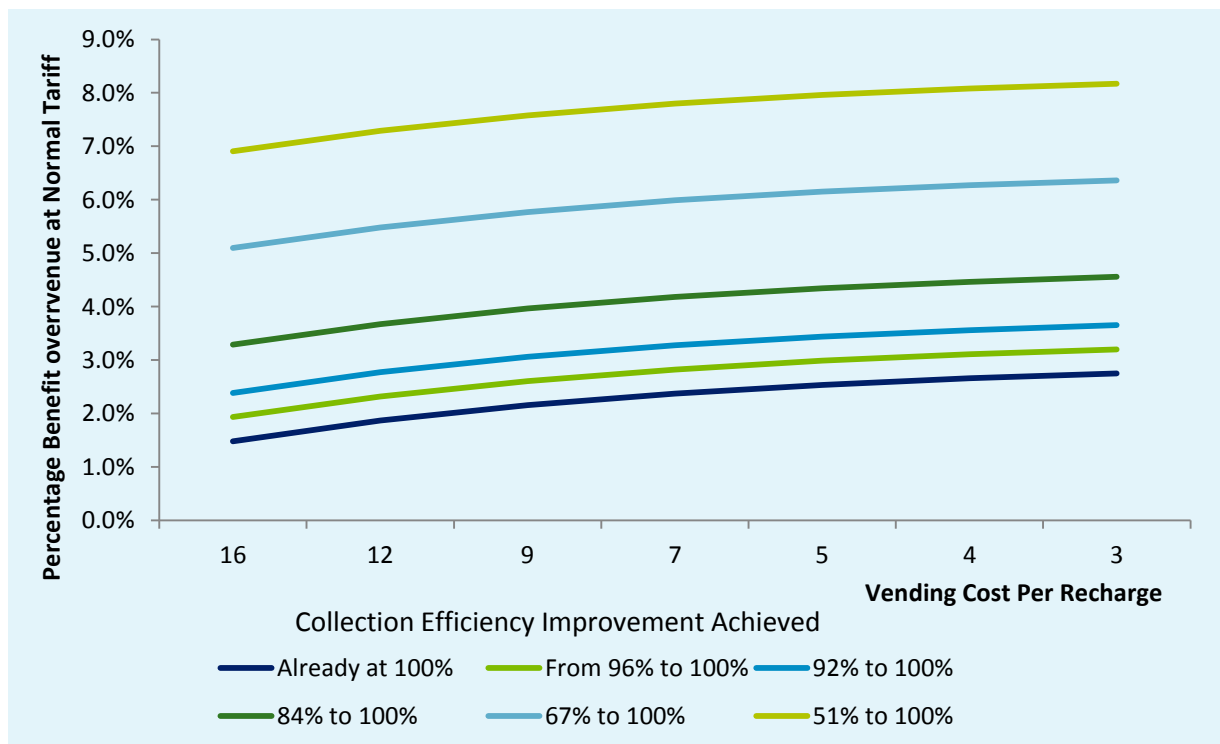


Figure 10: Sensitivity of PPM Benefits over Revenue at Normal Tariff (Domestic Case)



6.25 As can be seen from the charts above, the annualized recurring benefits that may be realized through introduction of prepaid meter for consumers already at a collection efficiency level of 100% shall be between 2% to 2.3% for Commercial and between 2% to 2.7% for the domestic category case considered. Such benefits may be offered as rebate in tariff for consumers opting for prepaid metering. However, this alone may not be attractive enough to convince consumers, as there is lack

of knowledge and experience on the service/ convenience related benefits of prepaid metering amongst consumers.

- 6.26 Additionally, if the impact of improvement in collection efficiency is considered, the benefits that may be realized from introduction of prepaid metering varies directly with the extent of such improvement achieved.
- 6.27 In view of the significant benefits that may be realized through introduction of prepaid metering during the initial years due to the immediate improvement in collection efficiency/ outstanding dues levels, an overall tariff rebate of 4% to 6% should be justifiable in view of the benefits that may be achieved (including the impact of collection efficiency improvement) and also attractive for consumers to opt for the same. Such rebate level may be reviewed after a period of 5 to 6 years by the respective SERCs as consumers would have had experienced the benefits/ convenience of prepaid metering by then.

# 7 Pre-paid metering: International experience

- 7.1 Pre-paid metering has been in the market as a ready option for consumers in many countries abroad. The United Kingdom has always been the pioneer in pre-paid implementation. From initiating token based pre-paid electricity meters way back in the early 1890s to the smart pre-paid meters that it currently uses, the country has been innovating and customizing pre-paid technology over the years based on market analytics.
- 7.2 There are around 50 countries other than the UK where prepayment meters are in use, some of these being small island states. Prepayment is widely used in a relatively small number of countries outside the United Kingdom – e.g. Tasmania, South Africa, New Zealand etc. Outside Great Britain prepayment metering is almost always used just for electricity and not for gas. In a number of countries there is often considerable opposition to the use of prepayment from consumer organisations and parliamentarians.
- 7.3 In the recent past, many other countries have initiated pre-paid implementation in their respective areas. The reasons for the same range from reducing operational expenses to improving collections. Notably, in the past two decades, South Africa has initiated a massive drive for pre-paid deployment. Similarly, in the neighbouring Bangladesh, pre-paid metering has found extensive acceptance amongst the utilities as well as the consumers, primarily because it helps consumers plan their budget and at the same time protects the revenues of the utility. There are different reasons for the adoption of pre-paid technology by utilities across the world as is discussed later on.
- 7.4 For the purpose of this study, we have undertaken a study of prepaid metering in the following countries:
- (a) South Africa
  - (b) Bangladesh
  - (c) United Kingdom
  - (d) Ireland and
  - (e) United states
- 7.5 The above countries have taken significant strides in pre-paid technology and hence they were identified for the study. The main intent of the study of prepaid efforts in these countries was to understand the regulatory provisions made for pre-paid metering, the benefits realized and also the lessons learnt while implementation of the technology in field. In the subsequent paragraphs, we discuss in detail the background to pre-paid implementation in all these countries and try to highlight the aspects of the implementation efforts in each of them individually.

## South Africa

7.6 South Africa has been one of the major proponents of prepayment meter development and can be considered among the main users and suppliers of prepayment type meters in the world today. Currently there are over 4 million prepaid meters installed in South Africa, with more than 3.2 million installed by Eskom, the major electric utility in the country. South Africa has the highest penetration of prepayment meters (for electricity) in the world, with 54 per cent of its approximate 7.3 million electricity customers having prepayment meters.

### History

7.7 The origin of installation of prepaid meters in the country can be traced back to the year 1988. Prior to 1988 Eskom supplied electricity mainly to large customers like mines and municipalities. At that time, although Eskom was one of the largest electricity generators in the world, it only had 120,000 customers and all of them were on post payment mechanism. In 1988, Eskom had a change of strategy owing to many factors from policy to social responsibility. As a result they had initiated supply of electricity directly to the large masses of domestic customers who did not have access to electricity at that time. Most of these customers were in rural areas. In this process of expanding electric supply in the country, several problems came to the forefront as under:

- (a) Many small areas had to be supported with a very small number of Eskom personnel. The standard system of billing and accounting required too much day-to-day management to process accounts and to maintain connections and disconnections.
- (b) There were frequent write-offs when poor people got into debt leading to losses for the utility.
- (c) Many of the areas, where potential customers lived, had no infrastructure and the local economy was merely subsistence based. People did not have permanent jobs or bank accounts. There were no fixed addresses to which electricity bills could be posted. Furthermore, there were no postal services in these areas. Considering identification of households/premises was mandatory for serving of bills and postal services were required for bill delivery, it was extremely difficult to operate on the post-paid mechanism in these areas.
- (d) Many customers were illiterate and did not understand the bills that were served after the electricity had been consumed. Many did not have budget to pay for the fixed charges—a component of the billed amount.

7.8 In order to address all the above issues, with a change in strategy Eskom started adopting pre-payment type meters to serve the masses in these far flung areas.

### Current Technology

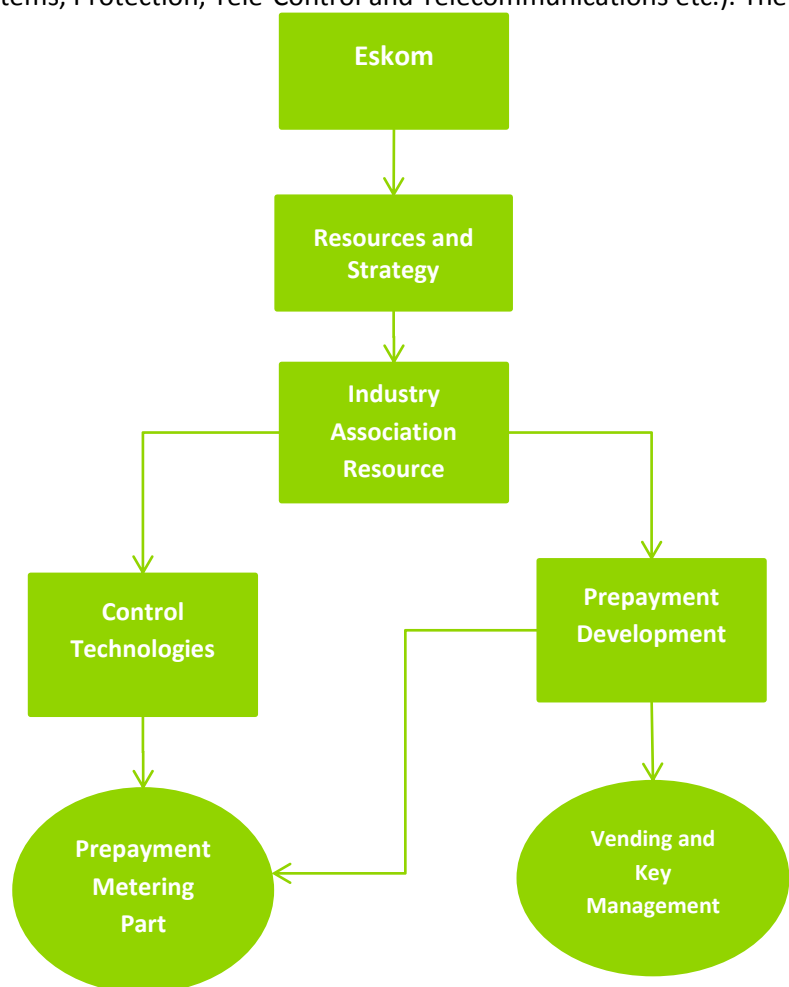
7.9 Traditionally used pre-payment meters were of two types: proprietary meters and STS meters. Proprietary meters were the old meters supplied to Eskom by companies like AEG, Ash, Conlog, Plessey, and Spescom, each of which ran on its proprietary technologies. The STS (Standard Transfer Specification) meters are the new meters specified by Eskom which accept tokens conforming to the STS specifications developed to enable the vending system to transfer credit to all types of meters, i.e. to ensure that a particular token would work for meters of all manufacturers. All the original proprietary Prepayment Meters have now been phased out in favour of STS Meters. There are currently a number of manufacturers that supply Eskom with STS approved Meters.

7.10 Eskom currently uses disposable tokens for recharging credit in the meters. By disposable tokens it is meant that a token is generated by the vending system could be used only for one recharge instance. For subsequent recharges a fresh token would need to be generated for every recharge done by the consumer. The advantages of disposable tokens are that they are very cheap to produce (a few cents).

### Current Operating Model

7.11 Prepayment falls under the Resources and Strategy (R&S) Division in Eskom and is managed by the Industry Association Resource Centre (IARC) which is under the R&S division for all operational purposes. Within the IARC department the operations for pre-paid metering are spread over two different areas as demonstrated in the figure alongside.

7.12 The Prepayment Metering part is officially managed by **Control Technologies** (which also handles the Conventional Metering, DC Systems, Protection, Tele-Control and Telecommunications etc.). The Vending and Key Management functions are managed by the **Prepayment Development** department. To ensure good integration and inter-compatibility, the metering resources are actually permanently part of the Prepayment Development work. The chart alongside tries to illustrate the hierarchy explained above.



7.13 The operations of Eskom are divided into regions. All the day-to-day operations in Eskom are managed by the individual Regions themselves. There are several permanent forums that the Regions use to consolidate all important issues. Three of the most prominent ones are: The National Prepayment Forum (NPF) which co-ordinates all vending related issues in Regions. The Measurements Study Committee forum is formally responsible for all metering issues in Eskom, and the Prepayment Technical Advisors (PTA) forum looks at general prepayment meter operational issues in the Regions.

7.14 Although Eskom has now adopted online vending systems for issuing recharge tokens to consumers, earlier it was largely dependent on the offline vending system. However these old offline vending machines have now been removed by Eskom and replaced by the Online Vending system.

- 7.15 Historically Eskom had many small offline vendors that sold electricity in their local area from a **CDU (Credit Dispensing Unit)**. Easy pay was the only company that sold electricity via their own network and sub-contractor outlets. Eskom is now in the process of developing their own online vending server which will make it easier for many more people to vend for them. They can then simply obtain an online vending client and connect directly to the Eskom server to vend. However the process is not complete yet and the rollout will happen slowly only after work on the Eskom server has been completed. As of now, a request for prepayment can only be accommodated if there is already a prepayment area (called a Supply Group) and a vending machine in that area.

## Lessons Learned

- 7.16 **Benefits for consumers:** Prepaid electricity has empowered the dispersed consumers in South Africa in various ways. The traditional billing system required substantial distribution infrastructure and also the paying capacity of consumers to pay for electricity. This meant that only consumers with fixed addresses, bank accounts and postal addresses could receive the benefits of electricity. Prepayment removed the problems of billing to customers and connection/disconnection of supplies in the event that consumers failed to pay their bills in time. Also, consumers gained a better understanding of the amount of energy being used. This enabled them to cut unnecessary use and economise by turning off lights, geyser, fans, and other electricity based instruments
- 7.17 **Benefits for utility:** The transaction cost related to billing, security deposit management, bill distribution through postage management, issues of incomplete or non-existent addresses etc. were altogether done away with by the use of prepaid meters. Cost-benefit studies have shown that prepayment is now proving to be a more cost effective option for system operation for Eskom than the original system of post-paid billing.
- 7.18 **Role of advertising and initial subsidy in popularising prepaid electricity:** When Eskom initiated the prepaid electricity program in 1992 it encountered much social and economic-resistance to the spread of the technology. To fine-tune the response of consumers towards prepaid electricity, Eskom initiated a massive advertising and media campaign to sensitize people to the importance of using prepaid electricity. The marketing campaign was not just directed at convincing consumers but also educating them about prepaid electricity. This means that consumers were taught how and when to purchase credit or tokens, how to read the metering unit and to know when to repurchase credit tokens, what to do and whom to contact if they experience problems and finally to know how much credit is available at any time.
- 7.19 **Prepayment is not necessarily a well-received innovation in all segments of society:** Although widely well received, Eskom's experience was that prepayment was not necessarily well received in all parts of the country. In some highly politicised areas, prepayment was viewed by the people as a means of control by Eskom or the Government. For example, in the highly politicised areas of Soweto near Johannesburg, the prepayment technology has not been accepted well and residents have insisted on a conventional metering system.
- 7.20 **Cost of prepaid electricity:** Prepaid electricity was initially launched to meet the home lighting needs of the sparsely populated rural areas. Early research by Eskom indicated that switching consumers over to prepaid electricity allowed significant savings via the removal of billing costs, meter reading, and meter repairing. Furthermore, it increased convenience by reducing the security risk to Eskom employees. Savings were also expected in the form of a decreased level of pilferage through meter tampering and through demand side management. The introduction of prepaid electricity solved these problems to a great extent. However, several new maintenance problems relating to meter tampering, vendor fraud, and meter failures arose due to pre-paid implementation.

## Bangladesh

### History

- 7.21 The idea of using prepaid meters to stem the financial drain on Bangladesh power companies was born over ten years ago. The initiative was a result of collaboration between the BPDB (Bangladesh Power Development Board) and the KfW Entwicklungs bank, which provides financial assistance to Bangladesh on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). In 1995, the then BPDB Chairman, visited South Africa with a KfW consultant in order to get a first-hand view of the possibilities.
- 7.22 Subsequently after a careful appraisal of the situation in Bangladesh, the BPDB received a grant of 4.09 million euros from the German Government through KfW for the cost of a pilot prepaid metering project in Chittagong. Chittagong was chosen as the site for the first pilot because the distribution (technical and non-technical) losses in Chittagong at the time were 28.4% and even 34% in some areas in the pilot circle which were much higher than the national average of 26%. At the same time the lines in Chittagong were in a technically acceptable condition thereby making post implementation monitoring of initiative easier.
- 7.23 Three distribution areas in Chittagong were chosen as the pilot areas and 12,000 single-phase meters, 1000 three-phase meters and 150 check meters were installed on the 11 KV feeder areas of Stadium and Khulshi in Chittagong along with insulated steel-reinforced aerial concentric conductor cables which make theft practically impossible.

### Current Operating Model

- 7.24 Prepaid meters in Bangladesh were initially installed only on domestic premises in the identified pilot areas. Once converted to pre-paid, the customers had to purchase their desired “taka” (currency of Bangladesh) amount of electricity in advance at one of 10 local vending centers.
- 7.25 The meters are activated and electricity is dispensed after the customers type in the 20-digit number generated by the computerized sales system at the vending centre. After the amount is used up, the inbuilt disconnecting device in the meter cuts off the flow of electricity. However, just like the concept of ‘Happy hours’ in India the meters allow customers to go into deficit overnight or over a weekend or holiday, and then pay back that excess amount in the vending centre on the next business day.
- 7.26 As part of the pilot initiative, BPDP had conducted surveys targeting the consumers to assess the satisfaction levels of customers with the initiative. Customers interviewed in the vending centres had indicated that they like the new system because they can control their own consumption and budget. Furthermore, in case of tenants or landlords, pre-payment provided a win-win solution for both of them as the tenants were not worried of disconnection due to non-payment of bill by the landlord and at the same time, the landlord did not have to worry about collection of outstanding bills against the tenants. Moreover, because there is no minimum charge, security deposit and far lesser number of reported disputed bills in the pre-payment system the overall satisfaction with the scheme is high.
- 7.27 In order to promote pre-paid metering, users of prepaid meters also receive a 2% discount on the standard electricity billing rate. Due to pre-payment technology, the power companies operating in Bangladesh also benefit through upfront payment, improved cash flow, decreased non-technical losses, lower overheads (no meter reading or billing), increased revenue, and better load



management. According to Project Director **A.M. Khorshedul Alam**<sup>3</sup>, it is expected that the BPDB will fully recover the initial investment costs of prepaid meters within six-seven years.

- 7.28 The BPDB-KfW pilot prepaid metering project in Chittagong was the first, but the idea quickly caught on. DESCO (Dhaka Electric Supply Company Ltd.), for example, has a pilot prepaid metering project in Uttara and the BPDB is implementing several additional pilots – in Chittagong Agrabad, Sylhet, Bogra, and Serajganj. Results from the latter three pilots demonstrated an almost 20% reduction in “unusual consumption” in the areas where prepaid meters had been introduced. The pilot projects have been undeniably successful and, according to Project Director Alam, the BPDB now has proposals to expand prepaid metering into four different distribution zones, including greater Chittagong, awaiting approval by the Government of Bangladesh Planning Commission. If approved, 1 million of the BPDB’s 1.6 million customers will have prepaid meters within a few years.
- 7.29 The BPDB-KfW pilot project is using keypad meters, in conjunction with numeric tokens generated by the vending centers. DESCO, on the other hand, is using a prepaid meter designed by the Bangladesh University of Engineering and Technology (BUET) and manufactured in Bangladesh. The BUET meters are operated by smart cards, similar to credit cards, which store the purchase and usage related information. Using locally manufactured technology will obviously save foreign exchange, but smart cards can potentially be damaged and/or manipulated, like credit cards, thus opening up avenues for fraud.
- 7.30 The power companies are currently evaluating the technologies being tested in the pilot projects, before large-scale roll outs of the same for all consumer groups. The BPDB-KfW pilot is employing the completely novel approach of engaging a turnkey contractor, namely Polymeters Response International Ltd., with its local partner K.C.J. & Associates Ltd. not only to procure and install the meters and upgrade and rehabilitate the distribution system, but also to operate and maintain the installed system for five years after it is fully operational.
- 7.31 In the BPDB-KfW model, the BPDB steps back allowing the operation to function completely as a private-sector enterprise – a revolutionary step for the Power Development Board. This is in contrast to the self-financed BPDB pilots, in which BPDB takes over a site one year after it is up and running.

## United Kingdom

- 7.32 The United Kingdom is one of the two world leaders (with South Africa leading the numbers) in the use of pre-payment meters and the only country in Europe that uses them on a significant scale. Pre-payment technology is not used in the European region primarily because pre-paid meters disconnect the supply of the consumers in case of low credit balance. This is seen as infringement of human rights of the consumers by depriving them of the essential services (electricity, gas or water as the case may be). Consequently, most of the countries in the European region discourage the deployment of pre-paid meters for electricity as well as other utilities. However, in case of United Kingdom, prepayment meters account for approximately 18% of electricity meters sold in the UK. Currently, there are more than 3.8 million electricity PPM customers in the country, representing 15% of domestic electricity customers.

<sup>3</sup> Source:

[http://www.dhaka.diplo.de/Vertretung/dhaka/en/07/EZ\\_\\_Praxis/Energy/Energieeffizienz/Energieeffizienz\\_\\_Seite.html](http://www.dhaka.diplo.de/Vertretung/dhaka/en/07/EZ__Praxis/Energy/Energieeffizienz/Energieeffizienz__Seite.html)

## History

- 7.33 The UK has the longest history of the use of prepaid meters, starting as early as the end of the 19th century. These prepaid meters were coin-operated meters. Prepayment coin meters were first introduced in 1887 for gas industry, which were then adopted by the electric utilities. But by the late 1970s there were growing problems with coin operated meters:
- (a) They were unreliable, the average 'life' being typically 4–5 years before needing attention.
  - (b) Although the customer paid in advance, the cash stayed in his meter until collected; hence it was not true prepayment from the utility viewpoint.
  - (c) Cash was stolen from meters during burglaries, leaving the customer responsible for replacing it (and some customers 'stole' from their own meter). A meter might typically contain in excess of £100 between collections.
  - (d) Staff collecting cash were targeted by criminals in robberies, to the extent that some collections had to be carried out using armoured vans.
- 7.34 Therefore research into alternative methods was encouraged to overcome these problems. In the mid-1980s, coin operated meters started being replaced by newer types of prepayment meters using tokens, plastic keys and eventually cards with embedded chips.

## Current Technology

- 7.35 There are at present four different technologies in use in the UK as under:
- (a) **Magnetic card/Token:** These meters were introduced in the late 1980s, adopted by approximately half of the UK utilities and are now used by 1.5 million customers. They are the most basic type of PPM and have a number of limitations including a greater susceptibility to fraud and misdirected payments than for other meter types, high maintenance costs deriving from the need for site visits, inflexibility in the recovery of debts, and general account balancing issues. Suppliers cannot set tariffs and receive meter readings remotely through the transfer of information from the meter to the payment device and vice-versa as with other technologies and so must visit the meter to perform these functions.
  - (b) **Smart Key:** Smart key meters were introduced in the early 1990s and are used by around 1.5 million customers. A key meter uses a special plastic key that will only work in a particular meter. Customers can recharge their key at the payment outlets.
  - (c) **Smart Card:** Smart Card meters were introduced in the mid-1990s. They were developed by Landis & Gyr and sold to the (then) UK utilities Norweb and Midlands Electricity. They are used by fewer than 1 million customers. These cards are of the same size as of a credit card and they operate by downloading information from an electronic chip on the card. The metres using the smart card will be updated with the new prices automatically in case of change in electricity prices.
  - (d) **Key Pad:** Key Pad meters, which are a one-way information system, were developed by PRI in the late 1990s. In a key pad meter, the customers receive a numeric code to enter into the meter which upon entering recharges the amount paid by the consumer to the meter and also effects any tariff revisions that might have been notified between two recharges.

## Infrastructure and Payment Outlets

- 7.36 Prepayment meters require infrastructure for customers to obtain credit to maintain the supply of electricity. These facilities include the provision of payment devices (tokens, keys or SMART cards), use of a network of payment outlets and the transfer of payment and customer data. When sourcing prepayment meters, suppliers have to ensure that there are payment outlets within reasonable distance of the customer's home, which are equipped to provide credit for the type of meter (token, key or SMART card).
- 7.37 The three networks providing facilities for PPM customers in the UK to buy credit are the Post Office, Paypoint and Payzone. Paypoint and Payzone provide extensive coverage in urban areas and operate over longer hours during the day while the Post Office provides a wider network in rural areas. There is active competition among service providers but some suppliers have experienced difficulties providing an adequate service to some rural customers when switching away from the Post Office.
- 7.38 Paypoint and Payzone terminals are often located in local shops and can generally deal with more than one type of technology, meaning that they can vend for more than one type of meter. The Post Office provides a wider network of payment outlets in rural areas but often has limited operating hours during the day. Furthermore, in areas where the Post Office is located within a shop (often in rural communities) the shop cannot compete with the Post Office and offer Paypoint or Payzone services. This limits MAPs (Meter Asset Providers) in their choice of prepayment manufacturer in these regions.
- 7.39 The Office of Gas and Electricity Markets (Ofgem) has the responsibility of regulating the electricity and gas markets in the United Kingdom. It has performed extensive research on prepayment meters and examined the current practices in the UK. Below are some interesting findings from their research:
- (a) Most people who have prepayment meters are content with them;
  - (b) Approximately 14 % of program customers are repaying debts with their meters;
  - (c) There are fewer disconnections in the UK for reasons of debt (only 1,361 in 2003 against 70,000 in 1990).
- 7.40 As can be seen from the above inferences, pre-paid metering has been very effective in its intent in UK. Accordingly OFGEM as well as the utilities have plans for continuing with the system in the future as well. In the recent past, the utilities have also come up with a process through which pre-paid consumers can switch between services providers with their debt. With all these initiatives, it can be concluded that pre-payment technology is a tool that has been adopted by the utilities in successfully tackling the issues of mounting operational costs and bad debt and at the same time has permeated the customer base and established a degree of acceptance with them.

## Northern Ireland

- 7.41 Northern Ireland Electric is not an electricity supplier but only a network service provider whose network is used by supplier to provide electricity to end users. At present Northern Ireland Electricity supplies power on behalf of the following suppliers:
- (a) Airtricity
  - (b) Energia

- (c) ESB Independent Energy
- (d) Firmus
- (e) NIE Energy

7.42 Of all these utilities, only Airtricity and NIE Energy offer pre-payment facility to its consumers. Firmus is also planning a rollout of the facility in select areas. Both the service providers are trying to promote pre-payment technology and hence offer various benefits to consumers willing to switch to pre-paid metering. A few of the points highlighted in a media campaign recently conducted by NIE Energy for promotion of pre-paid metering are as under:

- (a) Pre-paid customers pay less than standard credit customers. The customers get 2.5% discount off the standard price of electricity.
- (b) Pre-payment is an effective way for people to budget for electricity as they go along, rather than receive quarterly bills.
- (c) More than 1 in 4 homes in Northern Ireland (over 212,000) use a Keypad 'pay-as-you-go' meter.
- (d) It is easy to buy electricity 'top ups' for a Keypad meter through local Paypoint or Payzone shops across Northern Ireland, and also anytime online at [www.nieenergy.co.uk](http://www.nieenergy.co.uk) or over the telephone.
- (e) Keypad meters are installed free of charge.

7.43 It was experienced that the above campaign had a significant impact on the acceptance of pre-paid technology amongst consumers and to its large scale deployment.

## History

7.44 NIE had been utilizing 'Powercards' (magnetic type prepayment meters) since around 1990. However, because these cards are prone to theft/fraud, need for an alternative prepayment solution was being felt in order to reduce operating costs and to allay concerns about security and fraud. Additionally, there were high levels of customer dissatisfaction and continued pressure from the regulator and consumer groups over the auto-disconnection feature of pre-paid meters, as already explained.

7.45 For countering the problem of auto-disconnection AMR was considered, but was found to be too expensive for implementation in domestic category. After some initial market research, a Liberty 'Credit Management' keypad meter, which offered relaxed disconnection features as compared to the traditional pre-payment type meters, was tried in 200 homes on a pilot basis and received a successful response from the consumers. Consequently a roll-out for the same commenced in the year 2000.

## Current Status

7.46 The display of the Liberty meters used in Northern Ireland provides various consumption related details as under:

- (a) Credit time in days (based on average past consumption and balance available today);

- (b) The previous day's, week's, and month's costs;
  - (c) Unit rates and number of units used at these rates;
  - (d) Information on the previous 5 purchases;
  - (e) Total money entered into the meter;
  - (f) Current load;
  - (g) 24 hr. maximum demand and the time at which it occurred;
  - (h) Total units consumed.
- 7.47 Customers can purchase credit through a variety of methods, and receive a 20 digit 'Powercode' to enter into the meter which upon entering recharges the amount paid by the consumer to the meter. The technology includes full 'time of day' functionality. The meter can also be used as a standard credit meter. In addition, the technology offered a more acceptable system wherein a low credit warning was given and the electricity would not be switched off at night, week-ends or bank holidays.
- 7.48 As a result of the successful media campaign which was conducted at a marginal cost there has been a 100% increase in the number of prepayment meters installed. As per a recent survey conducted by the NIE Energy, removal rates of meter have been less than 5% at change of tenancy and there are greatly reduced meter fault rates. There has been an 8% reduction in customer calls to call centers, with almost zero complaints reported. Significant business benefits have been reported in debt management and billing costs reductions. As a result, cheaper rates are being offered (2.5% discount) to pre-paid consumers.
- 7.49 NIE has been installing the Liberty Keypad meter (manufactured by PRI), since the year 2000. The communication between the supplier and the meter (meter activation, credit of account etc.) is through the vend code input by the customer, obtained when the customer buys credit either from agents (such as pay point) or by telephone/internet. At the same time, the supplier can access the information stored in the meter through a code generated by the meter when a button (provided on the meter keypad) is pressed. This code when entered in the vending system updates all the information relating to the customer (peak load, consumption in a month, balance etc.) in the vending system.
- 7.50 In effect therefore the keypad meter operates in a similar way to the key and smart card prepayment meters used in Britain. The main difference between the meters used in Britain and the NIE is that the latter does not involve anything being inserted into the meter – the customer types in a digital code to activate the credit. So it cuts out a lot of the problems (and costs) associated with tokens/keys/cards that can be damaged or lost. Another difference is that the Northern Ireland keypad meter has a conveniently placed customer display that enables them to monitor consumption, credit available etc.
- 7.51 By mid-2009, 30% (230,000) of all electricity customers in Northern Ireland were using the keypad prepayment meters, with new connections continuing at the rate of 2000 per month. About 58% of the above pre-paid consumers were in the low income group but 32% were in middle or higher income groups including 17% who are wealthy achievers, indicating acceptance of pre-payment system amongst all strata of consumers.

- 7.52 Three key factors have driven the high level acceptance of prepayment meters.
- (a) Customers receive a discount compared to standard credit. This discount is considered cost reflective by NIE because of the reductions in bad debts, meter reading costs, call centre costs, billing and debt management costs etc.
  - (b) The range of credit top-up facilities (vending outlets, phone, internet etc.) is felt to have attracted a broader range of users. Whilst 86% of top-ups are still done in cash at Paypoint or Payzone outlets, internet and phone top-ups increased 37% in 2009 compared to 2008. Top-ups by phone and over the internet are also high in value on average and NIE has introduced a minimum top-up amount of £15 for such transactions, with no adverse reaction from customers.
  - (c) The “friendly credit” means users do not get auto-disconnected at weekends or between 4pm-8am (and this can be extended to 11 am on request). This safeguard was required by OFREG (the Northern Ireland regulator) due to concerns from consumer groups and others about auto-disconnection. Clearly, electricity used during periods of friendly credit has to be repaid at the next top-up.
- 7.53 These examples from other sectors and from Northern Ireland all suggest that prepayment can become an accepted and normal method of payment, provided that it is made attractive to customers through tariffs reflecting the cost-savings made by suppliers, credit top-up arrangements and limiting the scope for auto-disconnection at certain times.

## Republic of Ireland

- 7.54 The Republic of Ireland is not part of the United Kingdom but a separate sovereign country with its own energy and regulatory systems. At present there are 24,000 domestic customers using prepayment meters in Ireland. These are token meters and have been in use since 1990. However, in case of the Republic of Ireland, pre-payment meters are installed in cases where the customer is experiencing payment difficulties and are not available on request. They are only available to customers of the supplier ESB Customer Supply. With the opening of the electricity supply market in mind, the Commission for Energy Regulation (CER) is considering whether a prepayment system should be made available to all suppliers in the market. The Commission has established a Prepayment Meter Working Group to investigate this and it is still in the consultation stage.

## United States

- 7.55 Very few customers in US have prepayment metering – those who do are mostly in municipal and co-operative utilities serving small or rural communities. One of the obstacles to prepayment metering in the US has been the cost of the meters but more fundamental has been opposition from regulators, politicians and consumer groups. The self- disconnection facility is the major barrier to acceptance by utility regulators and others of prepayment meters in the US, because this is considered incompatible with rules banning disconnection except in very limited circumstances. The disconnection ban and attitude to prepayment came about because many households use electric heating and/or air conditioning and many parts of the US have very hot summers or very cold winters – so access to electricity is considered absolutely essential in these extremes.
- 7.56 Before terminating service to a customer whose payment is seriously over-due, the utility had to pursue an array of measures to secure payment. Varying from state to state, these measures could include:

- (a) Arranging a deferred or low interest payment schedule;
- (b) Co-operating with public financial assistance agencies that will pay the bill for the customer;
- (c) Providing service through the winter months, even with no firm commitment that any payment will eventually be received; and
- (d) Continuing electric service throughout a lengthy sequence of legal appeals.

7.57 Prepayment electric service with automatic disconnection when the prepayment runs out, is incompatible with these protective measures, and so was not seriously considered by regulators or the investor-owned utilities serving the large majority of the US population.

7.58 A recent example of the strength of the opposition to pre-payment metering is the Massachusetts Department of Public Utilities’ (DPU-the energy regulator for the state) dismissal (in summer 2009) of a proposal by Western Massachusetts Electric Company to pilot the use of prepayment meters among the company’s low-income customers. The proposal was opposed by the Massachusetts Attorney General, state energy officials, and low-income energy advocates who said it would threaten electrical service for hundreds of low-income families and allow the utility to bypass the state’s existing consumer protection rules. The DPU agreed with advocates that the program would circumvent Massachusetts’ consumer protection laws and said that it unfairly targeted low-income consumers. It ordered the utility to come up with a revised pilot program that includes all income classes

7.59 But after deregulation of the US utility industries aimed at allowing every energy consumer to choose his or her energy supplier from competing suppliers and to make a private contract for the energy, prepay services have become popular in some segments of the customer population as energy suppliers seek ways to give customers attractive choices.

## Current Status

7.60 Three U.S. utilities that have significant prepaid meter programs are listed below:

**Table 10: PPM in US Electricity distribution utilities**

| Utility                           | Location       | Total Served Population | No. of PPM | % of customer base |
|-----------------------------------|----------------|-------------------------|------------|--------------------|
| Wood Country Electric Cooperative | Texas          | 33,000                  | 600        | 2%                 |
| Brunswick Country EMC             | North Carolina | 71,000                  | 6,500      | 9%                 |
| Salt River Project                | Arizona        | 920,000                 | 50,000     | 5.5%               |

7.61 Salt River Project (SRP), which has the largest prepay metering program in the United States, reports that their customers are, on average, reducing their annual electricity usage by 12.8%. While reduced sales may not be viewed as a benefit, the lower consumption can be translated into a lower risk exposure for those who want to better manage their budget. Also, 95% of the prepay customers report they have more control over the electricity they consume. Despite this, pre-payment has still to gain critical mass for deployment at a large scale.

## Argentina

### History

- 7.62 In 1993, Cashpower Sudamericana, Landis & Gyr's distributor in Argentina, began marketing the Cashpower prepayment system at a time when about 87% of the population in Argentina had access to electricity. During the previous year, Cashpower Sudamericana had embarked upon an intensive marketing study to evaluate the reaction of users and utilities towards prepayment metering and prepayment systems and keypad technology was identified as the most suitable.
- 7.63 During the period 1992 to 1994, more than 20 co-operatives in Argentina adopted the Cashpower system, replacing conventional meters with prepayment meters. Towards the end of 1994, cooperatives not previously using prepayment technology began implementing it. Today, in Argentina, there are approximately 150 co-operatives that have implemented prepayment systems using keypad technology, while only three or four are still using the magnetic card concept; and these few are in the process of changing over.
- 7.64 The implementation of prepayment metering by CELCA (Co-operative Eléctrica Limitada de Carmen de Areco) provides an interesting example of how prepayment electricity supply technology was initiated in Argentina. CELCA has over 5,000 users in the city of Carmen de Areco, 140 km west of Buenos Aires City. The co-operative is characteristic of the private distribution companies that have actively initiated a prepayment strategy.
- 7.65 In May 1996, the co-operative implemented a pre-payment system in the province of Buenos Aires. The main reason for installing prepayment electricity meters was to find a solution for the very high rate of overdue invoices. Delayed payment or non-payment of these invoices averaged nearly 26% of CELCA's total monthly turnover at the time. From the outset, consumer response was highly positive, and surprisingly, even chronic late payers adapted well to the new system and became excellent customers of the co-operative.

### Current Operating Model

- 7.66 The current system in Argentina has been reasonably streamlined and works as follows:
- (a) The user goes to CELCA's offices or the point of sale and buys electricity
  - (b) The system issues an invoice (according to local regulations) for the amount purchased as well as a credit transfer voucher on which a 16-digit code is displayed.
  - (c) At home, the user punches in the code on the keypad of the meter and a confirmation of kWh credit is displayed
  - (d) The energy management unit is installed in the same place as the conventional meter, which is simply replaced by the new unit.
  - (e) A bipolar wire connects the energy management unit to the customer interface unit inside the user's home.
- 7.67 This has the additional advantage in that the internal distribution circuits in the user's home remain unmodified. This means that the co-operative does not incur additional legal responsibilities at the customer's premises.



## New Zealand

- 7.68 In New Zealand there are some 1.4 million residential customers but very few of them are on pre-payment system. The first major focus of pre-payment system began in 1992, when a large utility was able to introduce prepayment to around 10% of its 120,000 residential customers. This was done by marketing it as a value-adding service, rather than forcing customers to use it.
- 7.69 It transpired that these customers were 'weekly' customers who found it difficult to cope with monthly or bi-monthly utility billing arrangements and opted for pre-payment rather than being 'bad payers'. As of now New Zealand has around 60,000 prepayment meters representing around 3% of the residential customers, however there are no regulatory issues in New Zealand regarding prepayment. The Government is taking a hands-off approach, and those introducing the systems have been doing so responsibly. The key is that if the systems are imposed (hence attracting possible regulatory attention) then they are not economic to offer as a service; hence the problem is self-solving. The Government is unlikely to become involved directly, but will likely watch proceedings carefully.
- 7.70 The PRI Liberty prepayment smart meter has been successfully tried in pilot implementations by Genesis Energy in New Zealand and is now being readied for wider consumer roll-out. The pilot involved more than 80 homes in the Wellington and Waikato regions.

## Australia

- 7.71 Prepayment meters were primarily introduced into Australia as a debt recovery mechanism. Following the liberalisation of the electricity industry there was increased pressure to operate in a commercial manner and because of this utilities introduced the meters. However, the tariffs have been higher for these prepayment meters than for those charged for post-use billing. This has resulted in considerable discussion around the issue and resistance from consumer groups, who see prepayment meters as penalising the poor. So far prepayment meters have only been introduced in Tasmania, South Australia.
- 7.72 Prepayment meters are also used in the Northern Territory (mainly in Aboriginal communities) and South Australia, although absolute numbers are much smaller than in Tasmania. Prepayment meters are not used in other parts of Australia. Aurora Energy is the Tasmanian Government-owned electricity distribution and retail company operating in that area. It was the first utility in Australia to introduce prepayment metering and now has more than 20% of the Tasmania's residential Customers using prepayment meters.
- 7.73 The company operates the pre-payment meter tariff system; Aurora Pay As You Go (APAYG). This system, introduced as a trial in 1995 was opened up to general use in 1997 and had remained unregulated. In May 2005, however, South Australia's services regulator, the Essential Services Commission (ESCOSA), released a draft code of practice for a prepayment metering system. The move to investigate the PPM system was prompted by the fact that the adoption rate had been so high and that the pricing structure differed so markedly from the standard tariff that it was not possible to easily compare the two. Aurora has also introduced an APAYG 'Progress Rate' that allows consumers with PPMs to pay off outstanding debts through an increased per kilowatt-hour charge.

## Key issues for prepayment in other Countries

- 7.74 There are three key factors that have limited the attractiveness of prepayment as a payment method in the different parts of the world and have raised concerns amongst consumer groups. These are:
- (a) the higher prices paid by pre-payment meter customers (as applicable in some countries);
  - (b) the inconvenience of having to add credit; and
  - (c) The risk of auto-disconnection either due to lack of money or difficulties in adding credit.
- 7.75 These factors have led to gas and electricity prepayment being seen as a payment method of last resort for people who have got into debt or have difficulties in budgeting. As a result, prepayment has become stigmatized and indeed, is strongly opposed by consumer groups, regulators and politicians in many countries.

### Prepayment prices

- 7.76 The higher prices for prepayment in several countries are due to the fact that the current separate prepayment meters cost more than credit meters and have higher servicing costs. Other extra costs include the infrastructure needed to support the payment processes and the charges made by vendors like Paypoint/Payzone (to the electricity and gas suppliers) for handling payments through their payment network and terminals. Importantly, these extra costs are only partially offset by the cash flow advantages to energy suppliers and the elimination of debt. For every prepayment customer that wishes to switch, energy suppliers need to check whether they have a debt which represents another cost.
- 7.77 Another factor in the higher prices for prepayment customers is the state of competition in this sector of the market. Prepayment meter customers are less likely to switch supplier, partly because there have been fewer good deals for them to switch to (compared to customers who pay by direct debit or online). This relative lack of effective competition has tended to limit innovation and cost reduction for prepayment. Despite reductions in the differentials and the introduction of new license conditions consumer groups still have concerns that prepayment meter customers are being charged more than the costs to serve their payment method.

### Adding credit to prepayment meters

- 7.78 Compared to pre-pay mobile phones (where credit can be topped up from the phone itself, over the internet, at ATMs, supermarket checkouts etc.), topping up credit for a gas or electricity prepayment meter is not as convenient. To add credit to a prepayment meter customers have to visit a charging point (most commonly a Paypoint or Payzone outlet in a shop), hand over their card or key and the cash they wish to add and then insert the re-charged card/key/enter the vend code into the meter to add the credit when they return home. While such outlets have become much more numerous in a few countries (like South Africa and UK) in the recent years the need to go out to add credit does cause some problems of inconvenience.

### Auto-disconnection of PPM

- 7.79 Pre-payment mechanism has gained significant acceptance in the consumer base in UK. Prepayment meters are popular with users largely because of the budgeting control which such meters give them – they cannot get into debt once they have a prepayment meter. In a large scale survey of

prepayment meter users in UK, 85% preferred this method of payment, even though most realized that it was more expensive than alternatives. Even when pressed, half of prepayment meter users could cite no disadvantages. For those who could find disadvantages, the possibility of auto-disconnection was the predominant drawback cited. Only 6% of those who had considered switching to direct debit had rejected it because they had no bank account. Preference for prepayment meters was particularly high among the very low income households. Prepayment meters in effect help low income households to budget for their fuel and avoid the anxiety of bills and debt - this benefit outweighs the disadvantages. However, very few households with middle or higher incomes currently choose to pay by this method in UK (in contrast with Northern Ireland where the numbers of better off households using the keypad meters has been growing) because of the inconvenience, possibility of auto-disconnection and higher tariffs.

## International approaches to consumer protection for prepayment customers

7.80 In countries other than UK where prepayment meter system in power distribution exists, there are different approaches for consumer protection for prepayment meter customers, including ways of minimizing auto-disconnection; e.g. In Northern Ireland, households cannot auto-disconnect between 4 PM and 8 AM or at weekends. Other country experiences are as follows.

### Tasmania

7.81 Decisions on whether to allow pre-payment metering are made at individual state level in Australia. Only Tasmania makes significant use of prepayment meters for electricity- it has had them since 1995 and about 22% (47,000) of customers in Tasmania currently pay for electricity in this way. There is no usage of prepayment meters for gas.

7.82 The electricity retailer in Tasmania is Aurora, which uses two types of meters: the Siemens PAY AS YOU GO Meter and the ACTARIS Talexus Pay Guard. Both use a Smart Card to add credit to the meter. The pre-paid electricity meter displays what credit is left and which electricity rate applies, based on the time of year and time of use during the day. As there has been considerable opposition to use of prepayment meters from consumer and welfare groups, the codes of practice established by the regulators have built in a number of customer protection standards to alleviate the concerns.

7.83 A 'prepayment meter code' was introduced in Tasmania in May 2007 as part of the Tasmanian Electricity Code. This code makes some distinctions between new and existing prepayment meters in respect of some of the conditions. New prepayment meters are defined in the TEC Glossary as, 'A prepayment meter installed or to be installed, or existing prepayment meter equipment reconditioned, on or after 1 January 2008'. The newer meters are the ACTARIS Talexus Pay Guard meters. The code has a number of very detailed provisions that include :

- (a) New prepayment meters cannot disconnect the customer between the hours of 2:00pm and 8:00am. Older prepayment meters cannot disconnect the customer between 8:00 pm and 8:00 am. In addition all prepayment meters must provide an amount of emergency credit (i.e. which can be used at any time of the day including in the daytime when auto-disconnection is allowed) of not less than \$10. This amount is reviewed by the Regulator every two years to ensure that emergency credit is maintained at a level equivalent to the average cost of three to five days' electricity supply.
- (b) All new prepayment meters must be capable of identifying to the Electricity Retailer every instance on which the Customer supplied under a prepayment meter agreement was auto-

disconnected and the duration of that auto-disconnection. For new prepayment meters the Retailer is required to contact any customer who has auto-disconnected three or more times, for at least 240 minutes on each occasion, in a three month period. The Retailer is required to offer advice on whether alternative payment methods would suit them better, provide advice on Government assistance and (if the customer consents) make a direct referral to sources of Government assistance.

- (c) A customer display has to be provided with all prepayment meters. This has to show current consumption information (in kWh and dollars); the number of electricity units consumed in total and at each rate; the standing charge including any pre-agreed 'progress rate' (debt recovery) amount; when emergency credit becomes available; the remaining credit available or amount of emergency credit used; whether the meter is operating in normal credit or emergency credit mode etc.
- (d) Where a customer has used emergency credit, no more than seventy percent of the next top-up made to the prepayment meter account may be directed towards repaying the debit. The remainder of the payment must be directed towards recommencing electricity supply to the customer.

7.84 Through the above notified measures, the Tasmanian regulatory body has tried to protect the interests of the consumers. The proactive regulatory which is making efforts to protect the utility consumers is also one of the reasons for the increasing popularity of the pre-payment system in the state of Tasmania.

## South Australia

7.85 Prepayment meters for electricity have been allowed in South Australia since 2006, but to date the adoption rate has been limited. The South Australian customer code of conduct does not permit a prepayment meter system to disconnect supply to a customer other than between the hours of 10:00am and 3:00pm on a weekday. The South Australian code also requires that a retailer's prepayment meter system should be capable of identifying to the retailer every instance on which a small customer was auto -disconnected and the duration of that disconnection.

## Argentina

7.86 In Argentina some companies have adopted a metering technology that allows for either "conventional" prepayment or the "Fixed Invoice" with the option of purchasing additional electricity. The Fixed Invoice option provides a limited quantity of either free electricity for households eligible for the Government subsidized social tariff or for a fixed amount of recharge for other consumers. In both the cases the consumers have the option of additional recharge in case the originally recharged credit gets exhausted before the expiry of the month. The fixed invoice approach has been likened to a "faucet dripping small quantities of electricity into the meter." The "drip" operates every 15 seconds making a credit of 0.0008 kwh (cumulatively being 0.2 kwh/hour and 5 kwh per day). The "drip" approach prevents the customer from using all of the allotment too quickly, e.g., by inadvertently running a high consumption appliance, and is like a load limiter with a prepaid override option. The system includes a separate customer display (located at a location inside the premises as preferred by the customer), which shows the current electricity supply/demand balance and the cumulative credit. There is also an audible alarm warning of low credit. Customers with this system typically use 132 kwh per month compared to 210 kwh per month usage by low income customers without prepay.

## Flanders, Belgium

- 7.87 Every household in the Flanders region in Belgium annually receives a free amount of electricity- 100 kWh per household, plus a further 100 kWh per family member. Senior citizens and disabled people receive the first 500 kWh free as part of a social tariff provision. Electricity suppliers have no obligation to maintain supply to customers who cannot or do not pay their bills. Instead, the Flemish government has placed social obligations on the distribution network operators (DNOs), requiring them to serve customers in their area who are unable to stay with their existing supplier or find a new one willing to take them on.
- 7.88 Eandis - the DNO for about 2.45 million electricity customers and 1.45 million gas customers in the Flanders region - is one such social supplier. Eandis installs a prepayment meter, operated with a budget meter card, for each customer it takes on in this way. Credit can be loaded at Eandis customer centres and at the municipal social service department. When the customer has consumed the free electricity and has also run out of credit that they have added, (including the emergency credit), a minimal supply of electricity is still delivered, so households cannot completely auto-disconnect. Eandis started to provide a similar service with gas prepayment meters in June 2009.

## South Africa

- 7.89 South Africa also provides some free electricity for eligible households. 50 kWh per month are provided free to poor customers. The 50kWh is based on what is assumed to be needed for basic lighting, small black and white TV, small radio, basic ironing and basic water boiling through an electric kettle for grid-connected consumers. For pre-paid meters, households receive a non-interchangeable voucher or token each month loaded with the free basic units. When the free units have been used up, the consumer needs to buy additional units at the prevailing rates. The voucher is valid for one month only, and units do not accumulate to the next month. This way the utility/supplier is forced to supply at-least the minimum quantum of electricity to the poor households thereby protecting the interests of the consumers.

## Key Issues in Prepayment Implementation in India vis-à-vis International approaches

- 7.90 Some of the key issues related to large scale implementation of pre-paid meter in India which need further deliberation are as follows:
- (a) the effect of FAC/ Retrospective Change in Tariff;
  - (b) tariff structure for PPM;
  - (c) collection of duty and cess;
  - (d) frequency of meter reading for PPM;
  - (e) Billing for burnt meter cases/ method for assessment of credit available, and
  - (f) the vending infrastructure for PPM consumers;
- 7.91 We have interacted with the regulators and retailers of UK and South Africa to understand their experience on the above sited issues. The table below describes the practice adopted by UK and South Africa utility in detail.

| Key Issues in PPM Implementation              | UK, Southern Electric  | ESCOM, South Africa   |
|---|--|---|
|   | Regulator: Office of Gas and Electricity Markets (OFGEM)   | Regulator: National Energy Regulator of South Africa (NERSA)  |
| Effect of FAC/ Retrospective Change in Tariff | <ul style="list-style-type: none"> <li>Price changes are not frequent, there are options for consumers to avail fixed tariffs for long periods (3 years);</li> <li>There is no retrospective change in the electricity prices;</li> <li>Utility takes hit of any charging at old rates until the tariff change is configured in the prepayment meters;</li> <li>The utilities pass on changes in tariffs for pre-payment consumer via the key/vend code/smart card through which credit would be charged to the consumer meter;</li> </ul> | <ul style="list-style-type: none"> <li>NERSA approves prices for Eskom for a period of three (3) year based on a Rate of Return methodology. This mechanism for tariff determination is referred to as the Multi-Year Price Determination (MYPD). The MYPD methodology has a mechanism referred to as the Regulatory Clearing Account (RCA) which allows for all under and over recoveries of costs (inclusive of variations to fuel costs) to be “banked” into this account;</li> <li>At the end of the financial year (after receipt of actual results), if the balance in the RCA exceeds a certain threshold level as stipulated in the methodology, then adjustments are made to the revenues to be recovered in the next financial year. The adjusted revenues are then collected from all customers (not specifically prepaid metered customers). This therefore means that there is a retrospective adjustment made to the allowable revenue but this is factored in to the prices going forward. The customer price is never altered retrospectively;</li> </ul> |
| Credit availability with PPM consumer         | <ul style="list-style-type: none"> <li>There is a limit of £100 credit that a consumer can purchase.</li> </ul>  | <ul style="list-style-type: none"> <li>There are no limits for the units of electricity that can be purchased by prepaid metered customers. If the customer purchases additional units in a month prior to the increase in tariffs – then it remains to the benefit of the customer (this has been an issue reported in South Africa- were customers purchase additional units a month before the price increase is effective). However, with the next purchase the customer will see the effective price increase. It must be noted that with the introduction of the IBTs (Inclining Block Tariff, equivalent to the telescopic tariff applicable in several states in India), it will not be beneficial to the customer to purchase additional electricity units as this will shift them into the higher consumption blocks which have higher rates associated with them. The IBT therefore has a signal to promote a change in customer behaviour (on an IBT customers should ideally purchase only units that is required for consumption in a month).</li> </ul>    |

| Key Issues in PPM Implementation | UK, Southern Electric   | ESCOM, South Africa   |
|----------------------------------|---|---|
|                                  | Regulator: Office of Gas and Electricity Markets (OFGEM)  | Regulator: National Energy Regulator of South Africa (NERSA)  |
| Tariff Structure                 | <ul style="list-style-type: none"> <li>Separate tariff rates for pay as you go (pre-payment) meters notified;</li> <li>Single part tariff structure for prepayment meters;</li> <li>The tariff structures for prepayment metered consumers are based on per KW energy used, plus any debt that might be outstanding with the PPM consumers;</li> </ul>  | <ul style="list-style-type: none"> <li>Prior to 2010-11 the tariff structure applicable to prepayment metered customers was a single energy rate tariff (cent/kWh). Some licensees however opted for a two part tariff structure (made up of the fixed/ basic charge (Rand/month) and energy charge (cent/kWh)). In the financial year 2010-11, NERSA introduced the telescopic Inclining Block Tariff (IBT) structure. The telescopic IBT structure allows for consumers to get the first block at a lower price with large customers seeing a higher price in the higher consumption blocks. The IBT was introduced as a measure for protection of low income customers against high electricity prices.</li> </ul> |
| Duty/ Cess etc.                  | <ul style="list-style-type: none"> <li>Five per cent (5%) Value added tax is applicable on all electricity and gas bills;</li> <li>Since same rate of VAT is applicable both on energy charge as well as daily standing charge/ fixed charge pre-paid consumers, who are billed on single part tariff structure are not differentiated in terms of VAT applicability with other consumer being billed on two part tariff system. Moreover single part tariff make it simpler for deduction/ adjustment of VAT in prepayment connections.</li> </ul>   | <ul style="list-style-type: none"> <li>Currently an environmental levy charge to recover the environmental costs attributable to electricity sales (generation) is payable by utilities to government. This levy is allowed through the price determination exercise and recovered from all customers and is payable by the utility to government. These costs are therefore ring-fenced.</li> </ul>  |
| Meter Reading                    | <ul style="list-style-type: none"> <li>Magnetic/ Card based prepayment metering ensures two way communication;</li> <li>Meter reading even for normal connections is done on a six monthly basis. Reading of prepayment meters thus is not a problem as in the case of India;</li> <li>Meter reading is in the same way that it would obtain readings of a non-prepayment meter, Ofgem places an obligation on the companies to inspect meters at least once every two years with regards to safety. As yet there is no widespread capability to obtain the information via wireless technology;</li> </ul> | <ul style="list-style-type: none"> <li>There is no reading of meters with regards to prepayment meters. This is due to the fact that the customer purchases units from its vendor and pays for these units upfront. These units are then loaded onto the prepaid meter system at the customer's residence. Where there has been meter tampering the meters are now split. The customer portion in the dwelling communicates with the actual meter in a secure remotely located box which makes it very difficult to bypass the meter.</li> </ul>  |

| Key Issues in PPM Implementation   | UK, Southern Electric  | ESCOM, South Africa  |
|--|--|--|
|  | Regulator: Office of Gas and Electricity Markets (OFGEM)   | Regulator: National Energy Regulator of South Africa (NERSA)   |
| Billing for burnt meter cases/ method for assessment of credit available | <ul style="list-style-type: none"> <li>The companies rely on records obtained from when the key was last charged.</li> </ul>   | <ul style="list-style-type: none"> <li>Since meter reading is not regularly followed as a practice, the assessment is done on the basis of the recharge pattern of consumers.</li> </ul>   |
| Responsibility for prepayment metering                                   | <ul style="list-style-type: none"> <li>The utility undertakes is responsible for prepayment metering program. All consumer intending to adopt the same are required to file an application with the utility and the same gets processed as per defined procedures.</li> </ul>  | <ul style="list-style-type: none"> <li>As per the current system, the utility provides only a single pre-payment type meter at a single premises. However, in case a consumer intends to opt for pre-paid meters for tenants or for other purposes, the same can be purchased and got installed by the consumer at his own cost.</li> <li>In strict terms, the responsibility of pre-payment metering rests with Eskom but it is offering a lot of flexibility to consumers to promote the same.</li> </ul>  |
| Issuance of bills  | <ul style="list-style-type: none"> <li>An annual statement of billing is issued to every pay as you go consumer. These are meant for information and record only.</li> </ul>   | <ul style="list-style-type: none"> <li>In case of Eskom, billing is done only for consumers who have regular post-paid connections. For pre-paid consumers, the consumers are issued a plastic card with the Eskom logo embossed on it. The card is a proof of being a customer of Eskom and is required to be furnished during recharges. However, it is to be noted that pre-payment consumers are not issued any bills.</li> </ul>  |
| Vending  | <ul style="list-style-type: none"> <li>There are over 22,000 Pay Point (Collection Agent for Utility Bills) outlets across the UK, all located in local newsagents, convenience stores and forecourts, carefully selected for their long opening hours and friendly service;</li> <li>Consumers also have the option of purchasing the credit for the pre-payment meters at all the post offices.</li> </ul> | <ul style="list-style-type: none"> <li>Eskom has established a wide network of vending infrastructure through several service providers operating in South Africa. The utility offers vending options through vending outlets, ATMs, retailers, internet vending options, mobile vending, scratch-card (similar to scratch card for mobile phone recharges in India) and other third party vendors.</li> <li>Owing to the widespread infuse of vending infrastructure each and every consumer has access to vending options in one form or the other.</li> </ul> |



## 8 Suggested Amendments in existing Regulatory provisions

8.1 As part of the state practice review on pre-paid metering, the supply Code and Standard of performance regulation for the state of Maharashtra, West Bengal, Delhi and Gujarat have also been reviewed in the context of their suitability to the prepaid metering. Since the pre-paid metering system is aimed towards improving utility revenue management system, a policy and regulatory level back-up is necessary for mass level implementation of pre-paid system. Accordingly, the table below shows the suggested amendments in the existing policy and regulation in the state of Maharashtra, West Bengal, Delhi and Gujarat for smooth implementation of prepaid metering in the respective States.

**Table 11: Suggested amendments in the Policy and Regulations**

| Sl.  | Clause No. and provision under the Regulation/<br>Order   | Remarks   |
|--|---|---|
| <b>A. Maharashtra Electricity Regulatory Commission (Electricity Supply Code and Other Conditions of Supply) Regulations, 2005</b> |   |   |
| 1.   | <p><b>Definition of Meter:</b></p> <p>“<b>Meter</b>” means a set of integrating instruments used to measure, and / or record and store the amount of electrical energy supplied or the quantity of electrical energy contained in the supply, in a given time, which include whole current meter and metering equipment, such as current transformer, capacitor voltage transformer or potential or voltage transformer with necessary wiring and accessories and also includes pre-payment meters;</p> | <p>Defining “Meter” in a way to include pre-paid technology as in case of MERC (Electricity Supply Code and Other Conditions of Supply) Regulations, 2005 gives more clarity in implementing the same.</p> <p>Accordingly, it is suggested that the followed may be added to the said definition: “Such meters may include pre-paid meters and associated in-home display/ key pad unit”.</p> |
| 2.   | <p><b>Security Deposit</b></p> <p>Clause: 11.7 Where a consumer who has deposited security subsequently opts to receive supply through a prepayment meter, the amount of such security deposit shall, after deduction of all monies owing from such consumer, be either refunded to such consumer or treated as a part of the value of the prepayment credit to the account of such consumer, from which the value of his future</p>  | <p>In case of New connection with prepaid meter, it needs to be explicitly mentioned that there is no need of security deposit for new connections with pre-paid meters as per Section 47(5) of the Electricity Act 2003.</p> <p>For existing consumers shifting to prepaid, the security deposit should be adjusted in the energy charge and/ or arrear of the consumer, if any.</p>         |

| Sl. | Clause No. and provision under the Regulation/<br>Order   | Remarks  |
|-----|---|--|
|     | consumption is to be deducted.  |  |
| 3.  | <p><b>Supply and Cost of Meter</b></p> <p>Clause 14.1.3: Consumers may elect to purchase a meter from the Distribution Licensee or from any supplier of correct meters in accordance with specifications laid down by the Authority in the regulations made under Section 55 of the Act:</p> <p>Provided that till the regulations are specified by the Authority under Section 55 of the Act, consumers may purchase the meter in accordance with specifications laid down by the Distribution Licensee:</p> | <p>In the case when diverse consumer group opt for pre-paid meter, the Authority (Central Electricity Authority) and/or the state Commission should come out with specific regulation/ guidelines on pre-paid metering.</p>  |
| 4.  | <p><b>Reading of Meter</b></p> <p>Clause 14.3: Meter readings shall be undertaken by the Authorised Representative at least once in every three months in the case of agricultural consumers, and at least once in every two months in the case of all other consumers, unless otherwise specifically approved by the Commission for any consumer or class of consumers.</p>  | <p>As per the Regulation, meter readings of all consumers including pre-paid are required to be carried-out at regular interval; it also ensure better assessment of consumption in case of faulty/ burnt meter.</p> <p>Also for carrying out energy accounting meter reading at regular interval is necessary.</p> <p>Accordingly, the Regulation needs to explicitly mention the meter reading interval for pre-paid consumers. A suitable timeframe of a quarterly or bi-annual meter reading may be prescribed for prepaid connections, as felt appropriate by the Commission.</p> |
| 5.  | <p><b>Billing - Intervals for Billing and Presentation of Bill</b></p> <p>Clause 15.1.1: Except where the consumer receives supply through a pre-payment meter, the Distribution Licensee shall issue bills to the consumer at intervals of at least once in every two months in respect of consumers in town and cities and at least once in every three months in respect of all other consumers, unless otherwise specifically approved by the Commission for any consumer or class of consumers.</p>      | <p>Regulation mentioned that regular billing cycle doesn't apply in the case of prepaid meters.</p>  |
| 6.  | <p><b>Advance Payment</b></p>   |  |

| Sl.  | Clause No. and provision under the Regulation/<br>Order   | Remarks  |
|--|---|--|
|  | <p>Clause 15.6.3: The Distribution Licensee shall pay interest on the amount deposited by a consumer at a rate equivalent to the bank rate of the Reserve Bank of India.</p>  | <p>In connection with Clause 15.6.3 related to advance payment, it may be noted that the consumer recharge voucher may also be considered as payment in advance.</p> <p>Accordingly, to avoid any misinterpretation of the said provision under this regulation, it should be explicitly mentioned that the said clause is applicable only for post payment connections and shall not apply for prepaid connections.</p> |
| <p><b>B. West Bengal Electricity Regulatory Commission (Electricity Supply Code) Regulations, 2007</b></p> |   |  |
| <p><b>1.</b></p>   | <p><b>Access to premises of consumers:</b></p> <p>Access for delivery of bills etc, reading of meters, testing or repairing or altering the electric supply lines, meters, fillings, works, validation check for pre-paid meters etc.:</p> <p>Clause 8.1.1: The employees of a licensee or anyone acting on behalf of the licensee shall have access to the premises of a consumer at any reasonable time for the purposes of delivery of bills etc., reading of meters, validation reading for pre-paid meters, testing or repairing or altering the electric supply lines, meters, fittings, works and apparatus for the supply of electricity belonging to the licensee, disconnection of supply for any reason in accordance with the provisions of the Act or Regulations or Rules or orders of any competent authority, restoration of supply, removal and / or replacement of electric lines, meters, fittings, works or apparatus etc. belonging to the licensee, installation and / or maintenance of electric lines, meters, fittings, works or apparatus etc. belonging to the licensee.</p> | <p>Accordingly, the Regulation needs to explicitly mention the meter reading interval for pre-paid consumers. A suitable timeframe of a quarterly or bi-annual meter reading may be prescribed for prepaid connections, as felt appropriate by the Commission, depending upon connected load/ consumer category etc.</p>   |
| <p><b>2.</b></p>   | <p><b>Payment of the bills:</b></p> <p>Clause 3.3.8: If a consumer, for his convenience, wishes to deposit advance against energy to be supplied to him, he shall request the licensee for an advance bill, which shall not be less than the amount representing twelve months' consumption of the consumer on average basis. The advance</p>   | <p>In connection with Clause 3.3.8 related to advance payment, it may be noted that the consumer recharge voucher may also be considered as payment in advance.</p> <p>Accordingly, to avoid any misinterpretation of the said</p>   |

| Sl.              | Clause No. and provision under the Regulation/<br>Order   | Remarks   |
|------------------|---|---|
|                  | <p>amount paid by such a consumer shall be adjusted, under intimation to the consumer, with the actuals payable by him every month or quarter, as the case may be, against bills on the basis of actual consumption. <b><i>For such advance, the licensee shall provide interest at the rate atleast equal to the interest on security deposit for energy consumption. This accrued interest may continue to be used also for payment of bill.</i></b> If the consumer wishes to continue with such a system of payment, he shall recoup the advance at least three months before the period by which amount of advance is likely to be exhausted. Further, if there is any surplus after the last installment on the basis of actuals is paid, and if the consumer does not wish to continue with such a system of payment, the surplus should be either refunded to him in cash or adjusted with future bill(s).</p>  | <p>provision under this regulation, it should be explicitly mentioned that the said clause is applicable only for post payment connections and shall not apply for prepaid connections.</p>   |
| <p><b>3.</b></p> | <p><b>Notes Annexure – C2</b></p> <p>(x) Notwithstanding anything to the contrary contained in any other regulation of the Commission, in case of non-availability of pre-paid meter, the consumer applying under applicable tariff scheme or under optional tariff scheme shall be provided with the non-pre-paid meter but for such consumer the tariff shall be at the rate of pre-paid tariff scheme on the basis of post consumption payment basis as applicable for that class of consumers. If such pre-paid meter scheme is of TOD type then the non-prepaid meter with TOD – scheme will be first preferred and only on non-availability of non-pre-paid meter with TOD-scheme normal meter may be used when tariff will be the rate of normal hours of the pre-paid TOD-Scheme. This arrangement may be continued up to two years from the date of application for such pre-paid meter by the said consumer so that by that time the consumer shall have to be provided with the pre-paid meter. On completion of the specified two years if such pre-paid meter is not installed at the premises of the consumer then the distribution licensee will not be able to raise any bill in respect of the consumer till such time the pre-paid meter is installed and any losses incurred by the distribution</p> | <p>As per clause 3.12.7 of the Regulation, it is implied that the meter should be provided by the Licensee.</p> <p>In order to promote the pre-paid metering, in case if the Licensee is not able to provide the meter, the consumer may also be allowed to purchase the pre-paid meter in accordance with specifications laid down by the Distribution Licensee.</p> |

| Sl.  | Clause No. and provision under the Regulation/<br>Order   | Remarks  |
|--|---|--|
|  | licensee after the said two years on this account shall not be allowed to be recovered through tariff.  |  |
| <b>C. DERC Supply Code and Performance Standards Regulations, 2007</b> |   |  |
| 1.   | <p><b>Electricity Connection in Electrified Colonies/Areas</b></p> <p>Clause 16 (ix): The Licensee shall issue the first bill within two billing cycles of energising the connection. In case, the consumer does not receive the first bill within two billing cycles from the date of energizing of the connection, he shall complain, in writing, to the Business Manager of the concerned District Office of the Licensee and the Licensee shall issue the bill within next fourteen days. In, any case, if a bill is not raised within four billing cycles from the date of energizing the connection, the Licensee shall pay compensation as specified in Schedule III of the Regulations.</p> | <p>This clause is applicable only for post payment type electricity connections. Accordingly, the same may be explicitly mentioned in the said clause to avoid any misinterpretation.</p> <p>However, in case there is an applicable claim on retrospective basis, such as to claim against FCA, tax on sale of electricity etc. the regulation should mandate the Licensee to issue bills to the consumers at a pre-define interval preferably on quarterly basis.</p>                                      |
| 2.   | <p><b>Security Deposit</b></p> <p>Clause 29: All new consumers shall pay security at a pre-defined rate.</p>  | <p>In case of New connection with prepaid meter, it needs to be explicitly mentioned that there is no need of security deposit for new connections with pre-paid meters as per Section 47(5) of the Electricity Act 2003.</p> <p>For existing consumers, transitioning to prepaid metering, the security deposit should be adjusted in the energy charge and/ or arrear of the consumer, if any.</p>   |
| 3.   | <p><b>General</b></p> <p>Clause 41 (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.</p>   | <p>As per the Clause 41 (ii) of the Regulation, the licensee shall raise the bill for every billing cycle based on actual meter readings of all the consumers.</p> <p>However in case of pre-paid, although meter reading may be carried out as per need, but the same may be carried out at a pre-decided interval preferable at the end of each quarter/ bi-annually to ensure better assessment of consumption in case of faulty/ burnt pre-paid meter, as may be felt appropriate by the Commission.</p> |

| Sl.              | Clause No. and provision under the Regulation/<br>Order  | Remarks  |
|------------------|--|--|
|                  | <p>Clause 41 (iii): Delivery of each bill to the consumer shall be effected at least fifteen days before the due date for payment of the bill.</p>   | <p>Accordingly, the Regulation needs to explicitly mention the meter reading interval for pre-paid consumers.</p>  |
| <p><b>4.</b></p> | <p><b>Arrears appearing in bills</b></p>   | <p>If a consumer with past arrear in his account opts for pre-paid meter, he must clear all the due before shifting from post-paid meter to pre-paid meter.</p> <p>However, the Distribution Licensee may, at its discretion, in the case of connections pertaining to the State Government Departments, allow the licensee to freeze the arrears as on the date of such conversion to prepaid metering. Such arrears may be recovered through adjustment of a certain percentage, as may be decided by the licensee, of every prospective amount of prepaid credit purchased by such consumer. However, such facility of freezing of arrears shall not in any manner cease the rights of the licensee to charge delayed payment surcharge and/ or resort to disconnection of supply, if such outstanding arrears are not paid for by the consumer post conversion to prepaid connection.</p> <p>The Supply Code may explicitly specify appropriate provisions for the above for post payment type connections getting converted to prepaid.</p> |
| <p><b>5.</b></p> | <p><b>Advance payment of anticipated bills by consumer</b></p> <p>Clause 48 (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.</p> <p>Clause 48 (ii): The minimum amount to be paid is Rs. 5000/- and multiples of Rs.1000/-thereafter or six</p> | <p>In connection with Clause 48(i) related to advance payment, it may be noted that the consumer recharge voucher may also be considered as payment in advance.</p> <p>Accordingly, to avoid any misinterpretation of the said provision under this regulation, it should be explicitly mentioned that the said clause is applicable only for post payment connections and shall not apply for prepaid connections.</p> <p>There should be separate provision in the regulation in the case of prepaid meters enabling consumers to recharge by any amount.</p>  |

| Sl.  | Clause No. and provision under the Regulation/<br>Order  | Remarks   |
|--|--|---|
|  | <p>month billing of the consumer, whichever is higher.</p> <p>Clause 48 (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.</p>   |   |
| <b>D. Gujarat Electricity Regulatory Commission (GERC) (Security Deposit) Regulations 2005</b>                     |  |   |
| <p>1.</p>  | <p><b>Security Deposit for the electricity supplied / to be supplied</b></p> <p>Clause 4.1: The LT consumers shall at all times maintain with the licensee an amount equivalent to Consumption Charges of three months where bi-monthly billing cycle is applicable or to such charges of two months in the case of monthly billing cycle, as the case may be, as security against any default in payment towards the electricity supplied / to be supplied to him during the period, the agreement for supply of energy is in force:</p> <p>Provided that as and when the bi-monthly cycle is replaced with monthly billing cycle, the licensee shall refund the excess amount if any, over the two months charges estimated at prevailing tariff rate by adjustment against the existing dues or those becoming due immediately thereafter.</p> <p>Clause 4.2 The HT consumers shall at all times maintain with the licensee an amount equivalent to Consumption Charges of one and half months as security towards the electricity supplied / to be supplied, against any default in payment during the period the agreement for supply of electricity is in force.</p> | <p>In case of New connection with prepaid meter, it needs to be explicitly mentioned that there is no need of security deposit for new connections with pre-paid meters as per Section 47(5) of the Electricity Act 2003.</p> <p>For existing consumers, the security deposit should be adjusted in the energy charge and/ or arrear of the consumer, if any.</p> |
| <b>E. Gujarat Electricity Regulatory Commission (GERC) Electricity Supply Code and Related Matters Regulations</b> |  |   |
| <p>1.</p>  | <p><b>Definition of Meter</b></p> <p>The meter that records the active and/or reactive energy and demand and any other specified parameters of electricity. In the event any CT/PT or any such devices constituting an integral part of the measuring are located externally, they too shall be</p>  | <p>Defining "Meter" in a way to include pre-paid technology would give more clarity in implementing the pre-paid metering in the state.</p> <p>Accordingly, it is suggested that the followed may be added to the said definition: <i>"Such meters may include pre-paid meters and associated in-home display/ key</i></p>  |

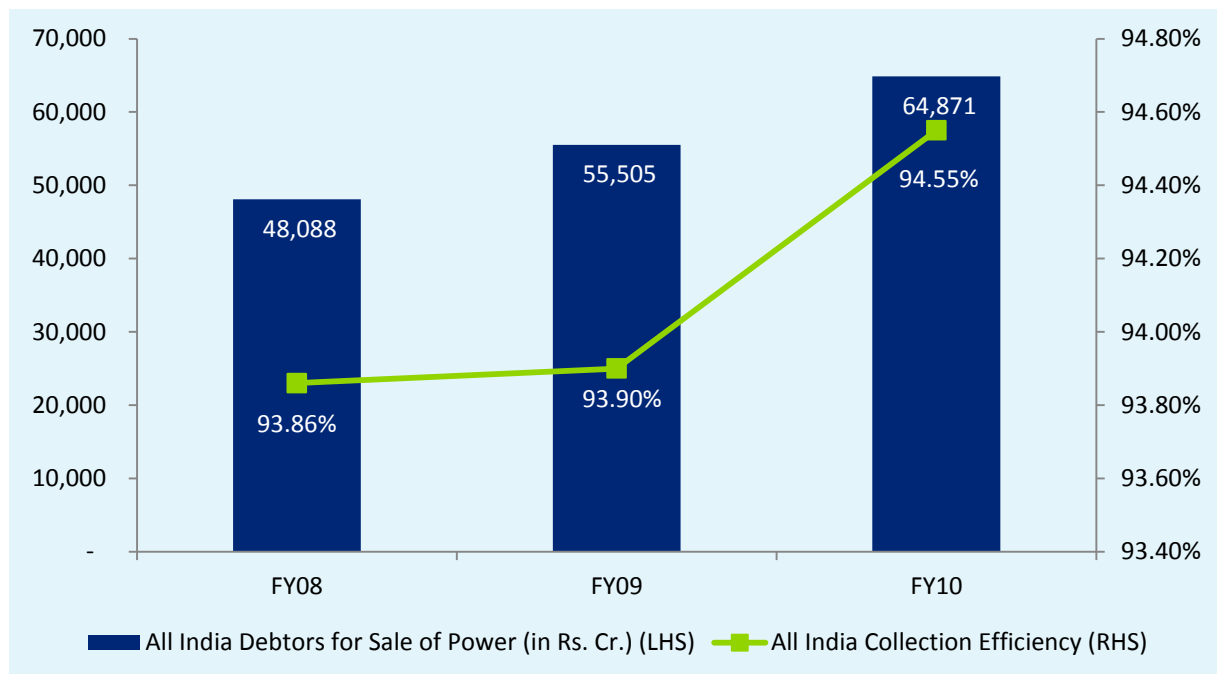
| Sl. | Clause No. and provision under the Regulation/<br>Order  | Remarks  |
|-----|--|--|
|     | deemed to be meter.  | <i>pad unit</i> ”.   |
| 2.  | <p><b>Metering and power supply charges (bills) meters:</b></p> <p>Clause 6.1.1: The Distribution Licensee shall comply with the regulations as may be formulated by Central Electricity Authority under the Electricity Act, 2003 with regard to metering of supply. In such a case, the Distribution 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 opts to purchase a meter. In case of any difficulty in immediately complying with such Regulations formulated by Central Electricity Authority, the GERC 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</p> | <p>In case of New connection with prepaid meter, it needs to be explicitly mentioned that there is no need of security deposit for new connections with pre-paid meters as per Section 47(5) of the Electricity Act 2003. Also, for existing consumers, the security deposit should be adjusted in the energy charge of the succeeding month.</p> <p>In the case when diverse consumer group opt for pre-paid metering, the Authority (Central Electricity Authority) and/or the state Commission should come out with specific regulation/ guidelines on pre-paid metering.</p>   |
| 3.  | <p><b>Payment of Bills</b></p> <p>Clause 6.4.5: Any payment made by the Consumer shall be adjusted towards the arrears including delayed payment interest charges, if any outstanding against his account and no prompt payment discount shall be admissible in respect of the current monthly bill so long as any amounts against past dues remain outstanding against the consumer. The notice for payment of arrears may be incorporated in the bill itself or may be served separately.</p>  | <p>If a consumer with past arrear in his account opts for pre-paid meter, he must clear all the due before shifting from post-paid meter to pre-paid meter.</p> <p>However, the Distribution Licensee may, at its discretion, in the case of connections pertaining to the State Government Departments, allow the licensee to freeze the arrears as on the date of such conversion to prepaid metering. Such arrears may be recovered through adjustment of a certain percentage, as may be decided by the licensee, of every prospective amount of prepaid credit purchased by such consumer. However, such facility of freezing of arrears shall not in any manner cease the rights of the licensee to charge delayed payment surcharge and/ or resort to disconnection of supply, if such outstanding arrears are not paid for by the consumer post conversion to prepaid connection.</p> <p>The Supply Code may explicitly specify appropriate provisions for the above for post payment type connections getting converted to prepaid.</p> |



## 9 Recommendations and way forward

9.1 The outstanding arrears of the utilities selling power directly to consumers has been increasing over years due to the poor collection efficiencies. As on FY 2010 the outstanding arrears for sale of power by the utilities/ licensees had already reached over Rs.64,871 crores which is equivalent to 109 days. The chart below outlines the worsening position of outstanding debtors at the national level over the period FY08 to FY10.

Figure 11: All Debtors for Sale of Power and Collection Efficiency



9.2 In view of the above and as demonstrated in the Cost Benefit Analysis section, earlier in this report, it is clear that prepaid metering offers significant commercial benefits over the conventional post-paid regime and shall be of key significance in addressing the issue of poor collection efficiency and outstanding debtors against sale of power at its root.

9.3 Moreover, the extent of benefits that may be realized through implementation of prepaid metering is directly proportional to the payment cycle of the consumers where it is implemented. In view, of the same it would be pertinent for SERCs/ Licensees to identify such consumers/ consumer groups where implementation of prepaid metering could yield significant commercial benefits for the licensee. Sorting out LT consumers (with a load of 45 kW or below) based on the outstanding arrears (in Days) would be an appropriate mechanism to identify such consumer/ consumer groups where prepaid metering would yield the best results.

## Promotion of effective usage of prepayment metering

- 9.4 It is suggested that the Forum of Regulators may recommend deployment/ implementation of prepayment metering roadmap to be adopted/ mandated by various State Electricity Regulatory Commissions to the respective distribution utilities in the country.
- 9.5 In view of the benefits already achieved by the utilities that have undertaken pilot implementation of prepaid metering in the select States elaborated earlier, the Commissions may enforce introduction of mandatory prepaid metering in the following class/ group of consumers:
- (a) Government/ PSU's establishments, under any consumer category, drawing power through Single Phase/ Whole Current Three phase meters;
  - (b) Commercial consumers in urban areas drawing power through Single Phase/ Whole Current Three phase meters, starting from consumers with highest connected load;
  - (c) Domestic consumers in urban areas with a connected load of 5 kW and above drawing power through Single Phase/ Whole Current Three phase meters, starting from consumers with highest connected load, although in these category priority may be given to Govt. quarters, multi-storey apartment and residential societies;
  - (d) All temporary connections drawing power through Single Phase/ Whole Current Three phase meters;
  - (e) Consumers premises where the owner has rented the house;
  - (f) Govt. residential quarter where BSF/ defence personnel live for short duration;
  - (g) Consumer premises where the occupant are old age/ retired people;
  - (h) Any consumer located in an urban area, who opts to shift to prepaid metering.

Note: For the purpose of above the definition of urban area may be taken as the areas falling under Municipal Corporations, Urban Local Bodies and/ or various areas covered under R-APDRP scheme.

- 9.6 Accordingly, the respective SERC's may mandate the roadmap for conversion/ introduction of prepaid metering in the respective state covering the consumers group as proposed above or as may be deemed fit by the respective Commission.
- 9.7 It is also recommended that the vendors may gear-up for meeting the demand expected to be generated through the accelerated implementation of prepaid metering in the country as per the proposed roadmap. In addition to meeting the demand expected, passing on the benefits of the expected economies of scale to be achieved due to the increased demand for prepaid meters in the country shall hold key to the acceptability/ effectiveness of prepaid metering in the country.
- 9.8 As already deliberated in detail, in the chapter on Cost Benefit Analysis, in view of the significant benefits that may be realized through introduction of prepaid metering during the initial years due to the immediate improvement in collection efficiency/ outstanding dues levels, an overall tariff rebate of 4% to 6% should be justifiable in view of the benefits that may be achieved (including the impact of collection efficiency improvement) and also attractive for consumers to opt for the same. Such rebate level may be reviewed after a period of 5 to 6 years by the respective SERCs as consumers would have had experienced the benefits/ convenience of prepaid metering by then.

- 9.9 As detailed in the Cost Benefit Analysis, the payback period for prepaid metering is critically dependent on the connected load and/ or average monthly usage pattern of the consumers where it is implemented. It may not be effective to implement prepaid meters on BPL and other very small consumers with low annual average consumption. Therefore, it is recommended that the respective utilities/ SERCs may undertake the necessary cost benefit analysis in their specific context to determine the minimum CUT-OFF Connected Load above which prepaid metering shall be introduced in the initial phase. The efficacy of introducing prepaid meters on the balance other/ smaller consumers may be reviewed after a period of 5 – 6 years.
- 9.10 As already detailed out in the chapter on features of pre-paid meters, considering the benefits of AMI/smart meters elaborated above and the perceptible shift that is being witnesses in AMI meter deployment across the world, it is imperative that the utilities in India too would move to AMI meters in due course of time. However, in the Indian power sector, the focus of distribution companies is currently on improving the basic power distribution network and infrastructure.
- 9.11 The reforms in the country too are focussed on electrification of the yet un-electrified villages/areas and on reduction of high transmission and distribution losses being faced by the utilities and not on adoption of high end technologies like AMI/smart metering. Although, when smart/ AMI meters are adopted by the utilities, running them on pre-paid mode shall only be a question of functionality and hence the utilities would not have to make any additional investment on metering infrastructure, but considering the long lead time expected in steering the technology in the Indian power sector it can safely be assumed that deployment of smart meters in the field is still a far way off.
- 9.12 The problems of high outstanding arrears and low collection efficiencies, being faced by the Indian Utilities, can be effectively addressed through adoption of standalone pre-paid meters. Hence, in the intervening period it is recommended that standalone pre-paid meters may be used to effectively deal with the issues of huge outstanding arrears and poor collection efficiencies in select consumer categories/ groups as detailed earlier.

## Addressing key issues for effective implementation

- 9.13 Based on the review of experiences in the various utilities, where prepaid metering has been implemented in the country, the key issues encountered in implementation of prepaid metering which are common across States/ Utilities have been identified. At the same time, many issues are specific to a few states. Such issues range from operational difficulties to regulatory complications. In the current section we have tried to identify all such issues and also to suggest the possible solutions for the same. We have segregated the issues into the following two categories:
- (a) Operational issues
  - (b) Regulatory, policy or legal issues.
- 9.14 As per the understanding developed by us during our interactions with all stakeholders from regulatory commissions to utilities and consumers, the possible solutions are discussed as under.

## Addressing key operational issues

- 9.15 Based on the understanding developed through the detailed study of pre-paid metering implementation efforts within India and abroad, it is felt that a common approach adopted at the country level may be helpful in ironing out the operational issues encountered in the pilot/ small scale implementations in the country so far.

- 9.16 It is inferred that in the absence of specific and clear common guidelines for the approach to pre-paid metering, most of the utilities and state regulatory commissions have either refrained from adopting the technology or have made interpretations based on their individual understandings. In view of this, it would be extremely relevant to have a uniform regulatory guideline which would be adopted by all State Regulatory Commissions and to be passed on to the utilities operating under their purview.
- 9.17 In view of the same, the Forum of Regulators may recommend adoption of the recommendations by the respective SERCs. The recommendations for addressing the key operational issues are provided in the table below.

**Table 12: Recommendation on the operational issues linked to PPM**

| Issue Number 1: Tariff Structure Related Issues/ Application of FSA & Electricity Duty |  |
|--|--|
| Issue Description  | <p>Key issues in two part tariff implementation in prepaid metering:</p> <ul style="list-style-type: none"> <li>• Licensee doesn't have information on actual adjustments against fixed and variable charges against credit sold to consumer;</li> <li>• Difficulty in charging electricity duty/ tax on sale of electricity which is applicable on energy charges only;</li> </ul>  |
| Recommendation   | <p>A single part tariff comprising of per unit as undertaken in UK and South Africa where prepaid metering has been implemented at the largest scale, so far, shall be simpler to implement.</p> <p>In case there is a concern regarding loss of revenue in cases of Nil/ Minimal consumption in transitioning to a single part tariff, monthly minimum units, with revenue contribution equivalent to the fixed charges may be specified by the SERC and such units can be incorporated in the prepaid meter.</p> <p>Telescopic tariff structure comprising of higher rates for units consumed in higher slabs may be retained/ introduced for promoting energy conservation under such single part tariff, as in the case of South Africa.</p> <p>However, such telescopic slabs and rates shall be applied in the recharging/ vending itself, as in the case of South Africa and not in actual consumption as per the present practice in the country.</p> <p>The benefits of the recommended single part telescopic tariff shall be:</p> <ul style="list-style-type: none"> <li>• Simplicity in charging/ accounting by utility as all sale of credit to prepaid consumer is against energy charges only;</li> <li>• Electricity Duty/ Tax on sale of electricity can be charged on actuals at the time of vending itself;</li> <li>• Consumers will not be lured to hoard credit in the prepaid meter to avoid impact of tariff increase so as to take benefit of the cheaper slabs in the telescopic tariff structure on a monthly basis.</li> </ul> |
| Responsibility   | SERC may introduce such simplified tariff structure in its prospective tariff orders for prepaid consumers under each category.  |
| Issue Number 2: Tariff Revisions   |  |
| Issue Description  | <p>The tariffs can be updated in the prepaid meters only at the time of recharge. This leads to following difficulties:</p> <ul style="list-style-type: none"> <li>• Tariff changes cannot be implemented in prepaid meters on billing/ consumption month basis, as in the case of post-paid connections, in accordance with the tariff applicability dates notified by the respective SERC in its tariff orders.</li> <li>• As the consumer is free to purchase recharge credit for any period of time based on his convenience, application of Fuel Surcharge/ FPPPCA from a specific date as may be prescribed/ approved by the respective SERC is not possible unless the consumer purchases additional credit post such notification.</li> <li>• Any tariff change becomes applicable in prepaid metering only once the consumer purchases and key's in the token for credit purchase post such notification. Any</li> </ul>  |

|  |   |
|--|---|
|  | <p>updating of tariff fed is meters shall become a massive exercise if taken up separately by the Licensee.</p> <ul style="list-style-type: none"> <li>In such case, there is an apprehension that any consumer may purchase large amounts of credit to avoid any anticipated tariff increase.</li> </ul>   |
| Recommendation                                     | <p>As practiced in UK and South Africa any changes in the tariffs should become applicable for prepaid connections of electricity in the recharge coupons purchased by such consumptions post notification of tariff increase(s) by the appropriate Commission.</p> <p>Further, the telescopic tariff applied in the vending (so that the benefit of lower charges for the initial slabs of the tariff is given in the recharge(s) made only in that particular month) is expected to deter consumers from accumulating/ hoarding credit in their prepaid meters to avoid tariff increases. There need not be any upper limit on the recharge that can be purchased by any Consumer in categories where such vending based telescopic tariff is implemented.</p>                    |
| Responsibility                                     | The respective SERC's may include such provisions in their tariff orders for making tariff changes applicable from subsequent recharges in the case of prepaid connections.   |
| <b>Issue Number 3: Serving of Bills</b>            |   |
| Issue Description                                  | As cited by many Government consumers in case of NDPL and BSES, the recharge vouchers are not valid forms of bills. Being government departments they were required to furnish their electricity bills as a proof of the expenses incurred by them. Non-issuance of bills by the utilities causes problems for them. Moreover, in case of many such government consumers, when the utility deducts FSA, ED, arrears etc. from their recharge amount and only a part of the total amount paid by them is credited to their account, it causes misunderstanding amongst the consumers. Similarly, in case of Gujarat, the utility follows a practice of issuing monthly supplementary bills for collection of FSA and duties. This also causes dissatisfaction amongst the consumers. |
| Recommendation                                     | To address these issues, we believe the utility should take the meter reading of the consumers on a quarterly basis/ bi-annual basis, depending on the connected load/ consumer category etc. as may be decided by the appropriate Commission for each consumer category, and issue Statements showing recharge vouchers purchased and the actual consumption as on the date of the reading etc.  |
| Responsibility                                     | The concerned Regulatory Commissions would be required to make suitable changes in their respective supply codes for the above billing provisions.  |
| <b>Issue Number 4: Modes of recharge</b>           |   |
| Issue Description                                  | As of now, in most cases consumers can only purchase recharge coupons for prepaid meters from the concerned offices of respective utilities, where the requisite vending systems are made available by the utility.   |
| Recommendation                                     | Additional avenues for recharge such as online generation of recharge codes and through agents in local markets etc. would make it more convenient for consumers to purchase recharge coupons. ESKOM, South Africa, follows a structure of vending through agents, a similar solution may be explored by the utilities.   |
| Responsibility                                     | Utilities and Vendors need to integrate the existing system with such new payment gateways to make purchase of prepaid credit more accessible to consumers.   |
| <b>Issue Number 5: Handling multiple operators</b> |   |
| Issue Description                                  | <p>Although at present there are limited suppliers of pre-paid meters in the market, but with increasing demand the competition is expected to increase. In such a scenario, it would become very complex for a single utility to use 6-7 different software for issuing different recharge coupons to the consumer based on their meter manufacturer.</p> <p>Also, at present the rights for generation of the recharge coupon/ codes are with the meter vendor and the vendor charges a per recharge fee of Rs. 16 which significantly takes away the benefits of operational cost reduction through transition to prepaid metering.</p>  |
| Recommendation                                     | Hence a common platform, in line with the similar initiative in South Africa needs to be evolved to solve this problem in the initial years itself. With the need to develop the above stated common platform for recharges the rights for generation of recharge coupons would need to be with the utility only.   |
| Responsibility                                     | The Apex Bodies such as CEA may intervene for ensuring development of a common platform   |

|  |  |
|--|--|
|  | for development of a secure common protocol for prepaid metering vending/ recharge system at the National Level to ensure easy, wide and cost effective deployment of prepaid metering in the country. Vendor/ manufacturers participation in such initiative shall be critical to its success.  |
| <b>Issue Number 6: Campaigning and necessary training to staff</b> |  |
| <b>Issue Description</b>   | In many utilities it was seen that due to lack of training to the utility staff or consumers, the initiative could not pick momentum. Also due to inadequate campaigning about the initiative, the interest of the consumers was not raised. As a consequence the initiative was not very popular in the state. On the other hand, countries like New Zealand, Ireland and Bangladesh have been extremely successful in making pre-payment a popular choice amongst their consumer base. |
| <b>Recommendation</b>  | A positive campaign detailing out the benefits of pre-paid metering is a must for the success of pre-payment technology in India.<br><br>There is no better marketing than to first apprise and train the utilities personnel on the concept, benefits and operationalization of prepaid metering. Accordingly, it would be appropriate to design and impart necessary trainings through structured programs to the utilities personnel.   |
| <b>Responsibility</b>  | The CEA, in association with the vendors, should intervene in developing standardized courses on prepaid metering which may be imparted to the utility personnel through the over 51 numbers of training centers recognized by it pertaining to the CPSU's/ SPSUs/ Private sector should develop specified courses,  |

### Addressing regulatory/legal issues

9.18 The review of Supply Code, Standard of performance and other related regulations issued by the respective SERCs in the state of Maharashtra, Gujarat, Delhi and West Bengal vis-à-vis the regulatory requirements in case of pre-paid meters have already been elaborated upon in this report earlier. Accordingly, it is suggested that the following may be relooked upon by the respective SERC's in States where prepaid meter has been implemented or is planned to be implemented:

- (a) Definition of Meter: Defining "Meter" in a way to include pre-paid technology in order to have clarity on the use of meter in the regulation.
- (b) Incentive to Consumers: The regulators across states may allow an incentive (say 5% tariff rebate) for pre-paid consumer's w.r.t. the tariff for the respective categories.
- (c) Security deposit: In case of New connection with prepaid meter, it needs to be explicitly mentioned in the regulation that the consumer need not pay any amount against security deposit as per Section 47(5) of the Electricity Act 2003. Also, for the existing consumers who wish to shift to pre-paid, the regulation may allow to adjust the security deposit of the consumer in the energy charge and/ or arrear of the consumer, if any.
- (d) Periodicity of meter reading/ supplementary billing: The regulation must explicitly mention the periodicity of the activity such as meter readings, bill distribution, claim of FAC and duty on electricity for pre-paid consumers.
- (e) Advance payment: The Regulator may make it clear that there shall not be any kind of interest payable to consumers with a pre-paid meter facility provided by the distribution licensee as in case of advance payment by the consumers.
- (f) Supply and Cost of Meter: To promote the pre-paid metering, in case if the Licensee is not able to provide the meter, the consumer may also be allowed to purchase the pre-paid meter in accordance with specifications laid down by the Distribution Licensee. Accordingly, the

Authority (Central Electricity Authority) and/or the state Commission should come out with specific regulation/ guidelines on pre-paid metering.

# 10 Annexure

## Annexure A: Questionnaire for Prepaid Metering Study

| Sl.  | Query   |
|--|---|
| <b>A. General queries</b>  |   |
| 1.   | How many prepaid meters are installed in Licensee's Area till date?<br><ul style="list-style-type: none"> <li>- Category wise – Domestic/ commercial/ Industrial</li> <li>- Load Wise- HT meters/ Lt meters</li> </ul>  |
| 2.   | What was the main reason for installation of prepaid technology and what benefits envisaged through it? (Bad debt management/Additional payment option for consumers/revenue cycle management etc.)   |
| 3.   | Who drove this installation?<br><ul style="list-style-type: none"> <li>- Government / Regulators/ Own Initiative</li> <li>- Internally – Department/ person</li> </ul>  |
| 4.   | Are pre-paid meters fixed to premises or consumers: Can consumers move their pre-paid meters when they move their location  |
| 5.   | While installing of prepaid meters, was a fresh agreement signed with the consumers? If yes, a copy of the blank agreement may please be provided.  |
| 6.   | Which categories of consumers are being provided with pre-paid meters currently? Does the utility provide pre-paid metering to other consumer categories if the consumers volunteer for the same? Further, if any consumer wants to switch over from pre-paid metering to post-paid, does the utility allow the same? |
| 7.   | Does the utility have any plans for mass installation of prepaid meters? If yes, details of the same may please be provided.  |
| 8.   | Does the utility have any plans to make prepaid meters mandatory for any category /Pockets of consumers?  |
| 9.   | Have any consumers or group of consumers volunteered for pre-paid metering?   |
| <b>B. Queries relating to Commercial issues in pre-paid metering</b> |   |
| 1.   | Have any tangible benefits been recorded from pre-paid metering (collection improvement, loss reduction etc.)?  |
| 2.   | Has any cost benefit analysis been conducted for pre-paid metering? If yes, report of the same may please be provided.  |
| 3.   | Who manage/make changes in the meter software; utility staff or meter supplier?   |
| 4.   | How were past arrears treated in case of consumers who were fitted with prepaid meters? Detailed  |



| Sl.   | Query  |
|---|--|
|   | procedure adopted in case the arrears were collected.  |
| 5.  | What was the impact of pre-paid metering on arrears of categories in which pre-paid metering was implemented?  |
| 6.  | Any specific drive for vigilance and control in case of pre-paid metering was launched? If yes what are the findings of the same?  |
| <b>C. Queries relating to Operational issues in pre-paid metering</b> |  |
| 1.  | How do you handle the 15 days disconnection notice as under section 56(1) EA 2003, in the case of prepaid meters as supply gets automatically disconnected once card is exhausted?   |
| 2.  | What was the initial response of the prepaid metering consumers? Has any customer satisfaction survey been conducted by the utility thereon? If yes what is the outcome of the same?   |
| 3.  | What is the procedure of recharge in the pre-paid metering? (Smart card/punch pad etc.)  |
| 4.  | Has any provision for any emergency credit limit been made for pre-paid consumers? (What if the credit becomes zero at mid-night?)   |
| 5.  | What is the make and specific features of the pre-paid meter? In case different makes of meters are used, how is the software requirement of the different meters met?   |
| 6.  | How do you handle the cases of Burnt meters? How do you ascertain the balance in such burnt pre-paid meters?   |
| 7.  | Was any training/capacity building exercise carried out for the consumers and the officials of the utility for pre-paid metering? If yes, brief outlook of the same.   |
| <b>D. Queries relating to regulatory requirements and tariff</b>      |  |
| 1.  | Were any promotion schemes for prepaid metering like tariff discounts etc. offered to consumers who were willing to adopt the same?  |
| 2.  | How was the cost of pre-paid metering met by the utility? (Cost sharing with consumer/pass on in ARR etc.)   |
| 3.  | How was the residual cost (depreciated cost) of the old meters which were replaced treated by the utility?   |
| 4.  | How did you handle different Tariff related issues listed below in pre-paid meters? <ul style="list-style-type: none"> <li>– Differential tariffs for different category of consumers?</li> <li>– Slab wise tariff details in prepaid meters?</li> <li>– Basis of calculation of slabs now, as billing cycle is not monthly or Bi-monthly?</li> <li>– ToD tariffs in prepaid meters?</li> <li>– Charging of electricity duty/cess/FSA and other statutory levies in these meters?</li> <li>– Fixed cost and variable cost charging methodology adopted for pre-paid meters?</li> <li>– Issue of security deposits in case the consumer has opted to move from post-paid to pre-paid mechanism?</li> <li>– Provisions for tariff revision: How are they handled?</li> </ul> |

## Annexure-B: Legal opinion

M.G. Ramachandran  
Advocate

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New Delhi - 110 065 INDIA  
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+91-11-26926102  
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E-mail:mgr1953@gmail.com

18<sup>th</sup> August 2011

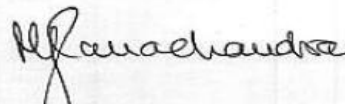
To,

Deloitte Touche Tohmatsu Consulting-  
Energy and Resources  
7<sup>th</sup> Floor, Building 10, Tower B,  
DLF Cyber City Complex  
DLF Phase 3, Gurgaon - 122002

**RE: APPLICATBILITY OF SECTION 56 OF THE ELECTRICITY ACT, 2003  
TO PREPAID METERS**

1. The concept of prepaid electricity meters give an option to the consumer to pay for and buy units of power by making advance payment. When the said units get exhausted, the consumer can buy further units / recharge by inserting the coupons in the prepaid meter. Inherent in the above is that the connection is given for specified number of units for which the advance payment is made. The contract between the parties is itself for supply of limited units and the contract comes to an end automatically once the units purchased are exhausted. The contract of supply of electricity in such cases expires by efflux of time related to consumption of the specified units.
2. The issue now arises whether Section 56 of the Electricity Act, 2003 in any manner affects the concept of prepaid meters. Section 56 reads as under-

***"Section 56. (Disconnection of supply in default of payment): --***  
***(1) Where any person neglects to pay any charge for electricity or any sum other than a charge for electricity due from him to a licensee or the generating company in respect of supply, transmission or distribution or wheeling of electricity to him, the licensee or the generating company may, after giving not less than fifteen clear days' notice in writing, to such person and without prejudice to his rights to recover such charge or other sum by suit, cut off the supply of electricity and for that purpose cut or***



M.G. Ramachandran  
Advocate

*disconnect any electric supply line or other works being the property of such licensee or the generating company through which electricity may have been supplied, transmitted, distributed or wheeled and may discontinue the supply until such charge or other sum, together with any expenses incurred by him in cutting off and reconnecting the supply, are paid, but no longer:*

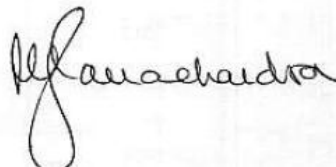
*Provided that the supply of electricity shall not be cut off if such person deposits, under protest, -*

*(a) an amount equal to the sum claimed from him, or  
b) the electricity charges due from him for each month calculated on the basis of average charge for electricity paid by him during the preceding six months, whichever is less, pending disposal of any dispute between him and the licensee.*

*(2) Notwithstanding anything contained in any other law for the time being in force, no sum due from any consumer, under this section shall be recoverable after the period of two years from the date when such sum became first due unless such sum has been shown continuously as recoverable as arrear of charges for electricity supplied and the licensee shall not cut off the supply of the electricity.*

(Emphasis Supplied)

3. The above provision proceeds on the basis that there would be a sum or charge of money due from a person to the licensee / generating company. However, in the case of prepaid meters, the consumer has already paid in advance for the electricity he will be consuming thereafter. Therefore, there is 'no neglecting to pay any charge for electricity due from a consumer to the licensee.' In such cases, there is no contract to supply and accordingly neither an obligation on the licensee to supply electricity nor on the consumer to pay for future supply. Every purchase of electricity by advance payment is an independent contract. If no payment is made for purchase of units, there is no connection to supply electricity and therefore is no occasion for any disconnection.
4. In the above premise, Section 56 will have no application in the case of prepaid meters. The contract with the consumer in the case of prepaid

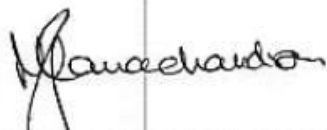


M.G. Ramachandran  
Advocate

meters for supply of electricity ends by efflux of use of the units already paid for by the consumer.

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

Yours faithfully,



(M.G. RAMACHANDRAN)

## Annexure-C: Office Memorandum of Govt. of NCT of delhi on Pre-paid Metering system

GOVERNMENT OF NCT OF DELHI  
(DEPARTMENT OF POWER)  
8<sup>TH</sup> Level, B-Wing, Delhi Secretariat, New Delhi-110 002.  
Telephone : 011-23392047, 23231748 & 23215198

No.11(168)/2005/Power/PF/ 14/0

Dated:11.06.2007.

### OFFICE MEMORANDUM

1. With the restructuring of the power sector three private Distribution Companies started functioning w.e.f. July, 2002. One of the important issues to be resolved is the payment of energy charges on the electricity consumed by Government Departments to the Distribution Companies. The system prevailing hitherto has been found to be unsatisfactory and the DERC has stated that non-payment/delayed payment of electricity bills directly impacts on the distribution business and has tariff implication for consumers. Therefore, such dues need to be settled in a time-bound manner. It is often not possible for the Distribution Companies to deprive Government Departments of electricity because of vital functions performed by many Government Departments. It is with this in view that a new payment mechanism / system is now proposed.

2. The Cabinet vide its decision No.116 dated 21.09.2006 has emphasized the timely settlement of power dues of Government Departments to Distribution Companies. A number of meetings have been held by the Chief Secretary and after discussions with various Departments and the Distribution Companies; it is felt that advanced technological solutions need to be introduced instead of the conventional system of billing and settlement of dues. It has therefore been decided that the following changes would be made in the payment system for settlement of power dues in future:-

- A. All Government Departments and autonomous bodies under the Government having single-phase and three-phase electricity load below 45 kW would need to switchover to the Pre-paid Metering System. The pre-paid meters at the different locations would be identified and installed by the Distribution Companies.
- B. For all Government Departments / autonomous bodies having load above 45 kW including High Tension loads, DISCOMs would switchover to Automatic Meter Reading System and settlement of pending dues could be done on the basis of advance drawal of contingent bills.
- A. (a) Pre-paid Metering System: The Distribution Companies would identify the locations where pre-paid metering systems would be installed. These would be ISI approved pre-paid meters, duly tested for their certification.

The average load of past four months would be informed to each of the offices where the pre-paid meters are installed. For new connections, the tentative amount shall be initially worked out based upon the sanctioned load.

- (b) Distribution Companies will conduct orientation programme for the Departments where the pre-paid meters are to be installed. The concerned HODs/Head of Offices would authorize purchase of pre-paid electricity coupons/receipts from the Distribution Companies from their different outlets. This would be allowed to be purchased either on monthly basis or even loading up the pre-paid cards. The concerned departments would buy the particular value of electricity and would be issued a receipt against each consumer number (K.No.) for the meter installed in the particular office. The Department would keep a record of the receipts. The HoD may sanction the advance required and operate the Abstract Contingency Bill procedure. The advance may be settled through Fully Vouched Contingency Bill (FVC Bill).
- (c) Rebate of 2% shall be allowed as the payment is being given in advance (In line with the guidelines of CERC on the subject) as approved by DERC.
- (d) The Head of Department/Office will fix the limit of electricity, which could be consumed, based on previous four month's consumption so that a check on electricity consumption can be kept as a measure of energy conservation. [As a part of this drive, the Departments, may also pursue with PWD or the agency responsible for maintaining electrical installation to switchover to CFL lamps and electronic chokes/tube lights to reduce energy consumption.] If there are any complaints of malfunctioning of meters, the Distribution Companies shall be responsible to ensure that they are rectified at the earliest and till such time it is rectified, the Distribution Company will ensure that consumption of energy is not automatically cut-off. The pre-paid meters can be programmed to give warning signs well in advance when 25% of amount is left or if the amount of electricity credit is low.

- B. (a) **Automatic Meter Reading System (AMR):** In the case of AMR the Department would be sent electronically generated bill for consumption of electricity on various units identified to function under AMR system. It will be the duty and responsibility of the Drawing & Disbursing Officer, (DDO) to download this information between 1<sup>st</sup> to 7<sup>th</sup> of every month and process the case for release of payment to DISCOMs. The payment shall be released within one month. The payment may be made by making advance drawal subject to settlement through FCV Bill. The DISCOMs shall give an undertaking that if the electricity bill of a Government Department remains less than the advance amount deposited, at the end of

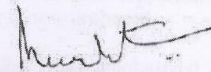
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an agreed settlement period, then the same shall be recoverable by Delhi Government as arrears of land revenue.

- (b) The Head of Department can monitor the monthly expenditure on electricity consumption for each office by preparing a consumption chart and also initiating measures for Energy Conservation to reduce electricity consumption. If there are any difficulties, the Distribution Company will be bound to rectify the defects at the earliest to the satisfaction of the Department.

3. The above system both for pre-paid meters and Automatic Meter Reading shall be started in a phased manner and the compliance report of the same shall be sent to the Department of Power every month by the Distribution Companies. DERC has been requested to examine a separate tariff for Government Departments.

4. This Office Memorandum is issued after obtaining the relaxation to Rule 114 of Receipts and Payment Rules by the Lt. Governor. It will come into effect as and when the new system is implemented in consultation with Distribution Companies within 1<sup>st</sup> July, 2007.



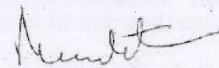
(RAKESH MEHTA)  
PRINCIPAL SECRETARY (POWER)

To

1. All HODs/Secretaries, GNCTD
2. All PSUs/Autonomous Bodies, GNCTD
3. CMD, DTL/IPGCL/PPCL/DPCL
4. Chairperson, NDMC
5. CEO, Delhi Cantonment (MES)
6. Secretary, DERC
7. Chairman, BSES Rajdhani Power Limited
8. CEO, BSES Yamuna Power Limited
9. CEO, NDPL

Copy to :-

1. Secretary to Lt. Governor, Raj Niwas, Delhi.
2. Principal Secretary to Chief Minister, Delhi
3. Secretary, Ministry of Power, Government of India
4. Secretary to Minister of Power, Delhi Secretariat
5. OSD to Chief Secretary, Delhi Secretariat



(RAKESH MEHTA)  
PRINCIPAL SECRETARY (POWER)

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