

Study to evolve an appropriate model of incentive-disincentive mechanism for Distribution Utilities*

Final report

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FORUM OF REGULATORS

TABLE OF CONTENTS

<u>A1: INTRODUCTION</u>	6
LEGISLATIVE FRAMEWORK	7
<u>A2: REVIEW OF NATIONAL EXPERIENCE</u>	10
REGULATORY INCENTIVES AND COSTS	11
GUJARAT	12
DELHI.....	14
MAHARASHTRA	17
KARNATAKA.....	19
HIMACHAL PRADESH.....	21
ANDHRA PRADESH	24
MADHYA PRADESH	25
CORRECTION MECHANISMS AND PROFIT SHARING	27
SHARING MECHANISM IN GUJARAT.....	27
SHARING MECHANISM IN DELHI.....	28
SHARING MECHANISM IN MAHARASHTRA	29
SHARING MECHANISM IN KARNATAKA	29
SHARING MECHANISM IN HIMACHAL PRADESH	29
SHARING MECHANISM IN ANDHRA PRADESH.....	30
SHARING MECHANISM IN MADHYA PRADESH.....	30
INCENTIVE MECHANISM FOR THE STAFF	31
UHBVNL EMPLOYEE INCENTIVE SCHEME.....	31
Step 1: Calculation of base level of AT&C losses	31
Step 2: Classification of sub-divisions	32
Step 3: Measuring performance	32
Step 4: Sharing of gains.....	32
MAHARASHTRA- EMPLOYEE INCENTIVE DISINCENTIVE MECHANISM	33
WEST BENGAL- EMPLOYEE INCENTIVE SCHEME FOR DISTRIBUTION WING	34
Incentive for reduction of AT&C losses	35
Incentive for increase in meter reading	35
Incentive for reducing Distribution Transformer Failure rate	35
Incentive for increasing the rate of disconnection for defaulting consumer	36
Incentive for reduction of service connection time	37
PERFORMANCE TARGETS AND ACTUAL PERFORMANCE OF THE STATES IN MYT PERIOD	37
<u>A3: REVIEW OF INTERNATIONAL EXPERIENCE</u>	39
UNITED KINGDOM	39
INCENTIVES	39
QUALITY OF SERVICE INCENTIVES IN THE PRICE CONTROL.....	40
PERFORMANCE OF ENERGY NETWORKS	41
IRELAND	42
INCENTIVES	43
PERFORMANCE OF ENERGY NETWORKS	44
NETHERLANDS	44
INCENTIVES	46
PERFORMANCE OF THE ELECTRICITY GRID MANAGER	47

VICTORIA	47
INCENTIVES	48
PERFORMANCE OF THE DISTRIBUTION COMPANIES	49
PAKISTAN	49
DISTRIBUTION MARGIN	50
POWER PURCHASE COST	50
NEW YORK	51
TREATMENT OF LOSSES IN DISTRIBUTION NETWORK	55
BENCHMARKING PRACTICES IN OTHER COUNTRIES	56

A4: SHARING GAINS OF PERFORMANCE-EMPLOYEE INCENTIVE SCHEME..... 59

BACKGROUND	59
INCENTIVE POOL	59
ORGANISATIONAL BUSINESS PLAN	59
MIS FRAMEWORK	60
CORPORATE PERFORMANCE SCORECARD	60
PERFORMANCE PARAMETERS	61
DEFINING KPIS	61
ASSIGNING WEIGHTAGES.....	61
DEFINING TARGETS	62
MEASUREMENT OF ACTUAL ACHIEVEMENT	62
CALCULATION OF TOTAL PERFORMANCE INDEX (TPI _{CORP})	62
CASCADING SCORECARD TO REGIONAL / FIELD LEVELS	63
CALCULATION OF WEIGHTED TPI AT THE SUB-DIVISION LEVEL.....	64
SUB-DIVISION PERFORMANCE SCORE CARD	64
PERFORMANCE PARAMETERS	64
DEFINING KPIS	64
ASSIGNING WEIGHTAGES.....	64
DEFINING TARGETS	66
MEASUREMENT OF ACTUAL ACHIEVEMENT	66
CALCULATION OF TOTAL PERFORMANCE INDEX (TPI _{SD})	66
PERFORMANCE AND PAYMENT RELATIONSHIP	66
SHARING THE INCENTIVES WITH THE EMPLOYEES	67

A5: ANNEXURE I: COST BENEFIT ANALYSIS OF INCENTIVE SCHEME FOR DISTRIBUTION COMPANIES 68

NDPL	68
BEST	69
MSEDCL	70

A6: ANNEXURE II: CALCULATION OF WEIGHTS FOR CORPORATE SCORE CARD..... 72

WEIGHTS	72
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A7: ANNEXURE III: CALCULATION OF TARGETS FOR CORPORATE SCORE CARD..... 74

A8: ANNEXURE IV: PERFORMANCE OF DISTRIBUTION UTILITIES IN THE MYT PERIOD..... 77

GUJARAT	77
KARNATAKA	77
MAHARASHTRA	78
DELHI.....	78

A9: ANNEXURE V: INCENTIVE SCHEME FOR DISTRIBUTION COMPANIES 79

BACKGROUND	79
INCENTIVE MECHANISM FOR DISTRIBUTION UTILITIES	79
SEGREGATION OF DISTRIBUTION BUSINESS	79
REVENUE AND COST DRIVERS FOR RETAIL SUPPLY	80
REVENUE FROM SALES	80
POWER PROCUREMENT COST	80
Option-1.....	81
Option-II	81
WORKING CAPITAL COST	82
DEPRECIATION COST	82
OPERATION & MAINTENANCE (O&M) COSTS	82
REVENUE AND COST DRIVERS FOR WHEELING BUSINESS	83
WHEELING TARIFF	83
DEPRECIATION COST	84
O&M COST.....	84
WORKING CAPITAL COST.....	85
BUSINESS DRIVERS FOR DISTRIBUTION COMPANIES (RETAIL SUPPLY & WHEELING)	85
CAPITAL INVESTMENT.....	85
RETURN ON CAPITAL EMPLOYED.....	86
TAX PROVISIONS.....	88
DISTRIBUTION LOSSES	89
QUALITY OF SUPPLY AND SERVICE.....	90
SUMMARY OF INCENTIVE SCHEMES.....	92

A10: ANNEXURE VI: SEGREGATION OF COST BETWEEN NETWORK AND RETAIL SUPPLY BUSINESS 94

SEGREGATION OF DISTRIBUTION IN NETWORK & RETAIL SUPPLY	96
COST ALLOCATION.....	97
ALLOCATION OF CAPITAL COST.....	97
DEPRECIATION.....	98
INTEREST & FINANCING CHARGES.....	98
O&M EXPENSES	98
Employee Cost	98
A&G Cost.....	99
R&M Expenses	99
RETURNS	99
OTHER/ MISCELLANEOUS EXPENSES	99
EXPERIENCE IN SELECT STATES	100
ANDHRA PRADESH	100
MAHARASHTRA	101
KARNATAKA.....	102
Apportionment of cost and assets –Methodology Proposed by BESCO.....	102

MADHYA PRADESH 103

A1: INTRODUCTION

- 1.1 Electricity distribution business is a natural monopoly. Hence in most of the countries, it is a regulated business. In India also, electricity distribution is a regulated business.
- 1.2 For any regulated business, it is important for regulators to create an environment for promoting efficiency and constant improvement. One way of doing it is by giving appropriate economic signals in the tariff setting process.
- 1.3 Internationally different countries have adopted different methods to provide incentive penalty mechanism in tariff setting process to incentivize utilities.
- 1.4 In India also legislative framework exists in the country to provide incentive-disincentive mechanism for distribution utilities and adoption of local area based incentive-disincentive mechanism for the staff of the utilities.
- 1.5 Based on the existing legislative framework in the country various State Electricity Regulatory Commissions (SERC) have specified incentive penalty mechanism for the distribution utilities.
- 1.6 The working group constituted by Forum of Regulators (FOR) has also in its report on “Loss Reduction Strategies” suggested that incentive to the staff for performance above the set targets might be operationalized taking an electricity division as the unit.
- 1.7 The FOR working group report on “Loss Reduction Strategies” gave the following recommendations:
 - (a) It was agreed that underachievement of the loss reduction target should be borne by the licensee, and in case of achievement over and above the targets the gain was to be shared between the licensee and the consumers in the ratio to be determined by SERCs.
 - (b) SERCs might also encourage suitable local area based incentive and disincentive schemes for the staff of the utilities linked to reduction in losses, as stipulated in para 8.2.1(ii) of the Tariff Policy.
 - (c) Incentive for the staff for performance above the set targets might be operationalized taking an electricity division as the unit.
- 1.8 Accordingly FOR has engaged PricewaterhouseCoopers Private Limited (PwC) to “Evolve an appropriate model of incentive-disincentive mechanism for Distribution Utilities”.
- 1.9 PwC had submitted the ‘Inception Report & Approach Paper’ and ‘Draft Report’ earlier. PwC also made presentation on the draft report to the FOR on 1st February, 2010 in FOR’s 16th meeting at Lucknow. This is the Final Report in this regard, after incorporating the changes suggested in the meeting.

- 1.10 As per the suggestion of the meeting, section on “Incentive Scheme for Distribution Companies” has been removed from the main report as sharing of gains/losses between the licensee and the consumers would be governed by the relevant regulations of respective SERCs. This section has now been added as an annexure to the final report.
- 1.11 As suggested in the meeting, a new section on “Segregation of cost between Network and Retail Supply business” has been added as an annexure to the report.

Legislative Framework

- 1.12 The legislative framework suggesting the incentive-disincentive mechanism for distribution utilities and adoption of local area based incentive-disincentive mechanism for the staff of the utilities has been discussed as under:

Electricity Act- 2003

- 1.13 According to Section 61 (Tariff regulations)of the Act :

The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-

- (a) the principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission licensees;*
- (b) the generation, transmission, distribution and supply of electricity are conducted on commercial principles;*
- (c) the factors which would encourage competition, efficiency, economical use of the resources, good performance and optimum investments;*
- (d) safeguarding of consumers’ interest and at the same time, recovery of the cost of electricity in a reasonable manner;*
- (e) the principles rewarding efficiency in performance;*
- (f) multi year tariff principles;*
- (g) that the tariff progressively reflects the cost of supply of electricity and also, reduces cross-subsidies in the manner specified by the Appropriate Commission;*
- (h) the promotion of co-generation and generation of electricity from renewable sources of energy;*
- (i) the National Electricity Policy and tariff policy:*

Provided that the terms and conditions for determination of tariff under the Electricity (Supply) Act, 1948, the Electricity Regulatory Commission Act, 1998 and the enactments specified in the Schedule as they stood immediately before the appointed date, shall continue to apply for a period of one year or until the terms and conditions for tariff are specified under this section, whichever is earlier.

Tariff Policy

- 1.14 Ministry of Power, Government of India has notified the Tariff Policy on January 6, 2006 under section 3 (1) of the Electricity Act 2003, which stipulates under Clause 5.0 “GENERAL APPROACH TO TARIFF ” as under:

5.3 Tariff policy lays down following framework for performance based cost of service regulation in respect of aspects common to generation, transmission as well as distribution. These shall not apply to competitively bid projects as referred to in para 6.1 and para 7.1 (6). Sector specific aspects are dealt with in subsequent sections.

f) Operating Norms

Suitable performance norms of operations together with incentives and disincentives would need to be evolved along with appropriate arrangement for sharing the gains of efficient operations with the consumers. Except for the cases referred to in para 5.3 (h)(2), the operating parameters in tariffs should be at “normative levels” only and not at “lower of normative and actuals”. This is essential to encourage better operating performance. The norms should be efficient, relatable to past performance, capable of achievement and progressively reflecting increased efficiencies and may also take into consideration the latest technological advancements, fuel, vintage of equipments, nature of operations, level of service to be provided to consumers etc. Continued and proven inefficiency must be controlled and penalized.

The Central Commission would, in consultation with the Central Electricity Authority, notify operating norms from time to time for generation and transmission. The SERC would adopt these norms. In cases where operations have been much below the norms for many previous years, the SERCs may fix relaxed norms suitably and draw a transition path over the time for achieving the norms notified by the Central Commission.

Operating norms for distribution networks would be notified by the concerned SERCs. For uniformity of approach in determining such norms for distribution, the Forum of Regulators should evolve the approach including the guidelines for treatment of state specific distinctive features.

8.0 DISTRIBUTION

8.2 Framework for revenue requirements and costs

- 8.2.1 The following aspects would need to be considered in determining tariffs:**

*(2) ATC loss reduction should be incentivised by linking returns in a MYT framework to an achievable trajectory. Greater transparency and nurturing of consumer groups would be efficacious. For government owned utilities improving governance to achieve ATC loss reduction is a more difficult and complex challenge for the SERCs. Prescription of a MYT dispensation with different levels of consumer tariffs in succeeding years linked to different ATC loss levels aimed at covering full costs could generate the requisite political will for effective action to reduce theft as the alternative would be stiffer tariff increases. Third party verification of energy audit results for different areas/localities could be used to impose area/locality specific surcharge for greater ATC loss levels and this in turn could generate local consensus for effective action for better governance. **The SERCs may also encourage suitable local area based incentive and disincentive scheme for the staff of the utilities linked to reduction in losses.***

.....”

A2: REVIEW OF NATIONAL EXPERIENCE

- 2.1 In India, SERC's have moved from traditional cost plus regulations to performance based Multi Year Tariff (MYT) regulations. SERC's have specified incentives and disincentives for exceeding/non-achievement of norms specified in their MYT regulations for distribution utilities.
- 2.2 This chapter covers detail analysis of the existing incentive penalty mechanism in the MYT regulations for electricity distribution business in India.
- 2.3 In India, tariff setting process adopted by SERC's is guided by the Electricity Act-2003 and the National Tariff Policy. Both, Electricity Act-2003 and the National Tariff Policy provides for Multi Year Tariff framework.
- (a) Section 61(f) of the Electricity Act, 2003 (EA 2003), as amended in 2007, stipulates that State Commissions are responsible for formulating the tariff terms and conditions for the determination of tariff and in doing so they shall be directed by the multi year tariff principles.
- (b) Section 5.3(h) of the National Tariff Policy stipulates that the MYT framework is to be adopted for any tariffs to be determined from April 1, 2006.
- 2.4 In India, fourteen states have issued MYT regulations so far. These States are: Andhra Pradesh, Madhya Pradesh, Gujarat, Maharashtra, Delhi, Karnataka, Himachal Pradesh, West Bengal, Chhattisgarh, Kerala, Rajasthan, Assam, Jharkhand and Tamil Nadu. The table given below outlines details w.r.t the year of issue of MYT regulations, respective duration of control period, date of first MYT order and number of APRs (Annual Performance Review) issued by SERCs.

Table 1: Status of MYT regulations

S No	State	Year of effectiveness of MYT Regulation	Duration of Control period (Years)	Date of First MYT order	Number of APRs issued
1	Andhra Pradesh	2006-07	3	23/03/2006	3
2	Kerala	2007-08	3	Order not issued	
3	Karnataka	2007-08	3	22/01/2008	1
4	Maharashtra	2007-08	3	18/05/2007	2
5	Delhi	2007-08	4	23/02/2008	1
6	Madhya Pradesh	2007-08	3	29/03/2008 (Annual tariff order issued)	
7	Gujarat	2008-09	3	17/01/2009	1
8	Himachal Pradesh	2008-09	3	28/05/2008	1
9	West Bengal	2008-09	3	30/09/2008	1
10	Rajasthan	2009-10	5	Order not	

S No	State	Year of effectiveness of MYT Regulation	Duration of Control period (Years)	Date of First MYT order issued	Number of APRs issued
				issued	
11	Chhattisgarh	2009-10	3	Order not issued	
12	Assam	2006-07	3	24/07/2009	
13	Jharkhand	2007-08#		Order not issued	
14	Tamil Nadu	2009-10	3	Order not issued	

In Jharkhand MYT regulations have been notified. Date of applicability of MYT regulation and control period will be notified by the Commission later.

2.5 This section deals with review of MYT framework for select seven states. The review covers the states of Andhra Pradesh, Madhya Pradesh, Gujarat, Maharashtra, Delhi, Karnataka and Himachal Pradesh.

2.6 The analysis covers the following major heads:

- (a) Regulatory incentives and costs;
- (b) Correction mechanisms and profit sharing;
- (c) Incentive mechanism for the staff; and
- (d) Performance targets and actual performance of the states in the MYT period.

Regulatory incentives and costs

2.7 SERC's, in their MYT regulations, have divided cost parameters into controllable and uncontrollable parameters.

2.8 Uncontrollable parameters are defined as parameters which are beyond the control of the distribution utilities and in a regulated regime benefits/losses arising out of such factors are passed on to the consumers.

2.9 Controllable parameters are defined as those, broadly, in distribution utility's control:

- (a) Costs of the controllable parameters are set by the SERC at the start of the period, based on the data of past years. Distribution utilities are required to manage the costs of these parameters within the limit specified.
- (b) SERC's have specified cost escalation index, so as to ensure that inflation variations are passed on to the consumers.

- (c) Baseline values of the various controllable parameters for the control period are determined by SERC's on the basis of the performance of distribution utilities in past year (base year) and audited accounts of past few years.
- 2.10 Distribution utilities can improve their profits by controlling the cost of controllable parameters.
- 2.11 In order to provide incentives to the distribution utilities and control the cost, SERCs have adopted a two prong approach:
- (a) Specified trajectory for reduction of distribution losses/AT&C (Aggregate technical and commercial) losses; and
 - (b) Fixed levels of "Controllable Cost" elements like O&M (operation and maintenance) costs, finance cost etc.
- 2.12 To analyze regulatory incentives and cost provided by different SERC's through controllable parameters, review of MYT regulations, MYT tariff orders and Annual Performance Review (APR) of the selected states was done. This review concentrated on following two aspects:
- (a) classification of controllable and uncontrollable parameters; and
 - (b) treatment of controllable cost elements

Gujarat

- 2.13 The term uncontrollable factors as defined in MYT regulations of Gujarat include following factors which are beyond the control of the distribution utilities:
- (a) Force Majeure Events;
 - (b) Changes in law, judicial pronouncements and Orders of the Central Government, State Government or Commission; and
 - (c) Economy-wide influences, such as unforeseen changes in inflation rate, market-interest rates, taxes and statutory levies.
- 2.14 Some illustrative variations or expected variations in the performance of the distribution utilities which may be attributed to uncontrollable factors include, the following:
- (a) Variation in the price of fuel and/ or price of power purchase;
 - (b) Variation in the number or mix of consumers or quantities of electricity supplied to consumers;
 - (c) Expenses on account of inflation; and

(d) Taxes on Income.

Where there are more than one distribution utilities within the area of supply, then any variation in the number or mix of consumers or in the quantities of electricity supplied to consumers within the area served by two or more such distribution utilities will be attributable to controllable factors.

2.15 Some illustrative variations or expected variations in the performance of the distribution utility which may be attributed to controllable factors include, the following:

- (a) Variations in capital expenditure on account of time and/ or cost overruns / efficiencies in the implementation of a capital expenditure project not attributable to an approved change in scope of such project, change in statutory levies or force majeure events;
- (b) Variations in technical and commercial losses, including bad debts;
- (c) Variations in the number or mix of consumers or quantities of electricity supplied to consumers;
- (d) Variations in working capital requirements;
- (e) Variation in expenses like: (i) Operation & Maintenance expenses, (ii) Employee Cost, (iii) Administration & General expenses, (iv) Interest & Finance Charges, (v) Return on Equity, Depreciation, (vi) Non-tariff income, however SERC has specified that these expenses are relatable to relevant Inflation, Indices and/or any pay revision agreement in the economy and applicable interest rates;
- (f) Failure to meet the standards specified in the Standards of Performance Regulations, except where exempted in accordance with those Regulations; and
- (g) Variations in labour productivity.

2.16 In the MYT order for the first control period, various controllable cost elements have been treated as shown below:

- (a) Revenue forecast is based on the annual audited accounts for the financial year 2006-07. It has been stated that the historical trend method has proved to be reasonably accurate and a well accepted method to estimate the number of consumers, the connected load and the energy consumption, thus the same has been adopted for the sales forecast.
- (b) SERC has approved distribution losses for the control period based on the data available for past 2 years.

- (c) Employee expenses have been approved based on the past data and correcting the same for factors like additional burden due to sixth pay commission.
- (d) R&M expenses have been approved based on the past data and provided escalation of 6% every year.
- (e) A&G expenses have been approved based on the past data and provided escalation of 5% every year.
- (f) Depreciation has been calculated taking into consideration the opening balance of assets at the beginning of the year and proposed capitalisation i.e additional assets proposed to be brought into use during the control period. The actual average rate of depreciation worked out to 3.63% and the same rate has been adopted for projections during the control period.
- (g) Interest and finance charges are calculated based on the past data on interest rates and projected schedule of loan draws.
- (h) Working capital is calculated by the following formula:
 - (i) Operation and Maintenance expenses for one month;
 - (ii) Maintenance spares @ 1% of the historical cost escalated @ 6% per annum from the date of commercial operation; and
 - (iii) Receivables equivalent to two months for sale of electricity,
- (i) Interest on working capital is linked to the State Bank of India (SBI) short term Prime Lending Rate (PLR).

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Based on past trends
2	O&M	Controllable	Based on past trends and indexed to inflation, also adjusted for factors like impact of sixth pay commission
3	Interest charges	Uncontrollable	Based on past data and projections
4	Distribution losses	Controllable	Target Based on past performance
5	Working Capital	Controllable	Based on norms and interest rate on working capital is linked to the short term SBI PLR

Delhi

2.17 In Delhi, in the MYT regulations SERC has defined following parameters as controllable:

- (a) AT&C losses;

- (b) Operation and Maintenance Expenditure;
 - (c) Return on Capital Employed;
 - (d) Depreciation; and
 - (e) Quality of Supply.
- 2.18 SERC has considered the consolidated sales of a specific category (i.e. Domestic, Industrial, Commercial etc) of all the three distribution companies and has forecasted the same for the Control Period by considering an appropriate growth rate based on the past trends. The weighted average share of sales of each distribution company in FY06 and FY07 in a particular category was calculated and allocated to the consolidated sales forecasted for that category to the respective distribution company in the proportion of its weighted average share.
- 2.19 SERC has specified the target for the AT&C losses considering the past achievements on loss reduction, capital expenditure programs, consumer mix of Delhi, metering status, loss levels in similar private urban distribution utilities.
- (a) SERC has also specified that each year, 25% of the total AT&C loss reduction target specified for the control period should be achieved by the distribution utility.
 - (b) SERC has assumed collection efficiency for current dues for FY08, FY09, FY10 and FY11 respectively and derived distribution losses for each year of control period.
- 2.20 O&M projections for the control period are done separately for A&G, employee expenses and R&M as under:
- (a) For the calculation of A&G expenses, data of the year 2007 has been taken as base. This base figure is indexed for inflation to arrive at the projections for the control period, as under:
 - (i) For the calculation of inflation index, data of WPI (Whole sale Price index) and CPI (Consumer Price Index) from 2001 to 2006 was used to calculate the projected growth rate for WPI and CPI.
 - (ii) Inflation index so calculated for each nth year was multiplied with the A&G expense of the previous year [(n-1)] to arrive at the A&G expenses of the nth year.
 - (b) For the purpose of calculation of employee expenses for the Control Period, true-up employee cost of FY07 (net of SVRS¹ amortization approved) was taken as the base employee cost for the Control Period. Employee expenses

¹ SVRS: Special Voluntary Retirement Scheme

for the base year have been escalated as per the inflation index to arrive at the employee expenses for the Control Period. All employee expenses due to the impact of the 6th Pay Commission recommendations would be payable separately.

- (c) Repairs and Maintenance (R&M) expenses for the Control Period has been calculated based on the following formula:

$$R\&M_n = K * GFA_{n-1}$$

Where,

- (i) 'K' is a constant (expressed in %) governing the relationship between R&M costs and Gross Fixed Assets (GFA) for the nth year.
- (ii) SERC has determined the value of 'K' for the Control Period as the average of the individual 'K' for the last 5 years (FY03 to FY07). SERC has considered the approved values of R&M Expenses and opening GFA, to calculate the respective values of 'K'

- 2.21 Return on Capital Employed (RoCE) for the year 'i' is computed in the following manner:

$$RoCE = WACC_i * RRB_i$$

Where,

- (i) $WACC_i$ is the Weighted Average Cost of Capital for each year of the Control Period;
- (ii) RRB_i - Regulated Rate Base is the asset base for each year of the Control Period based on the capital investment plan and working capital.

- 2.22 While calculating $WACC_i$, interest charges are linked to PLR of State Bank of India. SERC has treated Interest Rate as controllable and it will true up Interest Rate only if variation in SBI-PLR is more than +/- 1%. The distribution utility is encouraged to avail the loan at lower interest rate and increase its profit.

- 2.23 In Delhi amount of working capital for retail supply of electricity allowed consist of

- (a) Receivables for two months of revenue from sale of electricity.
- (b) Operation and maintenance expenses for one month.
- (c) Less: power purchase costs for one month.

2.24 Depreciation has been projected based on the projected asset base for the control period and then applying depreciation rates specified in the regulations.

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Category wise projections based on past data
2	O&M	Controllable	A&G and employee expenses were determined by indexing the past performance to inflation. R&M expenses is based on the following formula: $R\&M_n = K * GFA_{n-1}$ 'K' for the Control Period is average of the individual 'K' for the last 5 years (FY03 to FY07).
3	Interest charges	Controllable	Interest charges are linked to PLR of State Bank of India.
4	Distribution losses (AT&C losses)	Controllable	Based on the past achievements on loss reduction, capital expenditure programs, and consumer mix of Delhi, metering status and loss levels in similar private urban distribution utilities.
5	Working Capital	Controllable	Based on norms

Maharashtra

2.25 Maharashtra, SERC has defined the term “uncontrollable factors”. “Uncontrollable factors” include the following factors which were beyond the control, and could not be mitigated by distribution utility:

- (a) Force Majeure Events.
- (b) Changes in law, judicial pronouncements and Orders of the Central Government, State Government or Commission.
- (c) Economy-wide influences, such as unforeseen changes in inflation rate, market-interest rates, taxes and statutory levies.

2.26 Some illustrative variations or expected variations in the performance which may be attributed to uncontrollable factors include:

- (a) Variation in the cost of power generation and/ or power purchase;
- (b) Variation in the number or mix of consumers or quantities of electricity supplied to consumers;

2.27 In cases where there is more than one distribution utilities or where open access is allowed, then any variation in the number or mix of consumers or in the quantities of electricity supplied to consumers are attributable to controllable factors.

2.28 Some illustrative variations or expected variations in the performance which may be attributed by the Commission to controllable factors include the following:

- (a) Variations in capital expenditure on account of time and/ or cost overruns /efficiencies in the implementation of a capital expenditure project not attributable to an approved change in scope of such project, change in statutory levies or force majeure events;
 - (b) Variations in technical and commercial losses, including bad debts;
 - (c) Variations in the number or mix of consumers or quantities of electricity supplied to consumers;
 - (d) Variations in working capital requirements;
 - (e) Failure to meet the standards specified in the Standards of Performance Regulations, except where exempted in accordance with those Regulations;
 - (f) Variations in labour productivity.
- 2.29 Sales projections in Maharashtra are done by the SERC based on the category wise sales data of past five years. SERC has taken the data of five years from 2001-02 to 2006-07, to calculate the Compounded Annual Growth Rate (CAGR), and the same has been used for projections of sales for the control period
- 2.30 For calculation of distribution losses, SERC has adopted different approaches for different Licenses. For BEST, SERC has taken the basis of the load flow and loss reduction study carried out by the distribution utility and for MSEDCL past trend was used to fix targets.
- 2.31 SERC has allowed the O&M expenses under three heads employee expenses, R&M expenses and A&G expenses as under:
- (a) SERC has calculated the average employee expenses per unit of energy sold for last 5 years from 2001-02 to 2006-07. Same average employee cost per unit of energy sold has been used to project employee expenses for the control period
 - (b) SERC has calculated the CAGR of A&G expenses for past 7 years and compared the same with the submission of the distribution utility. As the projections of the distribution utility were in line with the past data same was approved.
 - (c) SERC has calculated the R&M expenses as percentage of GFA for past 5 years and compared the same with the submission of the utility. As the projections of the utility were in line with the past data same was approved.
- 2.32 Maharashtra SERC has specified that all capital expenditure done after April 2005 will be considered to be done at normative debt equity ratio of 70:30, thus giving the benefit of capital structuring to the utility.

- 2.33 Interest on loan is allowed as per the projections made in the business plan. This will provide incentive to the utility to restructure the loans and renegotiate with bankers.
- 2.34 Amount of working capital allowed is calculated by SERC in the following manner:
- (a) One-twelfth of the amount of Operation and Maintenance expenses for such financial year; plus;
 - (b) One-twelfth of the sum of the book value of stores, materials and supplies including fuel on hand at the end of each month of such financial year; plus
 - (c) Two months equivalent of the expected revenue from sale of electricity at the prevailing tariffs; minus
 - (d) Amount held as security deposits under clause (a) and clause (b) of subsection (1) of Section 47 of the Act from consumers and Distribution System Users; minus
 - (e) One month equivalent of cost of power purchased, based on the annual power procurement plan.”
- 2.35 Rate of interest on working capital allowed is equal to the short-term PLR of SBI as on date on which the application for determination of tariff is made.
- 2.36 SERC has allowed depreciation based on the projection of future capitalization.

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Based on past trends
2	O&M	Controllable	Based on past trends average employee cost per unit of sales is approved A&G and R&M expenses were approved based on past trends
3	Interest charges	Uncontrollable	Based on projections in business plan
4	Distribution losses	Controllable	For BEST, SERC has taken the basis of the load flow and loss reduction study carried out by the distribution utility and for MSEDCL past trend was used to fix targets.
5	Working Capital	Controllable	Based on norms

Karnataka

- 2.37 The expenditure of the distribution utility considered as “controllable” and “uncontrollable” by SERC are as under:

Table 2: Classification of cost parameters

S No	ARR Item	“Controllable”/ “Uncontrollable”
1	Power Purchase Costs	Uncontrollable
2	Operation & Maintenance expenses	Controllable
3	Interest & Finance Charges	Controllable
4	Expenses on account of Inflation	Uncontrollable
5	Return on Equity	Controllable
6	Depreciation	Controllable
7	Taxes on Income	Uncontrollable
8	Non-tariff income	Controllable

- 2.38 SERC has projected consumer category wise energy sales, based on the trend of sales growth over the last 5 years, duly modifying the sales for relevant factors specifically applicable to a particular category.
- 2.39 SERC has analyzed the past data and the loss reduction plans proposed by distribution utilities to project the distribution losses.
- 2.40 For O&M expense norms, SERC has taken the past data of the year 2006-07 to arrive at base figure. This base figure has been escalated by a suitable inflation index and business growth index (based on the increase in the number of consumers). The figure thus arrived was subtracted by efficiency gain, details of which are shown as under:
- (a) SERC has considered the weighted average rate of CPI & WPI to compute average inflation rate. CPI represents the inflationary increase for employee expenses and WPI represents the inflationary increase for A&G and R&M expenses. The Commission has therefore considered the weightage of employee expense as a percentage of total O&M cost for CPI [70%] and the weightage of R&M and A&G as a percentage of total O&M cost for WPI [30%] to determine the weighted average rate for inflation.
 - (b) SERC has considered the increase in number of consumers from 2002-03 to 2006-07 to calculate the business growth.
 - (c) SERC has also given an efficiency factor of 1%.
 - (d) Total increase allowed by SERC per year over the base year is = (inflation + business growth-efficiency factor).
- 2.41 SERC has taken the asset base at the end of 2006-07 as the opening asset base for the control period. To this asset base projected capitalization has been added to arrive at the asset base for each year of control period. Depreciation rate has been taken as 3% as projected by the distribution utility
- 2.42 Calculation of the interest on loans has been done by SERC using the following methodology:

- (a) For the past loans actual debt levels have been taken.
- (b) For new asset addition, debt ratio of 70% is considered.
- (c) Interest cost for the loans has been taken as an average interest rate paid by the Distribution Utility in 2006-07.

2.43 Working capital has been calculated by the SERC in the following manner:

- (a) Amount of working capital was calculated by taking the following:
 - (i) One-twelfth of the amount of O&M expenses.
 - (ii) Stores, materials and supplies 1% of Opening balance of Gross Fixed Assets (GFA).
 - (iii) One-sixth of the expected revenue from distribution user at the prevailing tariffs.
- (b) Rate of interest on working capital is taken on a normative basis and is equal to the short-term PLR of SBI as on 1st April of the year.

2.44 SERC has taken the amount of equity shown in the accounts of 2006-07 as the opening equity base and considered addition to the equity base as per the business plan to arrive at the equity base for each year of control period. To this equity base SERC has allowed return of 14%.

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Based on past trends
2	O&M	Controllable	O&M expense norms are linked to past trends. Total increase allowed by SERC per year over the base year is = (inflation + business growth-efficiency factor).
3	Interest charges	Controllable	Based on the average interest rate for the utility in 2006-07
4	Distribution losses	Controllable	Based on the past data and the loss reduction plans
5	Working Capital	Controllable	Based on norms

Himachal Pradesh

2.45 The SERC has defined following parameters as controllable:

- (a) Distribution losses;
- (b) Operation and Maintenance expenditure;
- (c) Financing cost;

- (d) Depreciation; and
 - (e) Quality of Supply.
- 2.46 The SERC has undertaken a detailed analysis of the sales. The SERC has analyzed the year-on-year variations in sales as well as the short term and long term trends in sales and has computed the CAGR over the short term, i.e., 3 years and long term, i.e., 10 years and projected sales. Based on these projections sales were forecasted.
- 2.47 Loss reduction trajectory for distribution losses is set by the SERC and distribution utility is required to maintain the loss levels within the limit. Since starting T&D loss levels are low, SERC has set a target of annual reduction of 0.5% each year from the base year.
- 2.48 SERC has adopted following methodology for projection of O&M expenses:
- (a) For the calculation of A&G expenses, data of the year 2008 has been taken as base data. This data is indexed for inflation to arrive at the projections for the control period:
 - (i) For the calculation of inflation index, data of WPI and CPI from 2001 to 2006 was used to calculate the projected growth rate for WPI and CPI;
 - (ii) Inflation index so calculated for each nth year was multiplied with the A&G expense of the previous year [(n-1)] to arrive at the A&G expenses of the nth year;
 - (b) For the purpose of calculation of employee expenses for the Control Period, trued-up employee cost of FY08 was taken as the base employee cost for the Control Period. Employee expenses for the base year have been escalated as per the inflation index to arrive at the employee expenses for the Control Period.
 - (i) Employee expenses due to the impact of the 6th Pay Commission recommendations would be payable separately.
 - (c) Repairs and Maintenance (R&M) expenses for the Control Period has to be determined based on the following formula:

$$R\&M_n = K * GFA_{n-1},$$

Where,

‘K’ is a constant (expressed in %) governing the relationship between R&M costs and Gross Fixed Assets (GFA) for the nth year.

- (d) SERC has determined the value of 'K' for the Control Period as the average of the individual 'K' for the last 4 years (FY04 to FY07). SERC has considered the approved values of R&M expenses and opening GFA, to calculate the respective values of 'K'
- 2.49 Interest charges has been calculated by taking 10.25% as interest rate for long term loans and 12.5% as interest rate for working capital loans. Interest rate on working capital loan is linked to short term SBI, PLR.
- 2.50 Depreciation for each year of the MYT Period has been specified on the average of approved GFA for the respective year and since the Himachal Pradesh Electricity Board has not prepared a "Fixed Asset Register (FAR)", the Commission has considered the rate of depreciation as 2.5% inline with the practice followed in the previous tariff orders.
- 2.51 The SERC has determined the working capital requirement for the wheeling business containing the following components: -
- (a) O&M expenses for one month.
- (b) Receivables for two months of the wheeling charges received.
- (c) Maintenance spares @ 40% of the R&M - expense for one month.
- (d) Less: consumer security deposit, if any.
- 2.52 The SERC has determined the working capital requirement for the retail supply business containing the following components.
- (a) O&M expenses for one month.
- (b) Receivables for two months of revenue from sale of electricity.
- (c) maintenance spares @ 40% of the R&M expense for one month.
- (d) Less: consumer security deposit, if any.
- (e) Less: power purchase costs for one month.

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Based on past trends
2	O&M	Controllable	A&G and employee expenses were determined by indexing the past performance to inflation. R&M expenses is based on the following formula: $R\&M_n = K * GFA_{n-1}$ SERC has determined the value of 'K' for the Control Period as the average of the individual 'K' for the last 5 years (FY04 to FY07)

S. No	Element	Controllable/Uncontrollable	Method of determination
3	Interest charges	Controllable	
4	Distribution losses	Controllable	Base T&D loss levels are low; SERC has set a target of annual reduction of 0.5% each year from the base year.
5	Working Capital	Controllable	Based on norms

Andhra Pradesh

2.53 The expenditure of the distribution utility considered as “controllable” and “uncontrollable” in the tariff regulations, are as under:

Table 3: Classification of controllable/uncontrollable parameters

S. No	ARR Item	“Controllable”/ “Uncontrollable”
Wheeling Business		
1	Operation & Maintenance expenses	Controllable
2	Return on Capital Employed	Controllable
3	Depreciation	Controllable
4	Taxes on Income	Uncontrollable
5	Non-tariff income	Controllable
Retail Supply Business		
6	Cost of power purchase	Uncontrollable

2.54 The distribution utility has considered different forecasting methodologies but mostly relied on the trend methodology, user surveys and analysis of previous years’ information in projecting the sales volumes for categories other than LT Agriculture. For LT Agriculture, it has relied upon the DTR meter-reading information and the connected loads. SERC has after having reckoned the forecasting procedure followed by the distribution utility and additional information made available approved the sales.

2.55 SERC has analysed the past data and also considered the investments in HVDS, System Improvement schemes and quality metering proposed for the control period 2006-07 to 2008-09, to project the distribution losses.

2.56 For the first control period, SERC has projected the O&M expenses of the distribution utility in the following manner:

- (a) Employee and A&G costs are determined based on past data and indexed to inflation (5%).
- (b) R&M costs has been approves as 2.5% of old assets (Gross Block as on 31st March 2002) plus 1.25% to 2% of new assets (Additions to the Gross Block during 2002-03 onwards up to the year under consideration).

- 2.57 The SERC has provided depreciation at Ministry of Power rates and has not allowed any advance against depreciation.
- 2.58 The SERC has adopted RoCE (Return on Capital Employed) approach to allow returns to the distribution companies. SERC estimates the rate base for each year of the control period and RoCE is computed using WACC. For the purpose of deriving the WACC, debt-equity ratio of 75:25 is taken. The cost of debt is determined after considering the utilities' proposals, present cost of debt, prevailing market conditions and other relevant factors.
- 2.59 Working Capital requirement is considered as being equal to one twelfth of the Operations and Maintenance expenses as allowed.

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Based on Past Data
2	O&M	Controllable	Employee and A&G costs are determined based on past data and indexed to inflation (5%). R&M costs has been approves as 2.5% of old assets (Gross Block as on 31st March 2002) plus 1.25% to 2% of new assets (Additions to the Gross Block during 2002-03 onwards up to the year under consideration).
3	Interest charges	Controllable	The cost of debt is determined after considering the utilities' proposals, present cost of debt, prevailing market conditions and other relevant factors.
4	Distribution losses	Controllable	SERC has analysed the past data and also considered the investments in HVDS, System Improvement schemes and quality metering proposed for the control period 2006-07 to 2008-09, to project the distribution losses.
5	Working Capital	Controllable	Based on norms

Madhya Pradesh

- 2.60 MYT regulations in Madhya Pradesh are applicable from April 01, 2007 for a period of three years.
- 2.61 MYT regulations provides for annual review. In the annual review, SERC will scrutinize the annual accounts, norms achieved and revenue estimated by the Distribution Licensee.
- 2.62 In the MYT regulations SERC has further stated that yearly adjustments will be allowed towards power purchase cost variations owing to justifiable power purchase mix variation (for example, more energy may be purchased from thermal generation in the event of poor rainfall).
- 2.63 While making projections for sales, SERC has used the past trends.
- 2.64 SERC has given distribution loss targets for the control period in accordance with the road map issued by Government of Madhya Pradesh for loss reduction.

- 2.65 SERC has taken the asset base at the beginning of the control period and added projected capital expenditure in each year to determine the asset base for each year of the control period. This asset base was then classified under different categories and the depreciation rates as specified by CERC for those categories were used to project depreciation for the control period.
- 2.66 Interest and finance charges on loan capital are computed on the outstanding loans, duly taking into account the repayment schedule, as per the terms and conditions of relevant agreements of loan, bond or debenture. For new loans SERC has taken the debt equity ratio of 70:30.
- (a) SERC has allowed incentive on savings arising out of restructuring of capital cost in terms of relative share of equity and loan during the tariff period, provided it does not affect tariff adversely.
 - (b) Distribution utility is allowed to swap loans. The cost associated with such swapping of loans is borne by the consumers and any benefit on account of swapping of loan and interest on loan is passed on to the consumers.
- 2.67 The net O&M expenses for each year of the tariff period are computed on the following basis.
- (a) Projected number of metered consumers metered sales, HT network length and transformation capacity of 33/11kV transformers.
 - (b) These norms exclude terminal benefits to be paid to employees, taxes to be paid to the Government or local authorities and fees to be paid to SERC, which the can be claimed separately.
- 2.68 Return on equity is allowed by the SERC at the rate of 14% on the asset base calculated.
- 2.69 Working capital for retail supply activity of the licensee as defined in the MYT regulations consist of:
- (a) Receivables of two months of billing less any consumer security and less power purchase cost of one month,
 - (b) O&M expenses for one month, and
 - (c) Inventory (meters, metering equipment, testing equipment are particularly relevant in case of retail supply activity) for 2 months based on annual requirement for previous year.
- 2.70 Working capital for wheeling activity of the licensee as defined in the MYT regulations consist of:
- (a) O&M expenses for one month, and

- (b) Inventory (excluding meters, etc. considered part of retail supply activity) for 2 months based on annual requirement considered at 1% of the gross fixed assets for previous year.

S. No	Element	Controllable/Uncontrollable	Method of determination
1	Sales	Uncontrollable	Based on past trends
2	O&M	Controllable	Projected number of metered consumers metered sales, HT network length and transformation capacity of 33/11kV transformers.
3	Interest charges		Linked to SBI long term PLR
4	Distribution losses	Controllable	Trajectory based on the loss reduction road map issued by GoMP
5	Working Capital	Controllable	Based on norms

Correction mechanisms and profit sharing

2.71 SERCs have specified annual reviews during the control period and also a review at the end of the control period. For the annual true up different SERCs have specified different mechanisms. Mechanisms for trueing up adopted by some select states are given below:

- (a) In Delhi and Himachal Pradesh, SERCs do a true up of uncontrollable variations every year during the control period.
- (b) In Andhra Pradesh, Commission does a periodic review during the Control Period, to address any practical issues, concerns or unexpected outcomes that may arise, and in general to assess the efficacy of MYT Principles.
- (c) In Madhya Pradesh true up of sales and power purchase cost is done during the annual performance review.
- (d) In Karnataka, SERC does annual performance review. In the annual review comparison of the performance with the approved forecast of ARR and ERC is done every year. Also determination of gains because of uncontrollable factors is done annually.
- (e) In Maharashtra and Gujarat Annual Performance Review of the audited performance of the last year with approved performance is done. Also comparison of the performance for the first half of the current financial year with the approved forecast for the current financial year is done.

2.72 SERCs have specified gain/loss sharing mechanism under MYT regulations. Mechanisms for sharing gain/losses adopted by some select states are discussed below:

Sharing mechanism in Gujarat

2.73 The approved aggregate gain to the, distribution utility on account of uncontrollable factors are pass-through as an adjustment in the tariff.

2.74 The approved aggregate gain on account of controllable factors are dealt in the following manner:

- (a) One-third of the amount of gain is passed on as a rebate in tariffs.
- (b) One-third of the amount of gain is retained in a special reserve by the distribution utility for the purpose of absorbing the impact of any future losses on account of controllable factors.
- (c) The balance amount of gain is utilized at the discretion of the distribution utility.

2.75 The approved aggregate loss to the distribution utility on account of controllable factors is dealt in the following manner:

- (a) One-third of the amount of loss is passed on as an additional charge in tariffs.
- (b) The balance amount of loss is absorbed by the distribution utility.

Sharing mechanism in Delhi

2.76 In Delhi the true up across various controllable and uncontrollable parameters is conducted as per principle stated below:

- (a) Variation in revenue / expenditure on account of uncontrollable sales and power purchase are trued up every year;
- (b) For controllable parameters,
 - (i) Any surplus or deficit on account of O&M expenses is to the account of the distribution utility and is not trued up in ARR;
 - (ii) Depreciation and RoCE is trued up at the end of Control Period due to change in actual asset capitalization vis-à-vis approved asset capitalization. RoCE will not be trued up due to change in interest rate in normal circumstances. It will be trued up only in case of SBI PLR deviated by +/- 1% during the control Period.
- (c) A benchmark for AT&C losses has been specified by the SERC. If the losses are more than the benchmark, revenue loss will be borne by the distribution utility. If losses are below benchmark but more than the lower cap prescribed by the SERC, revenue gain will be shared equally between the distribution utility and the contingency reserve. If losses are less than the lower cap then the gains will be kept by the distribution utility.

Sharing mechanism in Maharashtra

- 2.77 The aggregate gain or loss on account of uncontrollable factors shall be passed through as an adjustment in the tariff in the annual performance review each year.
- 2.78 The approved aggregate gain to the distribution utility on account of controllable factors is dealt with in the following manner:
- (a) One-third of the amount of such gain is passed on as a rebate in tariffs.
 - (b) One-third of the amount of such gain is retained in a special reserve for the purpose of absorbing the impact of any future losses on account of controllable factors.
 - (c) The balance amount of gain may be utilized at the discretion of the distribution utility.
- 2.79 The approved aggregate loss to the distribution utility on account of controllable factors shall be dealt with in the following manner:
- (a) One-third of the amount of such loss may be passed on as an additional charge in tariffs
 - (b) The balance amount of loss shall be absorbed by the distribution utility

Sharing mechanism in Karnataka

- 2.80 Any financial loss or gain on account of variation in power purchase cost either on account of change in hydro-thermal mix or other uncontrollable factors is passed through ARR. The approved aggregate gain or loss to the distribution utility on account of other Uncontrollable factors is also a pass-through in the ARR.
- 2.81 In case the actual distribution loss exceeds the normative loss level approved by the SERC, excess loss is charged to the account of the distribution utility.
- 2.82 In case the actual distribution loss is less than the approved loss level, savings is shared between the distribution utility and the consumers in the ratio of 70:30 during the first Control Period.
- 2.83 For gains or losses in case of other controllable factor, sharing mechanism is to be approved by the SERC in the review order.

Sharing mechanism in Himachal Pradesh

- 2.84 Variation in revenue / expenditure on account of uncontrollable sales and power purchase will be trued up every year.
- 2.85 For controllable parameters:

- (a) any surplus or deficit on account of O&M expenses is to the account of the distribution utility ;
 - (b) at the end of the control period
 - (i) the SERC reviews actual capital investment vis-à-vis approved capital investment;
 - (ii) depreciation and financing cost, which includes cost of debt including working capital (interest), cost of equity (return) will be trued up on the basis of actual/audited information and prudence check by the SERC.
- 2.86 In case the actual distribution loss is worse than the loss level approved by the SERC, distribution utility has to absorb the financial loss arising from such performance.
- 2.87 Profits arising from achieving loss levels better than specified in the loss reduction trajectory are to be shared in the ratio of 2/3rd with the distribution utility and 1/3rd in the contingency reserve for the first control period.

Sharing mechanism in Andhra Pradesh

- 2.88 As per the MYT regulations the distribution utility is eligible to claim variations in “uncontrollable” items in the ARR for the year succeeding the relevant year of the Control Period.
- 2.89 A statement of gain and loss against each controllable item is prepared after adjusting for any variations on account of uncontrollable factors by the SERC.
- 2.90 For the purpose of sharing gains and losses with the consumers, only aggregate gains or losses for the Control Period as a whole are considered. The SERC reviews the gains and losses for each item of the ARR and does appropriate adjustments wherever required. For the purpose of sharing gains and losses with the consumers’ aggregate gains or losses for the Control Period as a whole are considered and for the first period these will be shared annually, in the ratio as determined by the commission in the performance review orders.

Sharing mechanism in Madhya Pradesh

- 2.91 The financial gain or loss to the distribution utility is computed after considering all the incentives together.
- 2.92 The profit of the distribution utility is not restricted to the levels stated in MYT regulations but can exceed this limit provided that the distribution utility outperforms the targets set. In case the distribution utility makes a profit, the distribution utility is allowed to retain fifty percent of such profit earned from performance above the benchmarks.

2.93 Actual losses as achieved by the distribution utility are used by the SERC to arrive at the power purchase cost and any gains or losses are to the account of the distribution utility.

Incentive mechanism for the staff

2.94 None of the states have specified any specific regulations for incentive mechanisms for staff. This has been left for the utilities to consider. Moreover employee expenses are controllable in all regulations and any over spending by the distribution utility is not a pass through.

2.95 Impact of sixth pay SERC on the salaries of government employees of the distribution utilities has been allowed as a pass through.

2.96 In this section we have covered the employee incentive scheme proposed by UHBVNL (Haryana) and MSEDCL.

UHBVNL employee incentive scheme

2.97 In order to achieve reduction in T&D losses, UHBVNL designed an employee incentive/disincentive scheme. This scheme covers following employee groups:

- (a) sub-divisional staff engaged in commercial activities;
- (b) vigilance staff engaged in theft detection;
- (c) special theft detection teams from sub-divisions; and
- (d) circle and divisional staff.

2.98 Performance Based Group Incentive Scheme (PBGIS) is designed for sub-divisional staff in UHBVNL (Distribution Company in Haryana) based on equitable sharing of gains between Distribution Company and the contributing sub-divisions emanating from reduction of AT&C losses. It was based on:

- (a) Distribution Company's commercial performance in reducing AT&C losses in a particular year;
- (b) sub-division performance in terms of positive contribution to loss reduction and other commercial parameters; and
- (c) existing pay scale of employees.

Step 1: Calculation of base level of AT&C losses

2.99 Incentives are given to employees if the Distribution Company is able to reduce AT&C losses in the current year in comparison to the base loss levels in previous year.

2.100 The AT&C losses across all sub-divisions are calculated for base year 2006-07 and based on the existing levels, the sub-divisions are classified across four categories.

Step 2: Classification of sub-divisions

2.101 The classification of sub-divisions is to be done considering the existing base level of losses shown as under:

- (a) Class A (0-16% loss level): Sub-divisions having a base loss level in the range of 0-16% in previous year. They are incentivized to the extent of 5 % of the Net savings from that class of sub-divisions
- (b) Class B (>16% - 30% Loss Levels): Sub-divisions having a base loss level more than 16% and less than or equal to 30% in previous year. They are incentivized to the extent of 10% of the Net savings from that class of sub-divisions
- (c) Class C (>30 - 40% Loss Levels): Sub-divisions having a base loss level more than 30% and less than or equal to 40% in previous year. They are incentivized to the extent of 12.5% of the Net savings from that class of sub-divisions
- (d) Class D (Above 40%): Sub-divisions having a base loss level of more than 40% in previous year. They are incentivized to the extent of 15% of the Net savings from that class of sub-divisions

Step 3: Measuring performance

2.102 The performance of sub-divisions are evaluated every quarter across the classified categories into:

- (a) **‘Performing Sub-Divisions’**: The sub-divisions which are able to improve their AT&C loss levels in comparison to the base AT&C loss levels in previous year.
- (b) **‘Loss Maintaining Sub-Divisions’**: For sub-divisions under Class A, having AT&C loss levels less than or equal to 16%, incentives are designed to ensure that the sub-divisions maintain the loss levels. These sub-divisions are incentivized based on a notional saving of 1% AT&C loss reduction if they manage to maintain the same loss levels.
- (c) **‘Non-Performing Sub-Divisions’**: The sub-divisions which are not able to improve their AT&C loss levels compared to base loss levels in previous year is not incentivized.

Step 4: Sharing of gains

2.103 For each class of sub-divisions, contribution made by each sub-division to gains of the Distribution Company is calculated on an agreed principle.

2.104 Incentive is computed on the basis of the % contribution towards gross saving multiplied by net savings made by UHBVN as a whole.

Maharashtra- employee incentive disincentive mechanism

2.105 In November 2006, on the directions of MERC, MSEDCL submitted an employee incentive scheme to the Commission. This scheme was aimed at incentivizing employees to reduce T&D losses. In this section, we have elaborated the above scheme.

2.106 Maharashtra proposed division-wise incentive scheme to reward improvements in Aggregate Technical and Commercial Efficiency (ATCE) at a Division level. ATCE has been defined as the ratio of Realisation per Unit of Energy Input (RUEI) into the system to Average Billing Rate (ABR) for a specified period.

$$ATCE_i = RUEI_i / ABR_i$$

2.107 RUEI_i is computed as the ratio of actual cash collected (excluding non-tariff collection such as, service connection charge, out right contribution by consumers, etc) by the division during the specified period to the energy input to the division as recorded in the input meters. ABR_i is computed as the ratio of total revenue billed (as per actual bills sent to the consumers) by the division to the quantity (units of energy) of energy billed.

2.108 As the efforts required in bringing about improvements in ATCE is a function of the base level of ATCE loss at the time of introducing the scheme, the incentive scheme classified the divisions into various categories where the incentives is payable beyond a threshold minimum improvement required.

2.109 The incentive payable to the division is 10% of the incremental revenue brought about by operational efficiency beyond the threshold specified for respective divisions.

2.110 The maximum incentive that can be availed by a division is capped at sum of one month basic salary of all the employees in the respective division at end of the quarter. Accordingly, the maximum incentive that an employee can receive in a quarter is capped at not to be more than his one month's basic salary.

2.111 The incentives is payable quarterly by considering improvements brought in a quarter as compared to the same quarter of last year as computed using the following formula:

$$IP = \{ 10\% * [(ATCE_i - ATCE_{i-1}) - THI_m] * CC \}$$

Where,

IP is Incentive Payable to the all employees in the division. This incentive is distributed among all the employees in proportion of their basic salary.

ATCE_i is the Aggregate Technical and Collection Efficiency in Quarter i

$ATCE_{i-1}$ is the Aggregate Technical and Collection Efficiency in the same Quarter last year

THI_m Threshold minimum improvement applicable for the Division

CC is the total cash collected in the Division during the quarter (excluding non-tariff collection such as service connection charge, Out Right Contribution by Consumers, etc)

Table 4: Threshold improvement in % above which incentive is payable

Opening level of ATCE	Threshold Improvement in % above which incentive is payable
Above 90%	0.5%
>80%-90%	1%
>70%-80%	2%
>60%-70%	3%
>50%-60%	4%
Below 50%	5%

2.112 There is disincentive for non-performance of a Division as reflected in the deterioration of ATCE at a division level. The disincentive is recoverable quarterly by considering non-performance in a quarter as compared to the same quarter of last year and is computed using the following formula:

$$DR = \{ 10 \% * [(ATCE_i - ATCE_{i-1}) - THD_m] * CC \}$$

Where,

DR is disincentive to be recovered from all the employees in the division.

2.113 The maximum disincentive recoverable for a Quarter for a particular division is capped at not to be more than 15 % of the sum of one month's basic salary of all the employees in the division. This disincentive is recovered from all the employees in proportion of their basic salary. The maximum disincentive recoverable from an employee for a quarter is capped at 15 % of his one month's basic salary.

West Bengal- employee incentive scheme for distribution wing

2.114 West Bengal State Electricity Distribution Company Limited has introduced an employee incentive scheme with an objective of motivating the employees to perform better and as a result achieve reduction of technical and commercial losses, better consumer services, and better reliability of power, quicker connection and improvement of financial health of the company.

2.115 Following KPI's for the employees were identified for incentive scheme.

- (a) Reduction of AT&C loss.

- (b) Increase in number of meter readings per month per meter reader.
- (c) Reduction of distribution transformer failure rate.
- (d) Increase in rate of disconnection of defaulting consumers.
- (e) Reduction in time taken to release new service connections.

Incentive for reduction of AT&C losses

2.116 Incentive for reduction of AT&C losses will be calculated based on the following formula.

$$D = 15\% \text{ OF } \{ A - B \} \times C \text{ IN UNITS } \times \text{ AVERAGE TARIFF} \\ \text{CONSIDERING } B < A$$

Where

A = AT&C Loss IN FY 2006-07 In %

B = AT&C Loss IN FY 2007-08 In %

C = Energy Input to the Supply in FY 2007-08

D= Incentive for reduction of AT&C losses

2.117 This net award 'D' for the supply will be shared by the employees of the supply itself and also the employees of the concerned Sub Division, Division and Circle proportionate to their contribution, as follows.

Table 5: Methodology of distribution of incentive among employees for reduction in AT&C losses

S.No	Unit	Percentage of net award
1	Group. E/S.	65%
2	O&M Sub-Division	21%
3	Division	10%
4	Circle	4%

Incentive for increase in meter reading

2.118 Incentive scheme for encouraging the meter readers to increase the number of meters read by a meter reader in a month was introduced by WBS&DCL. Under the scheme, reward will be given in term of percentage of the basic salary for the target achieved. The table given below gives the details of the incentive to be given to meter readers.

Table 6: Methodology of incentive calculation for improvement in meter reading

Unit/ Supply	Percentage of meter reading			Additional Meter reading
	Above 90% below 95%	Above 95% and below 100%	100% and above	
Urban	3%	6%	8%	Rs 2 per M.R
Mixed	4%	6%	8%	Rs 2.5 per M.R
Rural	5%	6%	8%	Rs 3 per M.R

Incentive for reducing Distribution Transformer Failure rate

- 2.119 WBSUEDCL has prepared the scheme to motivate employees to take quick actions to reduce failure of distribution transformers. In the scheme a target level of the DTR failure rate has been specified and an incentive (percentage of cost saved in repairing the transformer) linked to the target is provided to the employees.
- 2.120 It can be seen from the table given below, that if in an urban GES, transformer failure rate is 2%, and then 50% of the amount saved on cost of repair of transformer will be given as incentive to the employees.

Table 7: Methodology of incentive calculation for improvement in DTR failure rate

Urban		Mixed		Rural	
% Failure rate	Award as % of the cost saved	% Failure rate	Award as % of the cost saved	% Failure rate	Award as % of the cost saved
5	20	7	20	9	20
4	30	6	30	8	30
3	40	5	40	7	40
2	50	4	50	6	50
1	60	3	60	4	60
0	70	2	70	3	65
				2	70
				1	75

- 2.121 The total incentive amount will then be distributed among the employees of the GES, Sub- Division, Division and circle in the following manner.

Table 8: Methodology of distribution of incentive among employees for improvement in DTR failure

Unit	Percentage of Net Award
Group. E/S.	70%
O&M Sub Divn.	22.5%
Division	5%
Circle	2.5%

Incentive for increasing the rate of disconnection for defaulting consumer

- 2.122 Under the incentive scheme introduced for increasing the rate of disconnection for defaulting consumer, all the disconnection orders issued during a calendar month except those issued during the last three days of that calendar month must be physically disconnected within the said calendar month for the Gr. E/S. becoming eligible to get incentive on this score.
- 2.123 Incentive will be given as % of total amount of the outstanding dues of the defaulting consumers disconnected as per order.
- 2.124 Incentive will be calculated, Gr. Electric Supply-wise and it will be divided among the employees of Gr. E/S. except Meter Reader. The employees of Supply and D.C.C. will get 95% and 5% of the calculated amount respectively.

Incentive for reduction of service connection time

2.125 Employees of Electric Supply shall be eligible for incentive on providing connection on time. Incentive amount has been linked to the time taken to provide correction.

Table 9: Methodology of incentive calculation for reduction in service connection time

Number of Days	Incentive Amount	
	Non Pole Case	Pole Case
15 days	Rs 15 per connection	Rs 25 per connection
10 days	Rs 20 per connection	Rs 25 per connection
7 days	Rs 25 per connection	Rs 35 per connection
3 days	Rs 35 per connection	Rs 45 per connection

Performance targets and actual performance of the states in MYT period

2.126 SERCs in most of the states have specified performance target for distribution losses and collection efficiency. In some states combined targets for AT&C have also been specified. These targets are specified based on the performance level of the distribution utility at the beginning of the control period. No scientific study has been done by the SERCs to set the targets.

2.127 Actual performance of the distribution utility against the target is difficult to estimate, as in most states, no annual review orders are available. Only in Maharashtra, Andhra Pradesh, Delhi, Karnataka and Gujarat review orders are available. Performance of the distribution utilities in these states during the first year of the control period was analyzed for distribution losses and O&M expenses. The table given below indicates whether utility was able to achieve the target specified for O&M expenses and distribution losses or not.

Table 10: Performance of distribution utilities

S. No	Distribution Utility	O&M Expenses	Distribution losses
1	UGVCL	No	Yes
2	PGVCL	No	No
3	DGVCL	No	No
4	MGVCL	No	Yes
5	BESCOM	Yes	Yes
6	CESC	No	Yes
7	GESCOM	No	Yes
8	HESCOM	No	No
9	MESCOM	No	Yes
10	BEST	No	Yes
11	MSEDCL	No	Yes
12	NDPL	Yes	Yes
13	BRPL	No	No

S. No	Distribution Utility	O&M Expenses	Distribution losses
14	BYPL	No	Yes

2.128 It is evident from the table above that most of the utilities were able to achieve the target specified for distribution losses but the performance of the utilities in achieving targets for O&M expenditure is not very encouraging. In Annexure-IV details of the performance of the utilities against O&M expenses and distribution losses is given.

A3: REVIEW OF INTERNATIONAL EXPERIENCE

3.1 In this chapter, case studies on the regulations in select countries have been prepared which highlights the treatment for incentives, cost elements, performance target setting, correction mechanism and profit sharing for the distribution system operators/ distribution utilities. Further the incentives provided for reducing losses in distribution network have also been discussed along with the benchmarking practices in different countries:

United Kingdom

3.2 The incentive regulation model of distribution networks in UK consists of a hybrid of incentive schemes. Under the current arrangements, the operating expenditure, capital expenditure, and quality of service (including network energy losses) are incentivised separately and under different types of schemes within a building block framework.

3.3 The price control regime adopted for distribution utilities is RPI-X (where “I” is inflation and “X” is productivity index). The basic RPI-X scheme is supplemented by the use of additional incentives and capex triggers. The length of control period is of five years.

3.4 Controllable operating expenditures (Opex) are incentivised by benchmarking these against an efficient frontier made up of the best practice Distribution Network Operators (DNO) in the sector.

3.5 The allowed Opex of individual DNOs is set such that it requires them to close a specific proportion of their performance gap relative to the frontier during the price control period. In addition, all DNOs are given a general technical efficiency improvement target that is common to all DNOs.

Incentives

3.6 Core capex is subject to overall RPI-X incentive, with rolling five year retention of efficiency benefits. Information Quality Incentive (IQI) menu approach provides an incentive for accurate capex forecasting together with an incentive to make efficiency savings for the DNO’s.

3.7 Capex is set through the review of company business plans to set baseline for IQI menu. Companies choose position on the IQI menu. The approach of incentive mechanism for capex in principle allows DNOs to choose between getting:

- (a) a lower cost allowance, but with a “higher-powered incentive” that allows them to retain significant benefits if they can do even better than the low figure, and
- (b) a higher allowance, but with a “lower-powered incentive” that gives relatively smaller reward for under-spending the higher allowance.

- 3.8 Further for capex incentive, companies that choose the low cost allowance get a reward (a small amount of additional return above the base cost of capital) for spending no more than their allowance, while companies that choose the high cost allowance do not (they are neither rewarded nor penalised if they spend their allowance). The aim is that companies who know they need to spend a lower amount of capex will find it more beneficial to choose the lower allowance, whereas companies who know they need to spend relatively more will find it more beneficial to choose the higher allowance.
- 3.9 In case of incentives for Opex, unanticipated savings are kept by the company for five years in a rolling system. There is no provision for overspend other than that for the pre-specified cases to be considered for revisiting.
- 3.10 Service performance level is set as a combination of revenue adjustments and direct compensation payments to suppliers and customers. Liability for payments is generally capped.
- 3.11 The regulatory asset base (RAB) for each DNO is determined, on which they are entitled to earn an allowed rate of return. The initial RAB (used from the second price control period) in the case of the Regional Electricity Companies was based on their market capitalisation at privatisation. The rate of return is set based on a weighted average cost of capital (WACC) measure which uses a specific reference debt and equity split, reference market rate of return and debt interest rate and a relevant equity beta. Firms are free to choose their own actual level of gearing.
- 3.12 The allowed Opex and Capex of the utilities together with their regulatory asset base form the basis of the calculation of the utilities' total allowed revenues. The allowed revenues are in turn the basis for determination of the utilities' X-factors and initial prices applicable to their tariffs for the duration of the price control period.
- 3.13 DNOs are allowed to recover their capital costs (WACC x RAB), depreciation costs, and operating expenditures. The utilities' actual revenue should reach the efficient level of allowed revenue by the end of the price control period. This can be achieved by an infinite number of combinations of a price reduction in the first year and subsequent reduction through X-factors. Traditionally, Ofgem have opted for an immediate and differentiated reduction in initial prices combined with equal X-factors for all DNOs. This means that customers can benefit from the expected efficiency gains immediately and then expect more moderate reductions in subsequent years.

Quality of service incentives in the price control

- 3.14 The quality of service incentives in Ofgem's price controls through revenue exposure consist of:
- (a) interruption(continuity of service) incentives;
 - (b) guaranteed standards of performance;

- (c) quality of telephone service; and
- (d) a discretionary reward scheme covering the following three broad categories: priority customer care initiatives; initiatives relating to corporate social responsibility (e.g. activities with schools such as promoting safety awareness) and wider communication strategies implemented by DNOs (e.g. relationships with local health authorities or with other utilities in co-ordinating work).

3.15 The fourth price control review has significantly increased the targets and provided stronger incentive to achieve these. The revenue exposure of the DNOs to quality of service performance measures for the third (2000/01-2004/05) and fourth (2005/06-2009/10) distribution price control reviews (DPCR) is shown in the table below. The interruption incentives are supply interruptions per 100 customers (CI) and number of minutes lost per connected customer (CML). Individual CI and CML targets are set for the companies and performance is measured in relation to the targets.

Table 11: Exposure of revenue of companies towards quality of service

S. No.	Incentive arrangement	DPCR3	DPCR4
1	Interruption incentive scheme:- Duration of interruptions Number of interruptions	+/-1.25% +/-0.5%	+/- 1.8% +/- 1.2%
2	Storm compensation arrangements	-1%	-2%
3	Other standards of performance	Uncapped	Uncapped
4	Quality of telephone response	+/- 0.125%	+ 0.05% to -0.25%
5	Quality of telephone response in storm conditions	+/- 0.125%	0 initially +/- 0.25% for 3 years
6	Discretionary reward scheme	NA	Upto 1 million pounds
7	Overall cap/total	+2% to -2.875%	4% on downside No overall cap on upside

Performance of energy networks

3.16 From the analysis of the performance of the electricity distribution companies under the RPI-X regulatory regime it is seen that:

- (a) Price controls have driven down the revenues that network companies are allowed to earn from their network charges. Since the network companies were privatized, allowed revenues have declined by approximately 60% in electricity distribution (allowing for increases in the current period driven by increased capital investment).
- (b) There is evidence to suggest that operating efficiency has increased, for example real unit operating expenditure has fallen by approximately 5.5% per annum across the electricity distribution networks since privatization.
- (c) Capital investment in the electricity networks is higher on average than the period immediately prior to privatization.

- (d) The allowed pre-tax return has typically sat within the range of 6%-7% in price control settlements and companies have, in response to the incentive regime in place, earned higher returns by beating the regulatory contract. The recent Ofgem analysis has estimated that actual returns across the electricity distribution networks over the current price control period may differ from the assumed norm by a variation of +3.5 % to -1.5 %.
- (e) The quality of service delivered to customers has improved, with a 30% reduction in both the number and duration of reported power outages between 1990 and 2008.

Ireland

- 3.17 The Commission for Energy Regulation (CER) regulates transmission and distribution networks in Ireland. The distribution network is a Semi-state enterprise. The current price control covers the period 2006 – 2010, which is the second control period.
- 3.18 The price control regime adopted for 2006-10 is not strictly CPI-X. The Commission has set “X” at zero, while it has profiled allowed opex to reflect increased efficiencies year on year. This will have the same effect as putting a value on “X” and profiling the allowed revenues over the control period to drive efficiencies.
- 3.19 The price control formula adopted by CER contains the following:
 - (a) A rolling retention of benefits achieved through costs lower than target levels, which the Distribution System Operator (DSO) will be able to retain for five years so that it remains neutral as to when in the regulatory cycle those efficiencies are gained. It is up to the DSO to prove the creation of additional benefits and request their inclusion in the rolling retention.
 - (b) For opex, the DSO is permitted to retain the annual savings made for a period of five years, provided such savings have not been made at the expense of performance and quality of service.
 - (c) In assessing the benefit to be retained on capex, the Commission will pay attention to the cost, volume and quality of the investment made. For example, no benefit will be retained if the DSO were to make savings through reducing the volume of its investment. The efficiency savings will be reviewed as part of the next price control and inefficient expenditure will not be allowed into the RAB. Revenue earned on capex not spent will be reduced, except where the DSO can show that the avoided spend is due to efficiencies on its part.
 - (d) The Distribution price control formula contains a cost driver based on customer numbers. This is intended to model the impact of changing customer numbers year to year on the DSO’s costs so that this can be reflected in its allowed revenue for the period 2006-2010. This factor is

used because the impact of customer numbers is deemed to be outside the DSO's control.

- (e) Uncertain costs, such as those relating to market opening, changes in legislation or restructuring costs driven by legislation, will be reviewed on a case to case basis by the Commission. In each case, the DSO would be expected to ensure that changes in opex or new capex would take place in an efficient manner and this would be reflected in the allowance provided – there would not be an automatic pass-through of such costs.
- (f) Pass-through of certain type of costs such as business rates is allowed however this is subject to detailed justification of the expenditure in order to minimise the impact of the uncertain costs.

Incentives

3.20 Incentives under the price control have been provided to the DSO as under:

- (a) The value of “X” to drive the overall opex and capex efficiency gains
- (b) An incentive linked to the level of distribution losses, allowing the DSO to benefit from reductions in their level.
- (c) Quality of response from customer contact centre: this incentive is based on a target response time to customer enquires. The aggregate penalty or benefit in respect of this element is set at 1.5% of the DSO's allowed revenue.
- (d) Supply interruptions: this is based on a combination of customer minutes lost, together with the number of interruptions that have occurred and will encompass both planned and unplanned outages. Targets to be set for both elements and a penalty or benefit applied. The target levels have been set in accordance with improvements in performance associated with the DSO's capex plans. The total penalty or benefit associated with this component is set at a maximum of 1.5% of allowed revenue
- (e) Customer Charter: In the event that the DSO fails to make payments due to not meeting customer charter requirements, such shortfall are to be recovered through the price control mechanism. An extra 10% of the outstanding payments will be added to provide an additional incentive for the DSO to ensure it makes all customer charter payments due.

3.21 The impact of all incentives shall be limited to 4% of the DSO's allowed revenue. For 2006 however the limit is set at 2.5% as a transition step to the 4% limit which will apply from 2007 to 2010.

3.22 The return for the company is based on the RAB and the regulator's assessed post-tax cost of capital determined through the WACC. The regulator has assumed an “optimal” gearing ratio of 50%. The cost of equity is calculated using Capital Asset Pricing Model.

Performance of energy networks

- 3.23 Ireland's customer minutes lost figure has improved 26% (96 minutes) since 2001 which reflects the significant investment that has been made to the network during 2001-2005.
- 3.24 DSO's have performed poorly against the requirements set in the consumer charter during the first price control period
- 3.25 While overall opex remained above levels allowed in the 2001 price control determination, it has however reduced over the period 2001-2005, both on per customer basis and per unit basis.
- 3.26 There has been an increasing trend in the overall capex allowed during 2001-2005 for DSO's.
- 3.27 The evidence from price control review is that the efficiency incentives have variable impacts, which can be partly explained by the state owned nature of the company, which affects the strength and consistency of the efficiency incentives. CER has increased the number of items subject to incentives or partial pass-through in an attempt to promote more effort by the company to realise efficiencies.

Netherlands

- 3.28 The Office of Energy Regulation (DTe) is responsible for setting price controls for the gas and electricity sectors under the Gas Act and the Electricity Act 1998. The latest regulation period covers 2007-2009 and is the third control period.
- 3.29 The regulation is based on yardstick competition, where the performance of the regional grid operators is compared to each other in order to simulate competition between them. The average performance of all the grid managers is taken as the starting point.
- 3.30 Revenue cap mechanism followed is given by : $CPI - X + Q$

Where, "X" refers to the productivity improvement and "Q" relates to service quality. "X" in this case covers a broader range of improvements than the concept of comparative efficiency of opex as it is normally understood in the context of RPI-X regimes. Since the second regulatory period (2005 to 2007 inclusive), the "X" factor has been specified in advance of the control period, whereas previously it was applied on an ex post basis.

The total allowed revenues in the first year of the third regulatory period are therefore based on the total allowed revenues of the last year of the second regulatory period adjusted for the CPI and the "X" factor.

3.31 The “X” factor is calculated as being the actual average annual change in productivity of all networks during the years 2003, 2004 and 2005. The same “X” factor is used in the calculation of allowed tariffs for all networks. Under the methodology used by DTe, the change in productivity is measured as being the change in:

$$= C/SO$$

Where (for each year and each network company), “C” is a measure of Standardised Economic Costs, and “SO” is a measure of Composite Output.

3.32 Standardised Economic Costs are defined as being the sum of operating costs and capital costs (including a cost of capital allowance) incurred by each network business during the years 2003, 2004 and 2005. A number of adjustments are made to this value, including:

- (a) changes to the assumed cost of capital in each year (enabling the gradual introduction of a reduced cost of capital allowance in the third regulatory period);
- (b) the removal of costs deemed “exceptional”;
- (c) expenditure resulting from Objectifiable Regional Differences (i.e. structural factors that mean some networks will incur higher costs than other networks)

3.33 Composite Output is essentially a calculation of revenue, defined as being the sum of the product of each sector tariff by the corresponding sector volume for each network. A number of adjustments are also made in the calculation of this value, including a different treatment of connection related services (maintaining prices for these services at 2000 levels).

3.34 The average annual change in productivity in each year is further adjusted by a “catch-up” value. This adjustment removes so-called historical inefficiencies from the calculation of productivity (ensuring that these are not included in the value of “X” applied in the third regulatory period). This appears to be a one-off move as DTe had previously given grid operators 6 years to eliminate historical inefficiencies.

3.35 Finally, an “equalisation factor” is applied to the calculation for “X” factor. This adjusts the calculated level of X to allow for any under / over collection of revenues by each network in the second regulatory period, during which X was set individually for each grid operator.

3.36 A value of “Q” is set for each grid operator and represents a target for the average duration and frequency of interruptions. A grid operator’s allowed revenue is increased /decreased by up to 5% if its performance is better/worse than the target. For the third control period, “Q” was calculated based on each grid operator’s quality performance during 2003-2005.

- 3.37 The DTe uses a measure it calls the System Average Interruption Duration Index (SAIDI), which is calculated as:

$$\text{SAIDI} = \text{VM} / \text{AK},$$

Where (for each year and each grid operator) “VM” is the total number of minutes not delivered and “AK” is the number of connected consumers.

- 3.38 The quality performance depends on the valuation of the difference between the “quality measurement” and the “quality norm”. The quality measurement is determined according to the level of the average annual interruption duration for each operator’s connected consumers. The quality norm is determined on the basis of the average annual interruption duration per consumer of all the grid managers during 2004 and 2005 (data prior to that was deemed unreliable).
- 3.39 The DTe aims to set the quality norm for future price reviews in advance, as such, the “Q” factor for the fourth control period will be equal to the average annual interruption duration per grid manager, measured for the years 2006, 2007 and 2008. Force Majeure events are excluded from the quality control.
- 3.40 The return is based on the Standardised Asset Value and a pre-tax real WACC. The allowance for the cost of capital is made through an (inverse) adjustment in “X”. DTe applied a gradual shift from the 6.6% WACC used in the first two control periods to the one used in the third period. This affected the value of “X” used in each year of the third control period. The cost of capital is based on a notional level of gearing (60% at the last price review) rather than individual company gearing.

Incentives

- 3.41 The companies get to keep any unanticipated savings for the duration of the price control while overspend is excluded. The previous regime allowed for ex post corrections. The current regime leaves the door open for it, but only if it turns out that the original revenue cap was set at a wrong level because of incorrect or incomplete information.
- 3.42 The current control period covers 3 years, but the regulator is able to set controls for 3-5 years generally targeting the maximum control length.
- 3.43 Opex and capex allowances are set ex ante but the regulator leaves itself some room to make ex post adjustments should the actual outcomes deviate considerably from the estimates. There are no special service incentives provided, beyond the use of a “Q” factor in setting the revenue allowance (allowed revenue is increased /decreased by up to 5% if its performance is better/worse than the target) and no special capex incentives (“X” factor symbolises efficiency gains, and grid managers, who reduce their cost per unit of output by more than the average grid manager, realise a relatively higher profit) is provided beyond the CPI – X + Q control.

- 3.44 The symmetry in the quality target (allowed revenue is increased /decreased by up to 5% if the performance is better/worse than the target set for “Q” factor)not only generates a disincentive to under-perform the target but also provides an incentive to outperform it.

Performance of the electricity grid manager

- 3.45 Complaint processing by energy companies has evidently improved by comparison to earlier control period, though structural arrangements are still insufficient.

Victoria

- 3.46 Revenue cap mechanism followed is given by : $CPI - X + S$

Where “CPI” is the change in customer price index, “X” refers to efficiency and “S” is a service adjustment incentive (an incentive on service reliability performance and customer service).

- 3.47 Prices are controlled under a weighted average tariff basket approach for each distribution company. Following the (annual) addition/ withdrawal of any tariff, responsibility remains on the company to show the basket of tariffs is compliant with the control. Opex and capex efficiency gains/ losses from 2001-05 are retained for a full five years (irrespective of when they were made) through an Efficiency Carryover Mechanism.

- 3.48 Pass through of costs (or savings) are permitted relating to the following:

- (a) changes in taxation policy;
- (b) financial failure of a retailer;
- (c) a declared retailer of last resort event; and
- (d) “major projects” events.

- 3.49 Revenue requirement allowance is set as

= (RAB x WACC) + Regulatory depreciation + Operating and maintenance expenditure + Cost of company tax + Efficiency carryover amount.

Forecasts of growth in numbers of customers, consumption and peak demand are critical to converting the revenue requirement into the price control (as well as impacting estimates of load-related capex). Companies bear all benefits (losses) from higher (lower) outturn levels of demand.

- 3.50 Regulator has set capex level for each company based on a 30% increase from capex incurred in the previous control period.

- 3.51 Cost of capital for the operator is determined using the WACC method and Capital Asset Pricing Model (CAPM) is used to estimate the post-tax return on equity.
- 3.52 The Efficiency Carryover amounts are calculated by taking the total NPV of efficiency gains over 2001-05 and incorporating it in the 2006-10 revenue requirement (net of any 2001-05 efficiency losses), with the first year of the latter control period given a significantly higher weightage in the allowance than the subsequent four years. In calculating the 2006-10 revenue requirements, capex and opex efficiency gains were included.
- 3.53 The Efficiency Carryover Mechanism (ECM) for 2011-2015 will only include opex efficiency gains since the regulator argues that the ECM is effective for opex due to its recurrent nature, while arguing that the impact on capex is less tangible since the relationship between revealed expenditure and future capital expenditure is more difficult to establish.

Incentives

- 3.54 There is a five year price control, applying from 1 January 2006. P_0 (starting year) reductions were applied to tariffs of all five companies in 2006 (ranging from 4% to 17% for distribution services). Subsequent X values of 2.5% was applied to all the companies. The Efficiency Carryover Mechanism (ECM) is a “roller” mechanism whereby efficiency gains from opex/ capex under spend is retained for 5 years (irrespective of when they are earned). Capex will not be included in the ECM that applies beyond 2010.
- 3.55 Two service incentive mechanisms are applicable:
- (a) service incentive scheme (S-factor scheme);
 - (b) Guaranteed Service Level (GSL) payments scheme.
- 3.56 Under the service incentive scheme, a company’s allowed revenue (through average prices for all customers) is increased (decreased) based on increases (decreases) in service performance as measured against defined targets. The targets included in the “S” factor are:
- (a) unplanned supply interruption frequency;
 - (b) unplanned minutes off supply;
 - (c) momentary supply interruption frequency;
 - (d) call centre performance (proportion of calls responded to within 30 seconds).
- 3.57 Reliability targets are weighted in line with customer preference. Targets are defined separately by urban/ rural network type. No qualities of service measures were included in this financial incentive due to lack of reliable historical performance data.

- 3.58 A Guaranteed Service Level (GSL) payment scheme also applies, designed to ensure a minimum level of service reliability. Under the GSL, customers who receive a level of service that is worse than defined levels receive automatic payments directly from the distribution companies. An allowance has been made in the revenue requirements of each company to meet a level of GSL payments for the 2006-10 control period
- 3.59 All efficiency gains within control period are retained by the companies. Customers benefit from (P_0 and annual) price reductions at subsequent controls. Efficiency gains are retained by companies for five years irrespective of the years in which they are earned (through the Efficiency Carryover Mechanism). This is a one-sided mechanism (a floor of zero applies for each company). Service performance incentives are tied with targets set at expected performance levels.

Performance of the distribution companies

- 3.60 In the control period 2001-05 all the distributors reported higher actual returns on their regulated assets than the forecast returns. Actual revenue for all the distributors was higher than the forecast revenue.
- 3.61 The performance of the distributors in terms of reliability of supply has shown an improvement over the period 2001-05, exceeding the target performance levels set for 2005. Average total minutes-off-supply per customer (excluding the events of load shedding due to lack of generation capacity) has shown declining trend in 2001-05 period. Average number of interruptions per customer has also shown a declining trend in the control period 2001-05.
- 3.62 In terms of unplanned minutes-off-supply, Alinta AE and CitiPower continued to show a generally improving trend in supply reliability over the 2000-06 period. Powercor's and United Energy's previously significant improving trends levelled out. SP AusNet, however, showed a small degree of deterioration in this performance area
- 3.63 Across the distribution businesses as a whole, the number of complaints per thousand customers varied relatively little over the past six years.
- 3.64 Forecast of the consumer contribution to the capital expenditure for the period 2001-05 was lower than the actual consumer contribution for all the distributors

Pakistan

- 3.65 In Pakistan, National Electric Power Regulatory Authority (NEPRA) acts as the regulator for distribution companies.
- 3.66 NEPRA examines and fix the total revenue for the distribution companies on yearly basis. Total allowed revenue for the year is called "Distribution Margin" (DM).

Distribution Margin

- 3.67 Distribution Margin allowed for the year comprise of following heads.
- (a) O&M
 - (b) Depreciation
 - (c) Return on asset base
 - (d) Other income
- 3.68 O&M expenses are approved by the NEPRA after comparing the expenses with O&M expenses of other distribution companies. It is important to note that O&M expenses per unit of sales are compared and no benchmarking exercise is undertaken as is done by OFGEM.
- 3.69 NEPRA also considers any effect because of change in laws or any other directions by the government, while deciding O&M expenses.
- 3.70 Depreciation is allowed to the companies based on the international accounting laws.
- 3.71 Return on regulated asset base is allowed based on the WACC (weighted average cost of capital). Regulated asset base also includes working capital apart from the fixed assets. Working capital is allowed on the basis of actual expenditure and is revised every year.

Power Purchase Cost

- 3.72 Apart from distribution margin, companies are also allowed to recover power purchase cost on the basis of actual. On the approved power purchase cost, monthly adjustments are made based on the movement of fuel prices. Adjustment in power purchase cost is calculated based on the following formula.

$$\Delta PPP = \pm \frac{(PPP_{(Act)} - PPP_{(Ref)})}{(1 - L)}$$

Where:

ΔPPP	=	Variation in Power Purchase Price including fuel price variation in terms of Rs./kWh purchased occurred in a month against the reference PPP
$PPP_{(Act)}$	=	Actual PPP (Rs./kWh purchased) during the month for which the adjustment is required to be made
$PPP_{(Ref)}$	=	Reference Power Purchase Price (PPP) of Rs. 5.4486/kWh
L	=	Target losses which are 11% for FY 2008-09

New York

- 3.73 In this section we have discussed the regulatory regime for Niagara Mohawk Power Corporation. Niagara Mohawk Power (which does business as National Grid) distributes electricity to approximately 1.5 million customers and natural gas to 540,000 customers in upstate New York.
- 3.74 New York State Public Commission is the regulator for New York.
- 3.75 In New York Earnings Sharing Mechanism, with a defined acceptable target for ROE is applicable. Electricity delivery rates were determined by a 10-year rate plan (from 31st January 2002).
- 3.76 The electricity regime is relatively complex, including risk mitigation clauses for both investors and customers. The profile of revenue sharing is defined around a central threshold ROE of 10.6%. Specifically:
- (a) any additional earnings up to 11.75% can be retained by the company (extended to 12.0% if certain customer migration and education goals are met);
 - (b) earnings above 11.75% (or 12%) and below 14% shared equally with customers;
 - (c) from January 1st 2009 additional sharing rules come into play with returns above 14% shared 75% with customers and returns above 16% shared 90% by customers; and
 - (d) after the fourth year of the plan, a cumulative assessment of the returns is made, with 50% of any excess return returned to customers.
- 3.77 To ensure the quality of service, regulator has specified penalties with total annual pre-tax value of US\$24 Million. This may be applied if satisfactory service levels are not met (under the Service Quality Assurance Program). US\$11 Million relates to electricity system reliability and US\$13 Million relates to electricity and gas customer service. Specifically:
- (a) customer service provisions include standards relating to call centre operations, billing, field services and low income customer assistance; and
 - (b) electricity reliability standards relate to both service reliability (frequency/duration of interruptions), and power quality (momentary interruptions).
- 3.78 If penalties exceed US\$7.5 Million in any year, these are credited to customers (with lesser penalties entering a deferral account). Low income customer assistance includes a US\$5 per month discount on the rate for eligible customers.
- 3.79 Capital costs are amortised unevenly over ten years with larger amounts being amortised in latter years (consistent with projected recovery through rates).

3.80 All fuel costs are pass through to the consumers. Though regulators try and manage the volatility of the price movements.

Table 12: Summary of international experience

S.No	Parameter	U.K	Ireland	Netherlands	Victoria	Pakistan	New York
1	Determination of annual revenue requirement	Allowed revenue comprise of, operating expenses and capital expenses. Both opex and capex are determined by RPI-X approach	The price control regime adopted is RPI-X, using the household CPI.	Revenue cap mechanism followed is given by : $CPI - X + Q$ X : productivity improvement Q : service quality. X in this case covers a broader range of improvements than as it is understood in the context of RPI-X regimes	Revenue cap mechanism followed is given by : $CPI - X + S$ Where CPI is the change in customer price index, X refers to efficiency and S is a service adjustment incentive	Revenue cap in the form of distribution margin comprising of following items O&M Depreciation Return on asset base Other income Power Purchase cost is a pass through	Earnings Sharing Mechanism, with a defined acceptable target for ROE is applicable. Electricity delivery rates were determined by a 10-year rate plan. A 10.6% to 11.75% (post tax) target deadband was defined for the electricity ROE, with earnings above this threshold shared with customers
2	Opex	Opex is determined by benchmarking and by providing suitable efficiency improvement factors in the form of X	The value of “X” to drive the overall opex and capex efficiency gains	Opex and capex allowances are set ex ante. There are no special service incentives provided, beyond the use of a “Q” factor in setting the revenue allowance (allowed revenue is increased /decreased by up to 5% if its performance is better/worse than the target) and no special capex incentives is provided beyond the $CPI - X + Q$ control.	Capex and opex are controlled by X factor	Opex per unit of sales is compared with other utilities and also the reasonability of expenses is examined	Opex is not controlled separately.
3	Capex	Core capex is subject to overall RPI-X incentive, with rolling five year retention of efficiency benefits. IQI menu approach provides an incentive for accurate capex forecasting together with an incentive to make efficiency savings for the DNO’s.	The value of “X” to drive the overall opex and capex efficiency gains			Reasonability of capex expenses is examined	Capital costs are amortised unevenly over ten years with larger amounts being amortised in latter years (consistent with projected recovery through rates).
4	Service quality	Quality of service incentives	There are no specific provisions for revenue	The symmetry in the quality target not only	Under the service incentive scheme, a	No incentive on	Penalties with total annual pre-tax value of

S.No	Parameter	U.K	Ireland	Netherlands	Victoria	Pakistan	New York
		<p>consist of: interruption guaranteed standards of performance; quality of telephone service a discretionary reward scheme covering the following priority customer care initiatives; initiatives relating to corporate social responsibility wider communication strategies implemented by DNOs (e.g. relationships with local health authorities or with other utilities in co-ordinating work).</p>	<p>to be increased or reduced as a result of poor quality of service.</p>	<p>generates a disincentive to under-perform the target but also provides an incentive to outperform it.</p>	<p>company's allowed revenue is increased (decreased) based on increases (decreases) in service performance as measured against defined targets. The targets included in the "S" factor are: unplanned supply interruption frequency; unplanned minutes off supply; momentary supply interruption frequency; Call centre performance</p>	<p>quality of service.</p>	<p>US\$24m may be applied if satisfactory service levels are not met. US\$11m relates to electricity system reliability and US\$13m relates to electricity and gas customer service. Specifically: customer service provisions include standards relating to call centre operations, billing, field services and low income customer assistance; a electricity reliability standards relate to both service reliability and power quality</p>

Treatment of losses in distribution network

3.81 The following table summarises the actual practices, representative of the different solutions put in place in the European countries for the treatment of losses in the distribution network.

Table 13: Regulatory incentives to reduce losses

Country	Regulatory incentives to reduce losses
UK	The distribution price control includes incentive to reduce losses against a DNO-specific benchmark. The incentive is set at 71.2€/MWh for the 2005-10 distribution price control. DNOs keep the benefit of losses reductions for five years through the application of a rolling retention mechanism.
Norway	<p>Transmission and distribution services in Norway face an incentive based yardstick regulation. Annually, the permitted income is set based on a 40/60 split between the companies own costs with a two year lag and a norm cost based on a benchmarking analysis. Permitted income covers all cost, including network losses.</p> <p>Only the physical losses measured in MWh are included in the cost base and the benchmarking exercises. Permitted income is annually adjusted as such according to a volume weighted area price, based on the monthly area price quoted on Nord Pool Spot and monthly volumes from Norwegian Water Resources and Energy Directorate's (NVE) consumption statistics. This arrangement is based on the assumption that the network owner can do little to influence the price of buying energy on the spot market element.</p> <p>However, network owner can influence the physical network loss in MWh (volume), both in the short run (through network operation) and in the long run (through an investment strategy). As such, network losses in terms of volume are included in the yardstick income regulation, and the network owner must work out a strategy of how to deliver adequate services at the minimum total cost, where network losses constitute one cost element. If the cost of reducing the network-losses is less than the reduced cost of losses, the company will be measured as more efficient and get a higher rate of return.</p>
Sweden	For local DSOs which are regulated in relation to a standardised grid, there are calculated standardised losses and costs for losses in the network performance assessment model which is used ex-ante by DSOs and ex-post by regulator
France	<p>For the main distribution system operator in France, which represents more than 90% of the distribution networks, the level of charges for losses in the ongoing regulatory period takes into account objectives of theft reduction (0.5% to 1.5% depending on the region where it applies).</p> <p>The French regulator and the networks operators are jointly considering an incentive mechanism on losses to be put in place for the next regulatory period (2009-2011). To implement this incentive mechanism, a reference amount for losses charges has to be defined for the transmission and distribution networks, respectively. Each year, if the amount for losses charges is below (or above) the reference value, the TSO/DSO would be entitled to a financial reward (or penalty) proportional to the difference between those values.</p>
Portugal	<p>National Plan for Climatic Changes (PNAC), approved by the Government, states that until 2010 total networks losses (transmission and distribution) should be lower than 8.60%.</p> <p>Tariff Code includes an incentive mechanism to reduce losses in distribution networks allowing the DSO to be rewarded/ charged if it achieves global distribution losses lower (or above) than a reference value set by Energy Services Regulatory Authority (ERSE), every year</p> <p>Based on the specificity and value of losses for each network type, the present incentive mechanism applies only to distribution networks.</p>

<p>At the beginning of the recent regulatory period (2006 – 2008), ERSE defined the reference values for the distribution networks losses. In each year, if the losses lies under (or above) the reference value, the DSO is entitled to a financial reward (or penalty) proportional to the difference between those values, capped to a maximum value set by ERSE.</p>

- 3.82 The analysis of the regulatory /incentive mechanism adopted in various countries to reduce power losses in transmission or distribution networks, illustrates the following:
- (a) Incentive based regulatory model where the incentives for the network losses are equal to the incentives for any other costs are in practice;
 - (b) Allowed rate of losses to be included in tariffs is capped to a maximum value defined in percentage terms;
 - (c) Incentive mechanism allowing the network operator to be rewarded / penalised if the network losses are lower/above than a reference value are achieved, are also in use in some countries.

Benchmarking practices in other countries

- 3.83 Benchmarking can be defined as a process of comparison of some measure of actual performance against a reference or benchmark. The performance of a company can be regarded in three main aspects - productivity, efficiency and quality. Efficiency and productivity are the most commonly used measure of performance in the electricity sector.
- 3.84 In traditional cost-of-service regulation systems companies recover their costs with a risk free fixed rate of return and therefore have little incentive to minimize costs. The incentive- or performance-based schemes on the other hand, are designed to provide incentive for productive efficiency by compensating the company with part of its cost savings.
- 3.85 Main categories of incentive regulation systems used for electricity utilities are: price/revenue cap schemes, sliding-scale rate of return, partial cost adjustment, menu of contracts, and yardstick competition. Amongst the widely used methods in electricity networks is price cap regulation (RPI-X), which sets the maximum rate of increase for the regulated prices equal to the inflation rate of retail prices index (RPI) minus a productivity growth offset referred to as X-factor. The regulated companies can therefore increase (lose) their profits if they improve their productivity at a higher (lower) rate than the assigned X-factor.
- 3.86 For the definition of X-factor the regulators around the world have used several options. In the first option based on the original price-cap approach, X-factor is set equal to the annual expected or target growth rate of the total factor productivity (TFP) in the entire sector. This option has been employed mostly by the US regulators.

In the second option used in Europe, X-factors are set equal to the annual target change in productive efficiency for each individual company. Therefore, the regulator can set differentiated price caps based on the companies' efficiency performance estimated from a benchmarking analysis. Hence, there is differentiation between the companies based on 'benchmarking' that is, measuring a company's productive efficiency against a reference performance.

3.87 In still other countries which have ROR (Rate of return) approach the regulators combine the ROR method with other incentive regulation approaches. For instance, benchmarking analyses can be used to estimate a reasonable return rate. In this case the ROR is calculated on the costs of an average typical firm or a fully efficient firm and not on the reported company's own costs. This approach is in line with the yardstick competition model.

3.88 The table below shows the benchmarking methods adopted in various countries:

Table 14: Benchmarking methods in various countries

Country	Regulation method	Approach	Explicit use of benchmarking	Benchmarking level	Benchmarking method
UK	Price-cap	Ex ante	Yes	Generic and individual	Corrected Ordinary Least Squares (COLS), Bottom-up engineering analysis
Norway	Revenue-cap	Ex ante	Yes	Generic and individual	Data Envelopment Analysis (DEA)
Finland	Expenditure cap and Rate of return	Ex post	No	Generic	DEA
Netherlands	Yardstick	Ex ante	Yes	Generic	DEA
Chile	Special case of Yardstick	Ex ante	Yes	For typical 5 zones	Engineering economic analysis (efficient model company is defined)
Sweden	Special case of Yardstick	Ex post	Yes	Individual	DEA, Performance assessment model (engineering analysis)
Australia (New South Wales)	Revenue-cap until 2004,	Ex-ante	No	Individual	DEA, Stochastic Frontier Analysis (SFA)
United States (California)	Price-cap with earning sharing	Various	No	Individual	Total Factor Productivity (TFP) studies

- 3.89 An important aspect of regulation is in the use of efficiency scores in the regulation schemes, such as X-factors in the price/revenue cap formula or the efficiency adjustment in yardstick rules. The efficiency scores can be considered as a generic value for all companies or as individual firm-specific values. While both approaches have been used in practice, there is a general tendency to use different scores for individual companies.
- 3.90 In general, there exist two approaches concerning the use of benchmarking results. Regulators in many countries like Chile, Norway, UK and Netherlands use in a rather “mechanical” way the efficiency results as an explicit part of the regulation process. In other countries such as US, Australia and Finland the benchmarking analysis is used only as an additional instrument for regulatory decisions. As for measuring efficiency, the deterministic methods like Data Envelopment Analysis (DEA) and Corrected Ordinary Least Squares (COLS) are most commonly used. However there is a growing interest in using Stochastic Frontier Analysis (SFA) as a complementary method.

A4: SHARING GAINS OF PERFORMANCE-EMPLOYEE INCENTIVE SCHEME

Background

- 4.1 The success of any organisation depends upon the performance of its employees. Hence it is imperative to keep the employees motivated for the success of the organisation in the long run. Linking the performance with the incentive is an effective way to motivate employees.
- 4.2 To apply any form of incentive or disincentive for the employees within an organisation, it is important to measure their performance and evaluate the same. In this aspect, many government-owned distribution utilities still rely on their traditional models of performance appraisal and compensation system.
- 4.3 This section discusses the incentive scheme for employees in government owned distribution utilities.

Incentive pool

- 4.4 Each utility may create a separate account called as the “**Incentive Pool**” for sharing the gains of performance with their employees. It is important for such an account to be created and sources may be:
- (a) Performance based incentives passed on by the SERC ;
 - (b) On account of central and state government incentive schemes; and
 - (c) Any other identifiable measure
- 4.5 Since many government-owned utilities do not earn any incentives currently, earmarking 10 percent of return on equity towards incentive has been proposed, as a one time contribution to the incentive pool at the beginning of the scheme. This money will be kept in the incentive pool for a transition period of 3 years to kick start this incentive scheme, after which this amount shall be returned back to the utility.
- 4.6 From the subsequent years, it is envisaged that because of the improved performance of the utility, the utility shall be able to earn incentive out of which only Fifty (50) percent of the incentive earned by the utility shall go towards the incentive pool account for distribution to the employees.

Organisational Business Plan

- 4.7 Each distribution utility shall be required to prepare a well structured business plan clearly indicating the following:
- (a) Vision / Mission

- (b) Strategies
 - (c) Long term and short term objectives
 - (d) KPIs and targets / milestones.
- 4.8 The effectiveness of any performance management system is triggered from a robust organisation business plan.
- 4.9 A well designed business plan is the key to trigger the process of designing a performance management system. The business plan serves the purpose of communicating the long / short term objectives and priorities within the organisation.
- 4.10 The long term, short term objectives and KPIs should be decided keeping in mind the vision and mission of the Company, Regulatory framework and Government policies.

MIS framework

- 4.11 The measurement of performance through a scorecard requires data collection, monitoring and analysis on a periodic basis. The frequency of the data collection at the corporate level as well as the field unit levels need to be defined.
- 4.12 This effort requires a robust MIS framework to be in place which can be further catalyzed by the use of a software package at a later stage. Similarly the scorecard and the indices to be monitored require assignment of responsibilities within the organisation.
- 4.13 Each utility is therefore expected to design and put in place its own MIS framework allocate responsibilities to administer such a system on a consistent basis.
- 4.14 The details of the MIS formats required shall depend on the design of the scorecard and the organisational setup of the specific utility. Hence it is beyond the scope of this report to detail out such formats.
- 4.15 It must be kept in mind to design the MIS system in such a way that it serves as a closed loop control system i.e. which can serve as an alarm system to indicate deterioration of performance than the expected level.
- 4.16 The subsequent sections outlines the performance linked incentive sharing scheme:

Corporate performance scorecard

- 4.17 It is important to identify the key drivers of performance and the key result areas within the organisation. These shall flow from the long term organisational objectives of the company spelt out in the business plan.

Performance parameters

4.18 The following indicative parameters (Pi) for the corporate score card, which drive the performance within a distribution utility have been proposed:

- (a) distribution losses;
- (b) collection efficiency;
- (c) O&M expenses; and
- (d) quality of supply.

Defining KPIs

4.19 For the purpose of comparing and measuring the performance against a parameter, there is a need to identify the KPIs for the same. The table given below lists the KPI for each of the parameter identified above.

Table 15: KPI for corporate score card

S. No.	Parameter	KPI
1	Distribution losses	Distribution losses as % of total input energy
2	Collection efficiency	Amount collected as a % of total amount billed
3	O&M Expenses	O&M expenses as a % of Gross Fixed Assets (GFA)
4	Quality of Supply	Network and supply availability index (Refer section 7.7,7.8,7.9 of Annexure-III)

Assigning weightages

4.20 Each parameters shall be assigned weightages (Wi) within a scale of 0 – 100 (percentage) depending on their relative importance and priority assigned to the utility in such a manner that sum of the weightages assigned to all the parameters should be 100.

4.21 For each of the parameter identified for corporate score card the weights have been calculated in **Annexure-II**. Summary of the weights assigned to each of the parameter is given below.

Table 16: Weightages for parameters in corporate scorecard

S. No	Code	Performance Parameter	Weightage
1	P1	Distribution losses	60%
2	P2	Collection efficiency	10%
3	P3	Quality of Supply	10%
4	P4	O&M Expenses	20%

Defining Targets

- 4.22 Each KPIs shall be measured against a target value (T_i) which is to be set at the beginning of the measurement period.
- 4.23 Some of the approaches for fixing the targets of the identified KPIs could be:
- (a) Targets set by the regulator as per the existing regulations;
 - (b) As a percentage improvement over the value of last period performance; and
 - (c) Industry benchmarks
- 4.24 For each of the parameter identified for corporate score card the targets have been calculated in **Annexure-III**.

Measurement of Actual Achievement

- 4.25 Performance of the distribution company against each parameter defined will be measured and defined as (A_i).

Calculation of Total Performance Index (TPI_{corp})

- 4.26 The performance index is calculated for each parameter (P_i) as = $W_i * A_i / T_i$
- 4.27 The summation of the performance index of all the parameters will give the Total Performance Index.

The Total Performance Index (TPI_{corp}) is calculated as = $\sum (W_i * A_i / T_i)$

- 4.28 The following table illustrates the corporate scorecard and the basis of measuring the total performance index.

Table 17: Performance Scorecard

S. No	Code	Performance Parameter	Indicative KPIs	Weight age	Target value	Actual value achieved	Performance index
1	P1	Distribution losses	Distribution losses as % of total input energy	W_1	T_1	A_1	$W_1 * (A_1 / T_1)$
2	P2	Collection efficiency	Amount collected as a % of total amount billed	W_2	T_2	A_2	$W_2 * (A_2 / T_2)$
3	P3	O&M Expenses	O&M expenses as a % of GFA	W_3	T_3	A_3	$W_3 * (A_3 / T_3)$
4	P4	Quality of Supply	Network and supply availability index as specified in section	W_4	T_4	A_4	$W_4 * (A_4 / T_4)$

S. No	Code	Performance Parameter	Indicative KPIs	Weight age	Target value	Actual value achieved	Performance index
			7.7,7.8,7.9 of Annexure-III				
Total Performance Index (TPI_{corp})							$\sum (W_i * A_i / T_i)$

Cascading scorecard to regional / field levels

4.29 Each electricity distribution utility in India has a different organization structure. The structure of some of the electricity distribution utilities in India is given below.

Table 18: Structure of Distribution utilities

S. No	MSEDCL	UHBVN	APCPDCL	APDCL
1	Corporate office	Corporate office	Corporate office	Corporate office
2	Region / Zone	Zone	Circle	Zone
3	Circle	Circle	Division	Circle
4	Division	Division	Sub division	Division
5	Sub division	Sub division	Dist centre / Section	Sub division

4.30 The present incentive scheme has been framed at the sub-division level and all employees in the sub-division be given same incentive based on the performance score card of the sub-division.

4.31 In order to implement the incentive scheme upto the subdivision level following prerequisites are required:

- (a) Distribution utility should have segregation of 11KV feeders among sub-divisions.
- (b) All sub-divisions in the utility should have adequate metering to measure the amount of energy received by the subdivision.
- (c) Sub-division should have the data on total amount of energy billed to the consumers.
- (d) Sub-division should have the data on total amount collected from consumers (this should have segregation of arrears and amount collected against current bills)
- (e) Sub-divisions should have data on SAIDI for each 11 KV feeder under its control.

4.32 For the field office above sub-division level like division office, circle office or zone office (as the case may be in the utility) performance score shall be taken as the average of the performance score of all the sub-divisions working under that office.

Calculation of weighted TPI at the Sub-division level

4.33 The calculation of the weighted TPI at the sub-division level may be done as follows:

- (a) Let the corporate TPI be denoted as = TPI_{Corp}
- (b) Let the sub-division level be denoted as TPI_{SDi} (TPI_{SD1} , TPI_{SD2} , TPI_{SD3} respectively)
- (c) We assign weightages to the corporate level TPI as = X% and the sub-division level TPI as = Y%
- (d) Let the weighted TPI at unit level be denoted as TPI_{WSDi}
- (e) Therefore the weighted TPI is calculated as follows:

$TPI_{WSDi} = (X\% \text{ of } TPI_{Corp}) + (Y\% \text{ of } TPI_{SDi})$

Sub-division Performance Score Card

Performance parameters

4.34 At the Sub-division level employees have no control over the power purchase cost and O&M expenses, thus at sub-division level, score card can have following parameters.

- (a) Distribution losses
- (b) Collection Efficiency
- (c) Quality of Supply

Defining KPIs

4.35 For the purpose of comparing and measuring the performance against a parameter, there is a need to identify the KPIs for the same. Table given below gives the KPI's for the parameters identified for sub-division performance score card.

Table 19: KPI for the sub-division score card

S. No	Parameter	KPI
1	Distribution losses	Distribution losses as % of total input energy
2	Collection efficiency	Amount collected as a % of total amount billed
3	Quality of Supply	Network and supply availability index

Assigning weightages

4.36 Weightage of 0-100 (percentage) can therefore be distributed among the above three parameters.

4.37 Weightage of each of the parameter will also depend upon the Type of the sub-division. Electricity sub-divisions have been classified into following 3 categories depending upon the customer profile of the sub-division.

- (a) Urban Sub-division
- (b) Rural sub-division
- (c) Industrial sub-division

4.38 While classifying the sub-divisions, it is assumed that more than 60% revenue from the consumers in the sub-division belongs to that particular category. For example, if in a sub-division, 60% or more revenue is from rural consumers, then the sub-division will be classified as rural sub-division.

4.39 Quality of supply, distribution losses and collection efficiency all three are important parameters, but depending upon the customer profile different weights can be assigned to each parameter. In industrial sub-divisions, emphasis should be more on the Quality of supply and in rural sub-divisions emphasis should be more on the distribution losses and the collection efficiency. Following weightages can be adopted for each of the three types of sub-divisions:

Urban-Sub-division

Table 20: Weights assigned to parameters of urban sub-division

S. No	Code	Performance Parameter	Weightage
1	P1	Distribution losses	75%
2	P2	Collection efficiency	10%
3	P4	Quality of Supply	15%

Rural-sub-division

Table 21: Weights assigned to parameters of rural sub-division

S. No	Code	Performance Parameter	Weightage
1	P1	Distribution losses	80%
2	P2	Collection efficiency	12%
3	P4	Quality of Supply	8%

Industrial-sub-division

Table 22: Weights assigned to parameters of industrial sub-division

S. No	Code	Performance Parameter	Weightage
1	P1	Distribution losses	70%
2	P2	Collection efficiency	10%
3	P4	Quality of Supply	20%

Defining Targets

4.40 Each KPIs shall be measured against a target value (T_i) which is set at the beginning of the measurement period.

Measurement of Actual Achievement

4.41 Performance of the distribution company against each parameter defined will be measured and defined as (A_i)

Calculation of Total Performance Index (TPI_{SD})

4.42 The performance index is calculated for each parameter (P_i) as = $W_i * A_i / T_i$

4.43 The summation of the performance index of all the parameters will give the Total Performance Index.

$$\text{The Total Performance Index (TPI}_{SD}) \text{ is calculated as } = \sum (W_i * A_i / T_i)$$

4.44 The following table illustrates the sub-division scorecard and the basis of measuring the total performance index.

Table 23: Performance Scorecard

S. No	Code	Performance Parameter	Indicative KPIs	Weight age	Target value	Actual value achieved	Performance index
1	P1	Distribution losses	Distribution losses as % of total input energy	W_1	T_1	A_1	$W_1 * (A_1 / T_1)$
2	P2	Collection efficiency	Amount collected as a % of total amount billed	W_2	T_2	A_2	$W_2 * (A_2 / T_2)$
3	P4	Quality of Supply	Network and supply availability index as specified in section 7.7,7.8,7.9 of Annexure III	W_4	T_4	A_4	$W_4 * (A_4 / T_4)$
Total Performance Index (TPI_{SD})							$\sum (W_i * A_i / T_i)$

Performance and Payment Relationship

4.45 The incentive score for corporate office is determined by the difference in the actual TPI achieved (TPI_{corp}) verses the Target TPI ($TP_{Icorp-Target} = 1$).

$$\text{Performance Score at corporate} = TPI_{Icorp-Target} - TPI_{corp}$$

4.46 The incentive score for each of the sub-division is determined by the difference in the actual weighted TPI achieved verses the Target TPI (Target TPI =1).

Performance Score at unit level = $TPI_{SDi-Target} - TPI_{WSDi}$
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4.47 Each of the sub-division shall have a performance score and based on the performance score of the sub-divisions other field units (zones, circles and divisions) will have performance scores. Hence it may be possible that some sub-divisions or field units shall have a negative performance score, which means that the respective field unit or subdivision shall not have any share from the incentive pool account and the same shall be distributed between the sub-divisions or field units which have a positive performance score and in the proportion of their contribution of performance score.

Sharing the incentives with the employees

4.48 Once the incentive for the respective unit (sub division or any other field unit as defined in paragraph 4.47) is determined, the same may be shared with the employees by linking the incentives to the basic pay of the employee.

4.49 All the employees working in a unit will be given incentive as a fixed % of their basic salary and this percentage will be fixed for all employees of the unit.

A5: ANNEXURE I: COST BENEFIT ANALYSIS OF INCENTIVE SCHEME FOR DISTRIBUTION COMPANIES

- 5.1 Performance of some of the utilities after first year of the control period were reviewed and the possible benefits achieved by the utilities and consumers because of the improved performance under the proposed scheme were calculated.
- 5.2 While calculating the benefits achieved following assumptions were taken:
- (a) Any gain on account of distribution losses and collection efficiency is to be shared between the utility and consumers in the ratio of 50:50
 - (b) Calculation of benefit on account of service quality has been done assuming 1% increase in supply availability and network availability, as the data on network and supply availability is not available. For 1% increase in supply availability and network availability, ARR (excluding power purchase cost) was increased by 0.2% (Based on distribution margin report assumption)
 - (c) Any gain or loss on account O&M expenses has been attributed to the utilities.
- 5.3 Following utilities have been reviewed:
- (a) North Delhi Power Limited (NDPL)
 - (b) Brihan-Mumbai Electricity Supply and Transport Undertaking (BEST)
 - (c) Maharashtra State Electricity Distribution Company Limited (MSEDCL)

NDPL

- 5.4 In the MYT order for the first control period, DERC has given targets to NDPL for different parameters. Review of the performance of the NDPL in the first year of the control period was done by DERC in the order dated May 2009.
- 5.5 Distribution losses of NDPL for the year 2007-08 were 20.72% against the target of 21.24% and collection efficiency was 103.07% against the target of 99%. On account of distribution losses and collection efficiency because of the over achievement of NDPL Rs 109.64 Crores were saved. As per the incentive scheme proposed any overachievement on account of distribution losses and collection efficiency is to be shared equally between consumers and utility. Hence on account of distribution losses and collection efficiency consumers will be benefited by Rs. 54.82 Crores and utility will be benefited by Rs. 54.82 Crores.
- 5.6 For NDPL calculation of benefit on account of service quality has been done assuming 1% increase in supply availability and network availability, as the data on network and supply availability is not available. For 1% increase in supply availability and network availability, ARR (excluding power purchase cost) was increased by 0.20% (based on distribution margin report assumption). Based on the above calculations NDPL will be benefited by Rs. 1.015 Crores.

- 5.7 O&M expenses of NDPL for the year 2007-08 were Rs. 219.54 Crores against the target of Rs. 219.55 Crores specified by DERC. Hence total saving on account of O&M expenses was of Rs 1 lakh.
- 5.8 Total benefits that could have accrued to consumers and NDPL based on the performance of FY 2007-08, under the proposed incentive scheme are tabulated below.

Table 24: NDPL (Data as per True up of FY 07-08, order dated May 2009)

S. No	Parameter	Target	Achievement	Total Benefits in Rs Crores	Share of benefits to Utility in Rs Crores	Share of benefit To consumers in Rs Crores
1	Distribution losses	21.24%	20.72%	109.64	54.82	54.82
2	Collection Efficiency	99%	103.07%			
3	Quality of Supply			1.015	1.015	
	Network availability					
	Supply Availability					
4	O&M expenses	219.55	219.54	0.01	0.01	
			Total	110.665	55.845	54.82

- 5.9 Sales of the NDPL were 4975 MU in the year FY07-08. As per the table given above, benefit to the consumer is Rs 548.2 million and benefit to utility is Rs 558 million. Thus for every unit sold consumer has saved 11 paisa and utility has gained 11.21 paisa.

BEST

- 5.10 In the MYT order for the first control period, MERC has given targets to BEST for different parameters. Review of performance of BEST in the first year of the control period was done by MERC in the order dated 15th June, 2009.
- 5.11 Distribution losses of BEST for the year 2007-08 were 10.27% against the target of 11%. On account of distribution losses because of the over achievement of BEST Rs. 19.26 Crores were saved. As per the incentive scheme proposed any overachievement on account of distribution losses is to be shared equally between consumers and utility. Hence on account of distribution losses and collection efficiency consumers will be benefited by Rs. 9.63 Crores and utility will be benefited by Rs. 9.63 Crores.
- 5.12 For BEST calculation of benefit on account of service quality has been done assuming 1% increase in supply availability and network availability, as the data on network and supply availability is not available. For 1% increase in supply availability and network availability, ARR (excluding power purchase cost) was increased by 0.2% (based on distribution margin report assumption). Based on the above calculations BEST will be benefited by Rs. 1.376 Crores.

5.13 Total benefits that could have accrued to consumers and BEST based on the performance of FY 2007-08, under the proposed incentive scheme are tabulated as under:

Table 25: BEST (Data as per True up of FY 07-08, order dated 15th June 2009)

S.No	Parameter	Target	Achievement	Total Benefits in Rs Crores	Benefits to Utilities in Rs Crores	Benefit to consumers in Rs Crores
1	Distribution losses	11%	10.27%	19.26	9.63	9.63
2	Collection Efficiency					
3	Quality of Supply			1.376	1.376	
	Network availability					
	Supply Availability					
4	O&M expenses in Rs. Crores			-20.07	-20.07	
			Total	0.566	-9.064	9.63

5.14 Sales of BEST were 4024 MU in FY07-08. As per the table given above benefit to the consumer is Rs 96.3 million and utility has incurred the loss of Rs. 90.64 million. Thus for every unit sold consumer has saved 2.3 paisa and utility has lost 2.2 paisa.

MSEDCL

5.15 In the MYT order for the first control period, MERC has given targets to MSEDCL for different parameters. Review of performance of MSEDCL in the first year of the control period was done by MERC in the order dated August, 2009.

5.16 Distribution losses of MSEDCL for the year 2007-08 were 24.15% against the target of 26.20%. On account of distribution losses because of the over achievement of MSEDCL Rs 528.5 Crores were saved. As per the incentive scheme proposed any overachievement on account of distribution losses is to be shared equally between consumers and utility. Hence on account of distribution losses and collection efficiency consumers will be benefited by Rs. 264.25 Crores and utility will be benefited by Rs. 264.25 Crores.

5.17 For MSEDCL calculation of benefit on account of service quality has been done assuming 1% increase in supply availability and network availability, as the data on network and supply availability is not available. For 1% increase in supply availability and network availability, ARR (excluding power purchase cost) was increased by 0.2% (based on distribution margin report assumption). Based on the above calculations MSEDCL will be benefited by Rs.10.264 Crores.

5.18 O&M expenses of MSEDCL for the year 2007-08 were Rs. 625 Crores against the target of Rs. 505 Crores specified by MERC. Hence total losses on account of O&M expenses were of Rs. 120 Crores.

5.19 Total benefits that could have accrued to consumers and MSEDCL based on the performance of FY 2007-08, under the proposed incentive scheme are tabulated below:

Table 26: MSEDCL (Data as per True up of FY 07-08, order dated 17th August 2009)

S.No	Parameter	Target	Achievement	Total Benefits in Rs Crores	Benefits to Utilities in Rs Crores	Benefit To consumers in Rs Crores
1	Distribution losses	26.20%	24.15 %	528.50	264.25	264.25
2	Collection Efficiency					
3	Quality of Supply			10.264	10.264	
	Network availability					
	Supply Availability					
4	O&M expenses in crores	505	625	-120	-120	
			Total	418.764	154.514	264.25

5.20 Sales of the MSEDCL were 55715 MU in FY07-08. As per the table given above, benefit to the consumer is Rs 2642.5 million and benefit to the utility is Rs 1545.14. Thus for every unit sold consumer has saved 4.74 paisa and utility has gained 2.77 paisa.

A6: ANNEXURE II: CALCULATION OF WEIGHTS FOR CORPORATE SCORE CARD

Weights

- 6.1 Weight to the each parameter should be assigned depending upon the relative importance of each parameter. Relative importance of each parameter can be assessed by measuring the impact that the parameter will have on the financial performance of the utility or on the quality of service delivered by the utility to the consumers.
- 6.2 Improvement in quality of service is difficult to measure as compared to impact on the financial performance. Therefore first priority should be to assign weight based on the financial impact, in case the parameter is such that it has no financial impact but the only impact is on the quality of service then appropriate weightage can be assigned to such parameter.
- 6.3 In order to understand the financial impact and assign weights to each parameter of the proposed incentive scheme, analysis of the expenses of last 5 years of 67 utilities in the country was done based on the PFC report.
- 6.4 **Distribution losses:** Distribution losses have a direct impact on the power purchase cost of the utility. Any reduction in the distribution loss will reduce the quantum of power to be purchased by the utility for sales. Thus in order to assign weight to the “distribution loss” power purchase cost as a percentage of total expenses was calculated for 67 utilities for the period 2003-04, 2004-05, 2005-06, 2006-07 and 2007-08 and average of the 5 years was taken. Again average of the 5 year average for all the utilities was computed, which came out as 62%, which means that on an average for a distribution utility in India about 62% cost is that of power purchase. As distribution losses have a direct impact on power purchase cost reduction, weight of 60% can be assigned to distribution losses.
- 6.5 **O&M Expenses:** After power purchase cost O&M cost is the second highest cost for utilities. O&M cost includes cost of employees, repair and maintenance cost and administrative cost. In order to assign weight to “O&M expenses”. O&M cost as a percentage of total expenses was calculated for all the utilities for the period 2003-04, 2004-05, 2005-06, 2006-07 and 2007-08 and average of the 5 years was taken. Again average of the 5 year average for all the utilities was computed. This comes out as 18.20% which means that on average for a distribution utility in India about 18 % cost is on account of O&M expenses. Thus weight of 20% can be assigned to O&M expenses.
- 6.6 **Collection efficiency:** Collection efficiency is an important parameter. Improved collection efficiency reduces bad debt and provide additional cash pertaining to the previous year’s revenues thereby providing a relief to the working capital requirements, but there is no additional revenue generation or reduction in cost because of improvement in collection efficiency. In order to incentivize improvement in collection efficiency it is proposed to assign a weight of 10% to collection efficiency.

- 6.7 **Quality of supply:** In the current tariff regime in Indian states regulators have included quality of supply as a factor in the MYT regulations, but have not given any targets for the same. In order to kick start the process of monitoring of quality of supply and incentivizing utilities to improve quality, it is proposed to assign a weight of 10% to quality of supply parameter.

Table 27: Weights assigned to parameters

S. No	Code	Performance Parameter	Weightage
1	P1	Distribution losses	60%
2	P2	Collection efficiency	10%
3	P3	Quality of Supply	10%
4	P4	O&M Expenses	20%

A7: ANNEXURE III: CALCULATION OF TARGETS FOR CORPORATE SCORE CARD

7.1 **Distribution losses:** FOR has prepared a report on loss reduction strategies in September 2008. Some of the highlights of this report are as follows.

- (a) Report recommends, need for differential analysis of technical losses, non-technical losses and collection efficiency.
- (b) In the Chief Ministers’ Conference on Power held in May 2007, it was generally agreed that, as a rule of thumb, reduction of loss level should be at least 10 percent of the existing loss levels every year till the losses are reduced below 20 percent.
- (c) Report recommends that though the technical and commercial losses should be monitored separately, the trajectory could give a combined target for technical and commercial losses in the first control period of MYT. The MYT trajectory has to be specific to every distribution licensee and preferably the same should be specified by the SERC as part of its regulations.

7.2 Keeping in view the recommendations of the FOR report, it is recommended that to start with, separate targets and incentive for technical and commercial losses should not be given and only targets for distribution losses and collection efficiency be given.

7.3 As recommended in the Chief Ministers’ Conference on Power held in May 2007, it is proposed that target for reduction in distribution losses be 10% of the existing loss levels each year from the existing loss levels for all states that have loss level above 20%. For utilities having loss level below 20% and above 10%, target of reduction by 5% of the existing loss levels is recommended.

7.4 **Collection Efficiency:** To fix the target for collection efficiency, data on the collection efficiency for past 5 years was collected. Details of the result are shown below.

Table 28: Data on collection efficiency

	2003-04	2004-05	2005-06	2006-07	2007-08
Number of utilities for which data is available	47	47	57	22	11
Mean collection efficiency	91.43	87.97	91.91	89.60	95.67
Standard deviation of collection efficiency	13.39	17.42	15.85	19.59	6.12
Minimum value of collection efficiency	43	23.39	42.28	12.49	87.72
Maximum value of collection efficiency	113.1	111.16	126.95	103.76	105.41

7.5 From the table given above, it is clear that collection efficiency on an average has been around 90%. Some of the states have performed much better and have even achieved the collection efficiency of above 100%. But there are some distribution utilities that have collection efficiency below 50%.

7.6 It is recommended to adopt following targets for collection efficiency:

- (a) Utilities having collection efficiency lower than 50%, should be given an annual collection efficiency improvement target of 10%
- (b) Utilities having collection efficiency lower than 70% but higher than 50%, should be given an annual collection efficiency improvement target of 8%
- (c) Utilities having collection efficiency lower than 80% but higher than 70%, should be given an annual collection efficiency improvement target of 6%
- (d) Utilities having collection efficiency lower than 90% but higher than 80%, should be given an annual collection efficiency improvement target of 4%
- (e) Utilities having collection efficiency lower than 95% but higher than 90%, should be given an annual collection efficiency improvement target of 2%
- (f) Utilities having collection efficiency lower than 98% but higher than 95%, should be given an annual collection efficiency improvement target of 1%

7.7 **Quality of Supply:** FOR has recommended introduction of supply availability index and network availability index for distribution companies in its report on “MYT framework and Distribution Margin”.

7.8 FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended following formula for the calculation of the network availability:

$$\text{“Wires Network Availability} = (1 - (\text{SAIDI} / 8760)) \times 100\text{”}$$

Where,

Wires Network Availability is proposed to be measured over the course of a month and year and will be expressed in percentage terms”.

- (a) Feeder reliability indices at 11 KV voltage level as specified by CEA can be used for calculating SAIDI, till 100% consumer indexing is achieved in the licensee’s area as the exact number of affected consumers by any interruption will be known only thereafter.
- (b) Considering the importance of availability of distribution network without which the supply cannot be ensured to the consumers, **the target proposed for network availability is 98%** (which is also in line with availability of transmission network specified in CERC tariff regulations).

7.9 FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended the following formula for the calculation of the supply availability:

“Base load Supply Availability =

$$\frac{(\text{Actual Contracted Base Load Supply in MW}) \times (\text{No of Off-Peak hours})}{(\text{Base load in MW}) \times (\text{No of off Peak hours})}$$
”

“Peak load Supply Availability =

$$\frac{(\text{Actual Contracted Peak Load Supply in MW}) \times (\text{No of Peak hours})}{(\text{Peak load in MW}) \times (\text{No of Peak hours})}$$
”

Note: Since the peak hours and off-peak hours could vary from one season to another, the above computations may be done in such a manner that the sum of off-peak hours and peak hours is 8760 hours, i.e., the total number of hours in a year.

(a) FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended that “*SERCs will specify Supply Availability trajectory based on past performance of Supply Business, however, it should not be lower than 90%, and should be progressively increased in a maximum of three years to 95% or 98%.*”.

(b) The table given below gives the details of the energy scenario in the country

Table 29: Energy scenario in India

Region	Energy				Peak			
	Requirement (MU)	Availability (MU)	Surplus/Deficit (MU) (%)		Requirement (MW)	Availability (MW)	Surplus/Deficit (MW) (%)	
Northern	241461	222875	-18586	-7.7	35460	29970	-5490	15.5
Western	276827	234819	-42008	-15.2	37330	34276	-3054	-8.2
Southern	220126	201222	-18904	-8.6	31384	27216	-4168	13.3
Eastern	91386	93613	2227	2.4	15110	14165	-945	-6.3
North Eastern	10744	9586	-1158	-10.8	1804	1537	-267	14.8
All India	840544	762115	-78429	-9.3	118794	103816	-14978	12.6

Source: Load Generation Balance report 2009-10

(c) Considering the recommendations of the FOR report and the current energy shortage of 9.3% in the country, it is recommended that the **target of the supply availability should be minimum 85%** (keeping in view the energy shortage of 15% in western region).

7.10 **O&M Expenses:** O&M expenses of a utility depends upon many factors like network coverage, consumer base, asset quality, existing man power base etc. Already the SERCs in all the states have specified targets for controlling O&M expenses of the utilities, hence the targets for the O&M expenses for the respective states can be based on the respective State Commission’s trajectory.

A8: ANNEXURE IV: PERFORMANCE OF DISTRIBUTION UTILITIES IN THE MYT PERIOD

Gujarat

Table 30: Performance w.r.t O&M expenses for FY09 (In Rs Cr)

S. No	Distribution utility	Approved in MYT order	Approved in APR	As claimed in APR
1	UGVCL	317.66	296.72	327.92
2	PGVCL	86.84	66.52	73.17
3	DGVCL	176.58	153.1	193.52
4	MGVCL	291.45	200.51	276.8

Table 31: Performance w.r.t Distribution losses/AT&C Losses for FY09

S. No	Distribution utility	Approved in MYT order	Actual Achieved
1	UGVCL	16%	14.57%
2	PGVCL	30%	32.11%
3	DGVCL	14.45%	14.78%
4	MGVCL	15%	14.52%

Karnataka

Table 32: Performance w.r.t O&M expenses for FY08 (In Rs Cr)

S.No	Distribution utility	Approved in MYT order	Approved in APR	Actual Achieved
1	BESCOM	402.17	420.17	458.28
2	CESC	168.62	156.21	176.66
3	GESCOM	144.62	144.78	164.01
4	HESCOM	231.77	238.31	265.54
5	MESCOM	121.63	121.88	130.31

Table 33: Performance w.r.t O&M expenses for FY09 (In Rs Cr)

S.No	Distribution utility	Approved in MYT order	Approved in APR	Actual Achieved
1	BESCOM	441.75	463.13	437.58
2	CESC	192.84	173.32	197.92
3	GESCOM	154.66	153.22	180.4
4	HESCOM	246.58	257.49	266.96
5	MESCOM	131.31	131.34	155.82

Table 34: Performance w.r.t Distribution losses/AT&C Losses for FY08

S.No	Distribution utility	Approved in MYT order	Actual Achieved
1	BESCOM	20%	19.99%
2	CESC	22%	22.62%
3	GESCOM	27.05%	26.03%
4	HESCOM	25%	25.06%
5	MESCOM	14.90%	13.71%

Table 35: Performance w.r.t Distribution losses/AT&C Losses for FY09

S.No	Distribution utility	Approved in MYT order	Actual Achieved
1	BESCOM	19%	16.67%

S.No	Distribution utility	Approved in MYT order	Actual Achieved
2	CESC	21%	17.35%
3	GESCOM	26.50%	26.01%
4	HESCOM	24%	25.15%
5	MESCOM	14.80%	12.95%

Maharashtra

Table 36: Performance w.r.t O&M expenses for FY08 (in Rs Cr)

S.No	Distribution utility	Approved in MYT order	Approved in APR	As claimed in APR
1	BEST	235.99	227.51	257.55
2	MSEDCL	2239	2307	2527

Table 37: Performance w.r.t Distribution losses/AT&C Losses for FY08

S.No	Distribution utility	Approved in MYT order	Actual Achieved
1	BEST	11%	10.27%
2	MSEDCL	26%	24.15%

Delhi

Table 38: Performance w.r.t Distribution losses/AT&C Losses for FY09

S.No	Distribution Utility	Target Specified in MYT order	Achievement at the end of first year
1	NDPL	22.03%	18.29%
2	BRPL	27.34%	27.51%
3	BYPL	34.77%	30.23%

Table 39: Performance w.r.t O&M expenses for FY09 (In Rs Cr)

S.No	Distribution Utility	Target Specified in MYT order	As claimed at the end of first year
1	NDPL	219.55	219.54
2	BRPL	289.22	302.63
3	BYPL	189.64	224.88

A9: ANNEXURE V: INCENTIVE SCHEME FOR DISTRIBUTION COMPANIES

Background

- 9.1 Incentive-disincentive mechanism, across network (gas, electricity) industries, is an important tool for inducing the regulated, distribution utilities to reduce costs, improve service quality in a cost effective way, stimulate efficient investment and pricing of access to regulated network infrastructure services.
- 9.2 This section of the report covers the incentive mechanism for the distribution utilities.
- 9.3 The incentive scheme proposed for distribution companies is suggested as an attempt to recommend uniform approach for providing incentive mechanism to distribution utilities. It is further clarified that the sharing of gains/losses between the licensee and the consumers would be governed by the relevant regulations of the respective SERCs.

Incentive mechanism for distribution utilities

- 9.4 The incentive-disincentive mechanism for distribution utilities should address the following:
- (a) Elements of the distribution business like wheeling and supply function separately;
 - (b) Clarity and simplicity in determination of various cost elements of wheeling and supply business;

Segregation of distribution business

- 9.5 A distribution utility in India normally conducts two distinct types of activities – distribution or network business and retail supply business.
- 9.6 In some of the countries like UK, Nord Countries, Australia etc, the distribution network and retail supply are handled by separate companies. In these countries, the distribution network is regulated business and retail supply is fully or partially competitive.
- 9.7 The distribution network company levies “distribution charge/wheeling charge” on the retail supply companies according to their respective contracts and the retail supply company levies a “supply charge” on its retail customers.
- 9.8 In case of Indian utilities, network and retail supply business are managed by a single entity. For designing an incentive scheme, it is necessary to treat the two businesses separately since cost and revenue drivers for each of the businesses are different.

Revenue and Cost drivers for retail supply

- 9.9 The revenue and cost drivers of retail supply business include:
- (a) Revenue from sales to retail customers.
 - (b) Various costs elements like power procurement costs, working capital costs, operation and maintenance costs, returns on capital employed.
- 9.10 Following sections deal with treatment of each element of revenue and costs; provides a risk sharing framework and proposes an incentive mechanism.

Revenue from sales

- 9.11 There are two options for treatment of sales:
- (a) **Uncontrollable:** Based on the approved sales forecasts, target distribution loss levels, the power requirement is computed and at the end of the year volume of sales are trued up with the actual or target distribution loss level (if actual is better than target) to compute the quantum of power requirement.
 - (b) **Controllable:** Variations are not allowed on the approved sales forecasts, so any loss or profit due to variations in sales shall be borne by the utility.
- 9.12 It is important to note that the very nature of retail supply business is such that uncontrollable factors like weather could significantly affect the demand forecasts of energy.
- 9.13 In a scenario of subsidised tariffs for certain categories of consumers, treating sales as “controllable” would “reward” utilities for providing poor quality supply to subsidised consumer segments.
- 9.14 In Indian scenario, where in most of the states, there is only one supplier in an area and competition is not present, the variation in sales will not happen because of the quality of supply of the utility, where consumer move from one service provider to another in case of poor quality of supply, but will happen because of economic or demographic change in the area.
- 9.15 It is recommended that sales be treated as an uncontrollable parameter and the risk of sales variation to be borne by the consumers.

Power Procurement Cost

- 9.16 As per the National Tariff Policy, actual power purchase cost should be allowed unless there is violation of Merit Order. In view of this in the present regulatory regime risk of variation in power purchase cost is borne by the consumers.
- 9.17 In India distribution companies procure power in the following manner

Table 40: Contract mechanism for power procurement

S. No	Contract duration	Mode of contract	Scope of price control for utility
1	Long term contract for 25 years	Regulated cost	None
2	Long term contract for 25 years	Competitive bidding	None
3	Medium term contract for 1 to 5 years	Competitive bidding	None
4	Short term contract	Bilateral contracts	Yes
5	Daily power purchase	From exchange or UI	Yes

9.18 As is evident from the table only short term and daily power purchase cost can be controlled by the Utility. This can be done by accurate load forecasting and having adequate long term and medium term contracts.

9.19 Following two options can be evaluated for providing incentive on power purchase cost:

Option-1

9.20 Based on the analysis of the past trends, load forecast and projected power availability; regulator can fix the ratio of the long term, medium term, short term and daily power purchase.

9.21 Price of the power for long term contracts and medium contracts is already fixed either through competitive bidding or by central/state regulator. Price for short term power can be taken from the market monitoring report of the CERC.

9.22 Price of power and the total quantum of power purchase should be approved by the regulator and if there is under or overspend on account of power purchase; same can be shared with the consumers in the ratio of 50:50.

(a) This will incentivize utilities to manage the purchase of power and try and reduce the quantum of power purchased on short term basis.

(b) But it needs to be ensured that minimum supply quality standards are maintained by the utility.

Option-II

9.23 Based on the analysis of the past trends and the load forecast, regulator can fix the ratio of the long term, medium term, short term and daily purchase and the total quantum of power purchase should be approved.

9.24 If the ratio of long term power purchase to total power purchase changes in such a manner that it favours long term purchase or in other words reduce percentage of short term power purchase, utility should be given incentive.

- 9.25 Incentive can be given in form of sharing of gains in the ratio such as 70:30, where 70% of the savings should be given to consumers and 30% to the Distribution Company or by providing higher return on equity.
- 9.26 Second option takes away the risk of price of short term power from the utility and thus the quantum of incentive will also reduce.
- 9.27 In India short term power prices fluctuate a lot, in recent time CERC has issued cap on short term prices in order to control the price volatility. Many of the Indian states have severe power shortage and it is not possible to control the purchase of short term power in recent future, hence it is recommended that for the time being this parameter should not be included in the proposed incentive mechanism. But in future as the power availability scenario improves option-II can be adopted for providing incentive to utilities.

Working Capital cost

- 9.28 The working capital requirements for supply business is computed by most of the regulators on the basis of :
- (a) Receivables of two months of billing less any consumer security and less power purchase cost of one month
 - (b) Operation and maintenance expenses for one month,
 - (c) Maintenance spares for 2 months based on annual requirement considered at 1% of the gross fixed assets for previous year.
- 9.29 Working capital cost can be controlled by the utilities and hence is allowed by the regulators on normative basis.
- 9.30 As the working capital is allowed on normative basis, utilities have an incentive to minimize the quantum of working capital required and save on the cost of working capital. Same incentive can be retained in the proposed incentive scheme.

Depreciation Cost

- 9.31 In the present regulatory regime depreciation is allowed on the asset base. By using advance against depreciation mechanism, depreciation is being matched with the loan repayment schedule. This mechanism provides no incentive for the utilities to negotiate loan repayment period with banks.
- 9.32 In the new Tariff regulations for generation and transmission companies CERC has removed the concept of advance against depreciation.

Operation & Maintenance (O&M) Costs

- 9.33 O&M cost of the Supply business has the following break-up:

Table 41: O&M cost of supply function

S. No	O&M cost component	Description
1	Employee cost	Employee base for billing, collection, meter reading and complaint handling
2	R&M cost	Cost associated is minimal, as most of the physical assets will be with network function
3	A&G cost	Normal business expenses

- 9.34 For the retail supply business most of the O&M cost is on the account of the employee cost for billing, collection, meter reading and complaint handling.
- 9.35 O&M cost can be calculated by taking the past trends including business growth and inflation. Efficiency improvement targets can be given over the base cost. Thus O&M cost for i^{th} year should be O&M cost of $(i-1)^{\text{th}}$ year + inflation+ business growth – efficiency gain.
- 9.36 O&M cost can be controlled by the utilities and the risk of variation of O&M cost should be borne by the utility.
- 9.37 Any over spend or under spend on O&M expenditure should be to the account of the utility. This will incentivize the utility to control O&M cost.

Revenue and Cost drivers for wheeling business

- 9.38 The revenue and cost drivers of wheeling business include:
- (a) Revenue from wheeling tariff;
 - (b) Various costs elements like depreciation, working capital costs, operation and maintenance costs, returns on capital employed;
- 9.39 Following sections deal with treatment of each element of revenue and costs; provides a risk sharing framework and proposes an incentive mechanism.

Wheeling tariff

- 9.40 There are two options to fix the wheeling tariff:
- (a) Retail business can pay to the wheeling business either based on actual amount of energy wheeled on the network, which is based on the utilization of the network.
 - (b) Retail business can pay to the wheeling business based on the contract demand, which is the capacity of the network.
- 9.41 Capital as well as the operating cost for the wheeling business remain same irrespective of the amount of energy wheeled and only depend upon the capacity of the network.

- 9.42 The retail sales variation would impact the cost recovery of the wheeling business if the tariff is set on the energy basis. Though it will be beneficial for the retail business as it will pay to the distribution business based on actual utilization of the network.
- 9.43 To mitigate the sales variation risk, the wheeling tariff can be set on a contracted load.

Depreciation Cost

- 9.44 In the present regulatory regime depreciation is allowed on the asset base. By using advance against depreciation mechanism, depreciation is being matched with the loan repayment schedule. This mechanism provides no incentive for the utilities to negotiate loan repayment period with banks.
- 9.45 In the new regulations for generation and transmission companies CERC has removed the concept of advance against depreciation.

O&M Cost

- 9.46 Most of the O&M cost for wheeling business, directly depends upon the physical infrastructure and the cost of maintaining network can be easily standardized. In the table given below a breakup of the O&M cost for wheeling business is given:

Table 42: O&M cost of wheeling business

S.No	O&M cost component	Description
1	Employee cost	Employee base for network maintenance and complaint handling
2	Rénovation & Modernisation (R&M) cost	Cost associated is substantial, as most of the physical assets will be with network function
3	Administration & General (A&G) cost	Normal business expenses

- 9.47 O&M cost can be determined using the benchmarking technique, where O&M cost of the utility is benchmarked against other similar utilities. Based on the relative performance with respect to other utilities, utility can be given a target of efficiency improvement. While approving O&M cost, escalation for inflation factor should also be provided
- 9.48 Thus O&M cost for i^{th} year should be O&M cost of $(i-1)^{\text{th}}$ year + inflation – efficiency gain.
- 9.49 O&M cost can be controlled by the utilities and the risk of variation of O&M cost should be borne by the utility.
- 9.50 Any over spend or under spend on O&M expenditure should be to the account of the utility. This will incentivize the utility to control O&M cost.

Working Capital Cost

- 9.51 We propose to allow working capital based on the following methodology for the wheeling business.
- 9.52 The working capital requirements for wheeling of electricity can be computed on the basis of:
- (a) receivables for two months of wheeling charges received less any consumer security
 - (b) operation and maintenance expenses for one month,
 - (c) Maintenance spares for 2 months based on annual requirement considered at 1% of the gross fixed assets for previous year.
- 9.53 As the working capital is allowed on normative basis, utilities have an incentive to minimize the quantum of working capital required and save on the cost of working capital. Same incentive can be retained in the proposed incentive scheme.

Business drivers for Distribution Companies (Retail Supply & Wheeling)

- 9.54 Apart from revenue and costs, several other elements drive the performance of the distribution companies.
- 9.55 Following sections deal with treatment of each business driver and proposes an incentive mechanism linked to each of the business drivers.

Capital Investment

- 9.56 Utilities are required to prepare capital investment schemes for approval of the regulator for AT&C loss reduction, system reliability improvement, load growth requirements, infrastructure improvements etc.
- 9.57 Salient features of the existing capital investment approval process are:
- (a) Monitoring of investments plan by the regulator are more input based with major focus on the feasibility and pricing of the schemes rather than the performance of the executed projects.
 - (b) Investment plans are not provided with clear indication of linkage to the load growth, loss reduction, quality improvement etc.
 - (c) There is no incentive for judicious investment in the proposed schemes
 - (d) There is no penalty framework for project cost over runs.
 - (e) Any variation in capital investments is approved by the regulator on basis of actual cost incurred after a prudency check (based on the existing system

of reporting and monitoring). There is always an element of information asymmetry because of lack of proper monitoring and reporting framework for capital expenditure.

9.58 The capital investment can be reviewed on annual basis with respect to the approved plan or at the end of control period. There are two options for consideration:

- (a) The first option is to continue with the existing process of annual investment plan review and monitoring.
- (b) The second option seeks to give flexibility in planning and implementation of capital works. In the second option, the approach for capital investment approval is as follows:
 - (i) Detailed analysis of the past investments and the existing condition of the distribution system is done to assess the status of investments on capital work already undertaken and also to identify the areas where future investment are required.
 - (ii) Detailed review of investment plan submitted by the utility, addressing needs in the next 3-5 years for load growth, refurbishment, loss reduction, quality of supply and reliability, metering and communication etc. concluding with an approved long term investment plan.
 - (iii) During the control period, the investment plan implementation is monitored but no adjustments are made for observed differences in revenue requirement as long as physical parameters agreed earlier are being met.

9.59 The second option discussed above allows utility to undertake capital investments in closer response to customer needs. It also rewards a utility that is able to procure capital goods cost-effectively, manage project execution better and has higher asset utilisation.

9.60 But transition from first option to second option will require detailed technical studies and elaborate monitoring system for the regulators. For most of the Indian states MYT is a relatively a new concept and transition from first option to second option will take some time. Thus for now on present system can be continued with.

Return on Capital Employed

9.61 The distribution utility is allowed return on equity of 14% / 16% on the issued and paid up capital and the free reserves invested in the assets under the existing regulations in most of the states. The return on equity is on the post- tax basis as income tax is considered as part of the annual revenue requirement. Apart from allowing return on equity, the SERCs also approve the interest expense incurred.

- 9.62 In case principle of pre-tax returns is adopted, then the actual tax cannot be a passthrough. Pre-tax return implies that cost of tax need to be taken care by the investor itself and should not be passed on to the consumer.
- 9.63 CERC in the tariff regulation for Generation and Transmission companies have adopted pre tax return on equity method.
- 9.64 Paragraph 14.4 of the CERC (Terms and Conditions of Tariff) Regulations, 2009 Statement of Objects and Reasons states that.

“The Commission, after considering all the views of all stakeholders is of the view that it will be appropriate to move to the system of pre-tax rate of return on equity from the existing post-tax rate of return on equity. Accordingly, the Commission has decided to allow pre-tax rate of return on equity to the utilities. The same shall be calculated by considering the applicable tax rate for the companies for the year 2008-09 as per the relevant Finance Act, as base rate. To give an example:

(i) In case of a generating company or transmission licensee paying Minimum

Alternate Tax (MAT) @ 11.33% including surcharges and cess:

Rate of pre-tax return on equity = $15.50 / (1 - 0.1133) = 17.481\%$

(ii) In case of a generating company or transmission licensee paying normal existing corporate tax @ 33.99% including surcharge:

Rate of pre-tax return on equity = $15.50 / (1 - 0.3399) = 23.481\%$.”

- 9.65 On the lines of the provisions of CERC it is proposed that for distribution companies also pre tax return on equity should be allowed.
- 9.66 It is felt that under the existing mechanism, utilities do not have any flexibility or incentive to optimise on the Debt-Equity mix or on the cost of debt.
- 9.67 CERC has provided incentive on debt restructuring in the new tariff Regulations. Paragraph 15.3 of the CERC (Terms and Conditions of Tariff) Regulations, 2009 Statement of Objects and Reasons states that

“The Commission has considered the views of the utilities and beneficiaries. As regards linking the repayment of loan to depreciation, the Commission feels that the provision should continue for the reasons explained in para 11 of the explanatory memorandum to the draft regulation. As regards the sharing of the benefits, the Commission is of the view that refinancing should be undertaken only if it is beneficial to the consumers and major portion of the benefits should be passed on to beneficiaries refinance the loan. Any cost incurred in such refinancing will be reimbursed by the beneficiaries and the net savings will be shared. Moreover, the changes to the terms and conditions of the loan shall be reckoned from the date of refinancing and will not have any retrospective operation.”

- 9.68 According to CERC (Terms and Conditions of Tariff) Regulations, 2009,(Clause 16 sub-clause 7) it has been stated as under -

“The generating company or the transmission licensee, as the case may be, shall make every effort to re-finance the loan as long as it results in net savings on interest and in that event the costs associated with such re-financing shall be borne by the beneficiaries and the net savings shall be shared between the beneficiaries and the generating company or the transmission licensee, as the case may be, in the ratio of 2:1.”

- 9.69 As provided by CERC similar incentive on debt restructuring should be considered for distribution companies also.

Tax provisions

- 9.70 Under existing practice of allowing post-tax rate of return, taxes, if any, are treated as expenses and as such are a pass through to consumer.

- 9.71 Based on the analysis of the Tariff Order of Generation & Transmission companies in Maharashtra it is observed that MERC had taken the following stand with respect to the income tax liabilities on incentives:

”As regards tax on income arising out of sharing of gains due to better performance and PLF incentive, the Commission is of the view that the expenses incurred for achieving better performance (such as A&G, R&M, etc.) including higher PLF has already been allowed as pass through by the Commission and allowing tax on income arising out of better performance will put additional burden to consumers. Hence, the Commission has not considered the tax on income arising out of sharing of gains due to better performance and PLF incentive income.

Based on above principles, the Commission has estimated the income tax of REL-G on stand alone basis by considering the income and expenses as per approved ARR after truing up for FY 2006-07, as Rs. 7.69 Crore.”

This order of MERC was however challenged by the Generation and Transmission companies in the Appellate (Appeal No. 111 of 2008 and Appeal No.115 of 2008) and the Appellate decided as under:

“The income tax payable on the PLF incentive will be treated as pass through”.

Appellate in its judgement (Appeal No. 111 of 2008) had further stated that-

“The Commission itself has not quoted any Regulation under which income tax on the incentive allowed can be denied to a generating company. The Regulation 34.2.1, of the MERC Tariff Regulations, which deals with income tax does not make any exception for the income arising out of incentive. Therefore, as per the Regulation the appellant is entitled to recover the income tax payable on the change in income on account of PLF incentive. Therefore, we find merit in the appellant’s prayer for income tax on incentive to be given to it as a pass through.”

9.72 Once the principle of pre-tax returns is adopted as suggested in Section 9.65 of this report, then the actual tax cannot be a passthrough.

9.73 According to CERC (Terms and Conditions of Tariff) Regulations, 2009, the provision for Tax on Income is provided as under:

“Tax on the income streams of the generating company or the transmission licensee, as the case may be, shall not be recovered from the beneficiaries, or the long-term transmission customers, as the case may be:

Provided that the deferred tax liability, excluding Fringe Benefit Tax, for the period up to 31st March, 2009 whenever it materializes, shall be recoverable directly from the beneficiaries and the long-term customers:”

9.74 It is recommended that for distribution utilities under pre tax return, the beneficiaries/consumers should be required to meet the Income Tax liability limited to the equity of the licensee, considered for tariff purposes.

Distribution Losses

9.75 Distribution losses comprise of the following:

- (a) Technical losses
- (b) Commercial losses
- (c) Collection efficiency

9.76

9.77 While the technical losses will be to the account of wheeling business, commercial losses and collection efficiency will apply to the supply business.

9.78 Forum of Regulators in the report on “Loss Reduction Strategies”, has suggested that though the technical and commercial losses should be monitored separately, the trajectory could give a combined target for technical and commercial losses in the first control period of MYT. Thus keeping in view the recommendations of the report and based on the capital expenditure plan, present condition of the network and current losses, loss reduction trajectory can be defined.

9.79 Any profits and losses achieved by the utility can be shared with the consumers in following manner:

- (a) if the loss levels are below target upto y% (for example if target is X% and loss level is between X% and X-y%) profit will be shared 50:50 between consumers and utility.
- (b) if the loss levels are below X%-y%, profit coming out of savings from the difference in X%-y% and the actual achievement will be kept by the utility.
- (c) if the loss levels are above target upto z% (for example if target is X% and loss level is between X% and X+z%), the resulting losses will be shared by the utility and consumers in the ratio of 50:50.
- (d) if the loss levels are above X%+z%, loss incurred from the difference in X%+z% and the actual achievement will be borne by the utility.
- (e) in order to have asymmetric incentive/penalty mechanism value of z should be greater than value of y.

9.80 Such provisions are already operational in many states and the results have been encouraging.

Quality of Supply and Service

9.81 Quality of supply and services plays an important role in the MYT regime as it requires the regulators to set Quality improvement targets and link them with the Capital Investment plans of the utility for the control period.

9.82 Quality of supply can be measured in the following three ways:

- (a) Network availability.
- (b) Supply availability.
- (c) Responsiveness in handling, technical and commercial complaints.

9.83 FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended following formula for the calculation of the network availability.

$$\text{“Wires Network Availability} = (1 - (\text{SAIDI} / 8760)) \times 100$$

9.84 Feeder Reliability Indices at 11 KV voltage level as specified by CEA can be used for calculating SAIDI, till 100% consumer indexing is achieved in the licensee’s area as the exact number of effected consumers by any interruption will be known only thereafter.

9.85 Wires Network Availability is proposed to be measured over the course of a month and year and will be expressed in percentage terms”.

9.86 Considering the importance of availability of distribution network without which the supply cannot be ensured to the consumers, the target proposed for network availability is 98% (This is in line with availability of transmission network specified in CERC tariff regulations)

9.87 FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended following formula for the calculation of the supply availability.

“Base load Supply Availability =

$$\frac{\text{(Actual Contracted Base Load Supply in MW)} \times \text{(No of Off-Peak hours)}}{\text{(Base load in MW)} \times \text{(No of off Peak hours)}}$$

“Peak load Supply Availability =

$$\frac{\text{(Actual Contracted Peak Load Supply in MW)} \times \text{(No of Peak hours)}}{\text{(Peak load in MW)} \times \text{(No of Peak hours)}}$$

Note: Since the peak hours and off-peak hours could vary from one season to another, the above computations may be done in such a manner that the sum of off-peak hours and peak hours is 8760 hours, i.e., the total number of hours in a year.

9.88 FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended that “*SERCs will specify Supply Availability trajectory based on past performance of Supply Business, however, it should not be lower than 90%, and should be progressively increased in a maximum of three years to 95% or 98%.*”.

9.89 The table given below gives the details of the energy scenario in the country

Table 43: Energy scenario in India

Region	Energy				Peak			
	Requirement (MU)	Availability (MU)	Surplus/Deficit (MU)	Surplus/Deficit (%)	Requirement (MW)	Availability (MW)	Surplus/Deficit (MW)	Surplus/Deficit (%)
Northern	241461	222875	-18586	-7.7	35460	29970	-5490	-15.5
Western	276827	234819	-42008	-15.2	37330	34276	-3054	-8.2
Southern	220126	201222	-18904	-8.6	31384	27216	-4168	-13.3
Eastern	91386	93613	2227	2.4	15110	14165	-945	-6.3
North Eastern	10744	9586	-1158	-10.8	1804	1537	-267	-14.8
All India	840544	762115	-78429	-9.3	118794	103816	-14978	-12.6

Source: Load Generation Balance report 2009-10

9.90 Considering the recommendations of the FOR report and the current energy shortage of 9.3% in the country, it is recommended that the target of the supply availability should be minimum 85% (keeping in view the energy shortage of 15% in western region).

9.91 Incentive to the wheeling business can be given based on the network availability and to the supply business be given based on the supply availability.

- 9.92 FOR report on the “Study to evolve an appropriate model for distribution margin” has recommended that, *“to start with, the addition/reduction in ARR may be considered as +0.2% of ARR for every percentage point increase/decrease in Availability vis-à-vis the normative levels, for wheeling business and supply Business, separately. For the Supply Business, if the total ARR, which includes the power purchase cost, is considered for giving additional returns through Distribution Margin, then it could result in providing a perverse incentive to the Supply Business to procure costly power, since this will lead to a higher additional return, in case the Supply availability is better than the normative levels. Hence, it is proposed to link the Distribution Margin to the ARR of the Supply Business, after reducing the power purchase cost, which also truly reflects the costs incurred by the Supply Business in ensuring that the requisite supply is contracted for and the desired customer service is delivered “.*
- 9.93 For parameters pertaining to commercial complaints and technical complaints SOP regulations provide for compensation to consumers, hence no separate incentive penalty have been proposed for the same.

Summary of incentive schemes

- 9.94 The table given below gives the summary of the incentives schemes proposed.

Table 44: Incentive schemes for supply business

S. No	Element	Controllable/Uncontrollable	Method of determining the benchmark	Incentive mechanism
1	Sales	Uncontrollable	Pass through	No incentive scheme recommended
2	Power Purchase	Uncontrollable	Pass through on actual	No incentive scheme recommended
3	Quality of supply	Controllable	Target based on the past performance	Addition/reduction in ARR may be considered as +0.2% of ARR for every percentage point increase/decrease in Availability vis-à-vis the normative levels, for supply Business, with a cap of +/-2% of ARR for supply business (ARR should not include power purchase cost as per recommendations of FOR report on distribution margin)
4	O&M	Controllable	Benchmarking exercise	Any savings or overspent are to the accounts of the utility.
5	Distribution losses (Technical & Commercial losses	Controllable	Target Based on past performance	Any savings or overspent are to be shared in a predefined ratio with the consumers as detailed in the section above.
6	Collection Efficiency	Controllable	Target set based on past performance	Any savings or overspent are to be shared in a predefined ratio with the consumers as detailed in the section above.

S. No	Element	Controllable/U ncontrollable	Method of determining the benchmark	Incentive mechanism
7	Working Capital	Controllable	Normative based on a formula	Any savings or overspent are to the accounts of the utility.

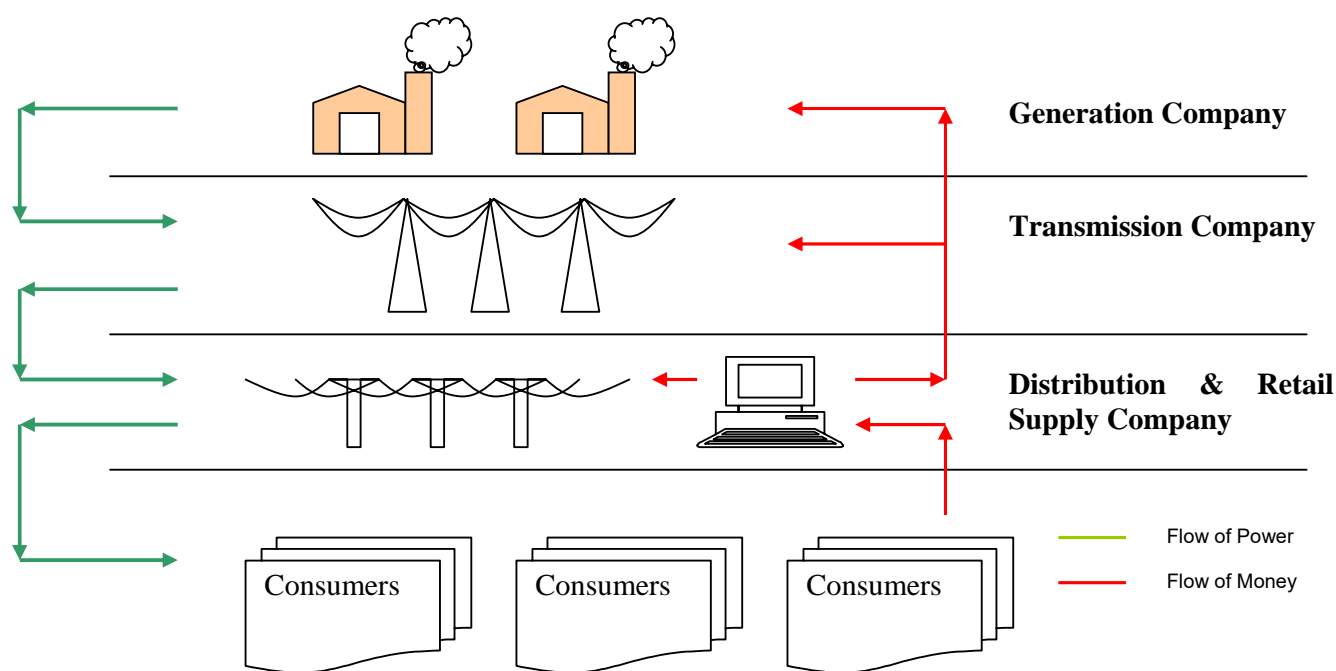
Table 45: Incentive scheme for network business

S.No	Element	Controllable/U ncontrollable	Method of determining the benchmark	Incentive mechanism
1	Capital investment	Controllable	Prudence check	No incentive scheme recommended.
2	Return on capital	Controllable	Based on normative rates	Return allowed on the pre tax basis and any savings net of cost on restructuring the loan to be shared between utility and consumers
3	O&M	Controllable	Benchmarking	Any savings or overspent are to the accounts of the utility.
4	Working Capital	Controllable	Normative based on a formula	Any savings or overspent are to the accounts of the utility.
5	Quality of supply	Controllable	Target based on past performance	Addition/reduction in ARR may be considered as +/-0.2% of ARR for every percentage point increase/decrease in Availability vis-à-vis the normative levels, for network business , with a cap of +/- 2% of ARR for network business
6	Technical losses	Controllable	Based on projections and capital investment plan loss levels are fixed	Any savings or overspent are to be shared in a predefined ratio with the consumers as detailed in the section above.

A10: ANNEXURE VI: SEGREGATION OF COST BETWEEN NETWORK AND RETAIL SUPPLY BUSINESS

10.1 The distribution company is responsible for the “Network” and “Retail Supply” business. In this chapter, the methodology for the segregation of cost between the Network and Retail Supply business has been discussed along with the analysis of the approach adopted in different states for the segregation and allocation of cost between the Network and Retail Supply business.

10.2 However, before discussing the approach for cost allocation it is important to understand the dynamics of the electricity supply industry structure.



10.3 The typical role of a Distribution company and Supply company are:

10.4 **Distribution Network function** involves transporting of electricity from transmission systems (transmission ends at 66kV) to customers. Traditionally described as customer end part of wires business (transmission is the generator end) with more radial operations rather than networked. This involves in setting up of network consisting of the poles, wires, transformers etc. to reach the electricity physically to the consumer. Main activities are:

- (a) setting up of physical network – poles, wires, transformers etc to reach electricity to consumers
- (b) obtaining the ‘right-of-way’ – in order to set up the network poles, distribution wires company should approach the local authorities for obtaining permission

- (c) new connections – extension or erection of network, so that new area loads are added to the systems – either a pull or push growth phenomenon
- (d) maintenance of network – ensuring that the network is in good condition, available to dispatch electricity at any time and is adequate (doesn't cause electrical instability)
- (e) quality of supply – maintaining proper conductor, transformer loading, transformer maintenance such that the consumer is assured of quality power – assured voltage, assured ampere and frequency

10.5 **Retail supply function** is also called as merchant function (not physical function). Retailing is sale of electricity to the final consumers and till recently thought of as part of distribution business. The main activities involved are

- (a) Procurement of electricity from wholesaler or bulk supplier (as mentioned earlier, the electricity generated, flows directly to consumer through wires at various voltages).
- (b) Pricing of electricity
- (c) Selling of electricity including the following commercial functions
 - (i) connection of consumer to the network – on payment of certain charges and signing up to consume energy equivalent of 'x' kw of load – categorization depending on the type of service (LT – Domestic, commercial, industry of certain voltage and HT – Colonies, industries, Railways etc)
 - (ii) metering of energy used by consumers – setting up meter in consumer premises, their maintenance, reading the meters at regular intervals and ensuring that energy accounting tallies up
 - (iii) commercial losses – meaning that energy has been consumed but not billed, either because the consumer is not accounted or because the meters are not read properly or not working or simply theft of energy by consumers
 - (iv) billing of electricity supplied – usually on variety of factors such as connected load, load factor, energy demand, energy supplied, consumer service etc. and approved by regulator at periodic intervals
 - (v) collection of bills – setting up infrastructure of collecting the dues from consumers such as 'section offices, kiosks, mobile vans, internet, cheque drop boxes, auto-debit to accounts' etc.
 - (vi) disconnection of service – as per the contract with the consumer, the supplier is allowed to discontinue services to the consumer.

Reconnection is possible with clearing of dues and payment of re-connection charges

- 10.6 In most of the countries where the Power sector is advance and stable the Distribution and Retail Supply are handled by separate companies. In these countries, the Distribution is regulated entity and Retail Supply is fully or partially competitive. The distribution company levies “distribution charge” on the retail supply companies according to their respective contracts and the retail supply company levies a “supply charge” on its retail customers. In the case of India there exist no distinct entities for wheeling and retail supply business. Hence, it is a bit complex to segregate the cost between the two businesses and arrive at a distribution and a supply charge.

Segregation of Distribution in Network & Retail Supply

- 10.7 Before discussing the methodology for the allocation of costs, it is important to understand the typical cost structure of a distribution company with integrated supply.

- 10.8 The total cost of a Distribution company includes:

- (a) Purchase of Electricity
 - (i) Capacity Charge
 - (ii) Energy Charge
- (b) Operation & Maintenance
 - (i) Employee Cost
 - (ii) Administration Cost
 - (iii) R&M Cost
- (c) Capital Cost
 - (i) Depreciation
 - (ii) Interest charges
 - (iii) Return

- 10.9 The main dilemmas for the cost segregation are:

- (a) Which cost categories have to be recovered under which business i.e. the Revenue Requirement?
- (b) What are the cost allocation rules and tariff components i.e. Tariff Design?
- (c) And, who should pay what?

Cost Allocation

- 10.10 Given the characteristics and nature of the wheeling and retail supply business, as explained in the earlier section, the allocation proposed is based on the premise that the distribution infrastructure up to the consumer's meter is part of the wires business, and the distribution infrastructure from meter to consumer premises is part of the supply business.
- 10.11 The approach proposed for allocation of expenditure between wires and supply is discussed below.
- (a) Retail Supply Charge, is aimed to recover the power purchase costs, transmission costs, any other costs clearly attributable to the supply business, Distribution losses², Interest on security deposits and cross subsidies.
 - (b) While, Distribution Charge is aimed to recover the cost of “network business” – that would reflect Capital Servicing Costs (depreciation, interest costs and return on equity), O&M costs (employee costs, R&M costs, A&G costs), and related network business costs (true-ups, incentives, penalties).
- 10.12 The general understanding is that, costs incurred for supplying power which are the bulk supply costs of the distribution licensee are to be allocated to the supply business. Apart from this, the minor costs of O&M also form part of supply business, the other costs of the licensee belong to the wheeling business as the assets of the licensee are on account of wheeling power. Hence the costs other than bulk supply can be allocated to wheeling business.
- 10.13 The following section discusses in detail the options for allocation or Costs:

Allocation of Capital Cost

- 10.14 To allocate the capital cost, it is important to split the total assets under the distribution company into Network and Retail Supply business.
- 10.15 Following options were considered for segregation of fixed assets.
- 10.16 Option 1: Identification of Fixed Assets location wise with values based on which the assets may be segregated as pertaining to Distribution business and Retail supply. In case of common assets a proportion may be considered to allocate the assets.

² To clarify, Distribution losses are a cost for the supply business, and a performance parameter for the network business. Users of the network would pay a regulated wheeling charge (for use of network), and would also bear the losses in accordance with the supply market rules.

- 10.17 Option 2: Identify the Assets pertaining to Retail supply (since the retail supply assets would be lesser in number) and allocate the balance asset to the Distribution business. The major components that would form part in the Asset Book (GFA) of a Retail Supply company would be Meters and billing equipments (computer etc).
- 10.18 Most of the Plant and Machinery and Lines and Cables based Assets would form part of the Distribution Assets the same can be allocated to Distribution business. Other fixed assets like Buildings, office equipments, furniture and fixtures, vehicles etc. can be apportioned on the basis of predominant usage concept.
- 10.19 Option 3: Identify the % use of each type of fixed assets and allocate them wires and supply business on the basis of voltage level and retail supply.
- 10.20 The related capital cost (depreciation, interest charges & return) of the respective assets, thus, could be allocated based on the above ratio of fixed assets.

Depreciation

- 10.21 Based on the allocation of fixed assets to each function, depreciation for each asset sub-group can be proportionately allocated.

Interest & Financing Charges

- 10.22 **Option 1:** Identify specific loan taken for each of the business (Network & Retail Supply) depending on the nature of the business. The interest and finance charges can be charged to the respective function based on the loans identified.
- 10.23 **Option 2:** Allocate all long term loans to Wires business and Interest on WC, Power Purchase dues and consumer security deposit to supply business.
- 10.24 **Option 3:** From the total loans of Distribution licensee, loans relating to Retail supply business (viz. consumer meters, vehicles, etc). can be identified and the balance can be considered as relating wires business. Here also further bifurcation of loans as relating to each voltage class would be required.

O&M Expenses

- 10.25 The proposed allocation for O&M expenses is discussed below.

Employee Cost

- 10.26 **Option 1:** On the basis of the ratio of employee's effort pertaining to Distribution wires and Retail supply business in the company based on elaborate time and motion study. This exercise will involve time and effort.
- 10.27 **Option 2:** To segregate the employee cost on the basis of employee requirement to undertake the retail supply business. Given the nature and role of the retail supply business, as explained in the earlier section, the employee requirement is significantly less than that of the Network business. Thus, the board could do an

evaluation on the number of employees that could be allocated to the retail supply business. This evaluation could be done on a thumb rule basis i.e.

- (a) The power purchase team/ division could be allocated to the retail supply business
- (b) The number of employees involved in metering and billing could to allocated to retail supply business
- (c) And any other which the board may feel relevant.

10.28 The rest of the employees would be considered in the Network business.

10.29 The distribution licensee could compile the list of employees at different levels and allocate the same of the approach mentioned above. The employee cost would then be automatically be allocated between wheeling and retail supply based on the employees allocated to the respective businesses. The employee capitalisation should be considered in the ARR of the Network business.

A&G Cost

10.30 The A&G expenses could be allocated on a ratio assumed on the basis of experience of distribution licensee pertaining to classification of expenses under Network and Supply business.

R&M Expenses

10.31 The R&M expenses could be allocated on the proposed ratio of fixed assets between Network and Retail Supply business. For the purpose of getting more accuracy, the allocation could be done by allocating the R&M sub-heads related to specific asset category in the ratio of the respective classified under Network and Retail supply business i.e. R&M (Plant and Machinery) could be allocated in the ratio of Gross fixed asset value of Plant and Machinery classified under Network and supply business.

Returns

10.32 The Distribution licensee may split the Returns between Network and Supply business. The following options can be considered.

- (a) **Option 1:** From the total equity of Distribution licensee, allocate a portion of the equity to supply business and apply ROE (%) on both the businesses. This could be done on the basis of asset allocation considered.
- (b) **Option 2:** Allowing ROE (%) for the Network business and assuming a supply margin on the energy handled.

Other/ Miscellaneous Expenses

10.33 Other than the expenses discussed above, the Retail Supply business would also be liable for the following expenses.

- (a) Incentive & rebate on supply of electricity
- (b) Interest on Consumer Security Deposits
- (c) Bad Debts, and
- (d) UI Charges

10.34 Based on allocation statement formed, the ARR for Network and Retail Supply could be formed.

Experience in select states

Andhra Pradesh

10.35 The approach followed for allocation of expenditure and revenue between wires and supply in Andhra Pradesh is discussed below. The approach proposed by the Licensee had been accepted by the Commission. However, a directive has been issued in the MYT order to have a formal accounting of both the businesses.

10.36 The approach used in Andhra Pradesh is fairly simple and allocates the broad heads either in Wires business or in Supply business.

Table 46: Cost Allocation Approach followed in Andhra Pradesh

Licensee's Approach/ Commission Approved		
Expenditure Items	Wires	Supply
Power Purchase Expenses		100%
<i>O & M Expenses</i>		
Employee Expenses	100%	0%
Administration & General Expenses	100%	0%
Repair & Maintenance Expenses	100%	0%
Depreciation, including advance against depreciation	100%	0%
Interest on Long-term Loan Capital	100%	0%
Transmission & PGCIL Charges	0%	100%
Bad Debts Written off	0%	100%
Interest on Consumer Security Deposits	0%	100%
Supply Margin	0%	100%
Total Revenue Expenditure		
Return on Equity Capital	100%	0%
Aggregate Revenue Requirement		
Less: Non Tariff Income	0%	100%

Maharashtra

10.37 The approach followed for allocation of expenditure between wires and supply in Maharashtra is discussed below.

Table 47: Cost Allocation Approach Proposed in Maharashtra

Expenditure Items	MSEDCL Approach			Commission's Views
	Wires	Supply	Basis for allocation	
Power Purchase Expenses		100%	Linked to sales, which is a supply function	
<i>O & M Expenses</i>				
Employee Expenses	60%	40%	Assumed ratio - The cost of employees associated with the metering, billing and collection activities as well as the commercial section is not separately available, hence assumed ratio	MSEDCL would not have the accounting separation and over a period the estimates / assumptions would improve. Part of Billing, Metering and collection expenses should also allocated to wires business
Administration & General Expenses	50%	50%	Assumed ratio	The assumptions can be improved for the next tariff review / MYT process
Repair & Maintenance Expenses	92%	8%	In ratio of share of GFA	
Depreciation, including advance against depreciation	92%	8%	In ratio of share of GFA	
Interest on Long-term Loan Capital	92%	8%	In ratio of share of GFA	
Other Interest & Finance Charges incl. Interest on working capital & consumer security deposits	92%	8%	In ratio of share of GFA	Interest on Working capital has to be provided as a separate head as specified in the filing (what did they specify)
Interest on working capital		100%		Interest on Working capital cost can also be allocated in the ratio of revenue i.e. wheeling ARR and retail supply ARR especially in the case receivables and O&M cost. Spares, if any, can be confined to the supply business. Interest on CSD can also be based on revenue.
Bad Debts Written off	0%	100%	Linked to sales, which is a supply function	At present the consumer is paying a bundled rate which includes compensation for wheeling services also. Hence, the bad debts should also be allocated to wires business in the ratio of revenue
Other Expenses		100%	Comprises TOSE and miscellaneous expenses – linked to supply function	

Expenditure Items	MSEDCL Approach			Commission's Views
	Wires	Supply	Basis for allocation	
Income Tax			In proportion to share of total expenses, and hence revenue	
Transmission Charges paid to Transmission Licensee		100%	Dependent on quantum of energy wheeled, which is linked to sales	Transmission network is utilized to transmit the power purchase capacity and hence have to be allocated entirely to supply business.
Contribution to contingency reserves	92%	8%	For creation of assets in situation of natural calamity, hence proportional to asset ratio	
Total Revenue Expenditure				
Return on Equity Capital	80%	20%	Assumed – can be linked to share of GFA on the basis that equity is required for asset creation; but supply business also requires some equity	Ratio cannot be different from asset ratio assumed for other capital costs. Hence has to be allocated 92% and 8% respectively
Aggregate Revenue Requirement				
Less: Non Tariff Income		100%	Related to sales - DPC and interest on delayed payment	
Less: Income from wheeling charges				Income from wheeling cannot be deducted from ARR as the expenditure incurred is also on account of third party sales

Karnataka

10.38 The MYT Regulations issued by KERC required segregation of Accounts between Distribution and Retail supply business. BESCOM has done a detail segregation of expenses by segregating the expenses at each individual heads/ sub-heads.

Apportionment of cost and assets –Methodology Proposed by BESCOM

10.39 **Segregation approach and Methodology:-**Currently, there is no segregation of expenses and Income between the Distribution business and Retail supply business. Since detailed segregation involved high complexity, for the purpose BESCOM has proposed a macro level segregation of fixed assets, costs and income.

10.40 **Methodologies considered for segregation of fixed assets:-** The following methodology was adopted.

- (a) Identify the % use of each type of fixed asset and allocate them wires and supply business as under:-
 - (i) Distribution wires - 33 KV (if applicable)
 - (ii) Distribution wires - 11 KV
 - (iii) Distribution wires- LT network
 - (iv) Retail supply

10.41 **Methodology for apportionment of Expenses:-** Expenses are segregated into two major categories

- (a) Costs 'that predominantly' belong to a particular business to be booked under such business i.e. Wires or Supply
- (b) Common costs which need to be allocated or apportioned based on the apportionment rule or a Cost Driver

10.42 The apportionment of expenses has been considered at each item of expenses or expense groups from Account Group. The segregation of expenses to arrive at costs under Distribution business and Retail supply business is attempted on a best estimate basis.

10.43 Following is the overall element wise allocation table for wires as well as supply business based on 2005-06 actuals.

Table 48: Cost Allocation Approach Proposed in Karnataka

Allocation Table			
	Wires	Supply	Basis of Allocation
Power Purchase	0%	100%	Expense of RS Business
Repairs & Maintenance	89%	11%	In the ratio of Gross fixed asset value of the assets allocated to RS business and Wires business
Employee costs	54%	46%	Apportionment of the total employee cost on the basis of number of employees effort broadly identifiable for each business.
A&G expenses	44%	56%	Based on the expenditure profile in a typical field unit the committee of officers can capture the expenses allocable to each of the functions on a % basis
Depreciation	88%	12%	Based on the allocation of Fixed assets to each function, depreciation for each Asset sub-group can be proportionately allocated
Interest and Finance charges	34%	66%	From the total loans of Bescom loans relating to supply business viz. consumer meters, vehicles, etc. can be identified and the balance can be considered as relating wires business. Here also further bifurcation of loans as relating to each voltage class would be required.
Other debits	1%	99%	Item wise allocation, Predominantly pertains to supply business.
Prior period expenses	50%	50%	Item wise allocation
Total	9%	91%	

Madhya Pradesh

10.44 Following is the element-wise expenses considered by Madhya Pradesh West Distribution company for the purpose of MYT.

Table 49: Cost Allocation Approach Proposed in Madhya Pradesh

Expense element	Wires	Supply	Basis of Allocation
Power Purchase Expenses	0%	100%	Retail Supply Expenses
Repairs and Maintenance Expenses	96%	4%	In the ratio of GFA based on assets identified for retail supply and wires business
Salaries and Wages	76%	24%	The cost of employees associated with the metering, billing and collection activities as well as the commercial section
Administration and General Expenses	45%	55%	
Depreciation	87%	13%	In the ratio of GFA based on assets identified for retail supply and wires business
Interest Charges	78%	22%	In the ratio of interest charges on the loans applicable for respective assets identified for retail supply and wires business
Other Debits	3%	97%	Item wise allocation, Predominantly pertains to supply business.
Gross Total	12%	88%	