Maharashtra Electricity Regulatory Commission

Assistance to MERC in preparation

of

MYT Regulations for FY 2010-11 to FY 2014-15

September 23, 2009
Mumbai

ABPS Infrastructure Advisory Pvt. Ltd.

Agenda

1. Background
2. MYT General Principles
3. Broad Financial Principles
4. Norms and Principles for determination of Revenue Requirement and tariff for Generation Companies
5. Norms and Principles for determination of Revenue Requirement and Tariff for Transmission Business
6. Norms and Principles for determination of Wheeling Charges for Wires Business
7. Norms and Principles for determination of Revenue Requirement and Tariff for Retail Supply Business
8. Norms and Principles for Energy Efficiency (EE) and Demand Side Management (DSM)

Background

Background…1/2

- Section-61 of Electricity Act, 2003 mandates 'Appropriate Commission' to specify terms and conditions for the determination of tariff which shall be guided by Multi Year Tariff Principles.
- MERC (Terms and Conditions of Tariff) Regulations, 2005 notified on August 26, 2005.
- Regulation 14.1 of the MERC Tariff Regulations specified that the first Control Period for the Multi-Year Tariffs would be three financial years beginning April 1, 2006.
- MERC suspended implementation of the MYT framework by one year.
- MERC issued the MYT Order for all the Utilities in the State, except MPECS, in accordance with the MERC Tariff Regulations, for the first Control Period from April 1, 2007 to March 31, 2010.

Background…2/2

- MERC Tariff Regulations, 2005 do not have any specified applicability period and can theoretically be continued for the next Control Period also.
- MERC has to be guided by the
  - CERC Tariff Regulations, 2009 notified in January 19, 2009
  - National Electricity Policy
  - Tariff Policy by the Ministry of Power, Government of India
  - Forum of Regulators (FOR) Report recommendations on the standard MYT framework to be implemented for distribution licensees across the country
  - Learnings from the first Control Period vis-à-vis the MERC Tariff Regulations, 2005
- In view of the above, there is a need to revise the MERC Tariff Regulations for the second Control Period.

Terms of Reference of the Assignment

- Develop Discussion Paper on the contours of the Multi-Year Tariff Regulations for the second Control Period of five years beginning April 1, 2010;
- Formulate the draft MYT Regulations for the second Control Period of five years beginning April 1, 2010
- Assist the MERC in discussions with the experts
- Assist MERC during subsequent regulatory process.
- Assist MERC in finalising the MYT Regulations and Explanatory Memorandum, based on stakeholders' comments and discussions with the MERC.

Approach & Methodology

MYT General Principles

MYT Objectives

- Provide regulatory certainty to the investor and consumers.
- Address the risk sharing mechanism between Utility and Consumers based on controllable and uncontrollable factors.
- Ensure financial viability of the sector to attract investment, ensure growth and safeguard the interest of the consumers.
- Review operational norms for Generation, Transmission, Wires and Supply businesses.
- To promote operational efficiency.
- Reduce tariffs in the long-term through improvement in operational efficiency.

Performance Based Regulations…1/3

- **Cost plus Regulation**
  - **Revenue = Cost + Profit**
- **Performance Based Regulation**
  - **Profit = Revenue - Cost**
- **Need for Performance Based Regulation**
  - **Provides greater regulatory certainty to Investors and consumers.**
  - **Helps to align customer and Utility objectives, viz., the customer desires reduction in tariff and certainty in tariff, while the Utility seeks to maximise its returns, which is possible by increasing operational efficiency, since a large part of the gains will be retained with the Utility.**
  - **Designed so that cost control and Utility accountability are not jeopardized.**

Performance Based Regulations…2/3

- **Demerits of Performance Based Regulation**
  - Utilities may opt to invest less than approved expenditure especially in Capital Expenditure (Capex) and Repair & Maintenance (R&M).
  - Normative benchmarks, if not derived properly in PBR, may lead to abnormal profits or abnormal losses.
- **The generic price cap formula can be defined as:**

$$Price(t) \leq Price(t-1) * [1 + (I - X)] + Z$$

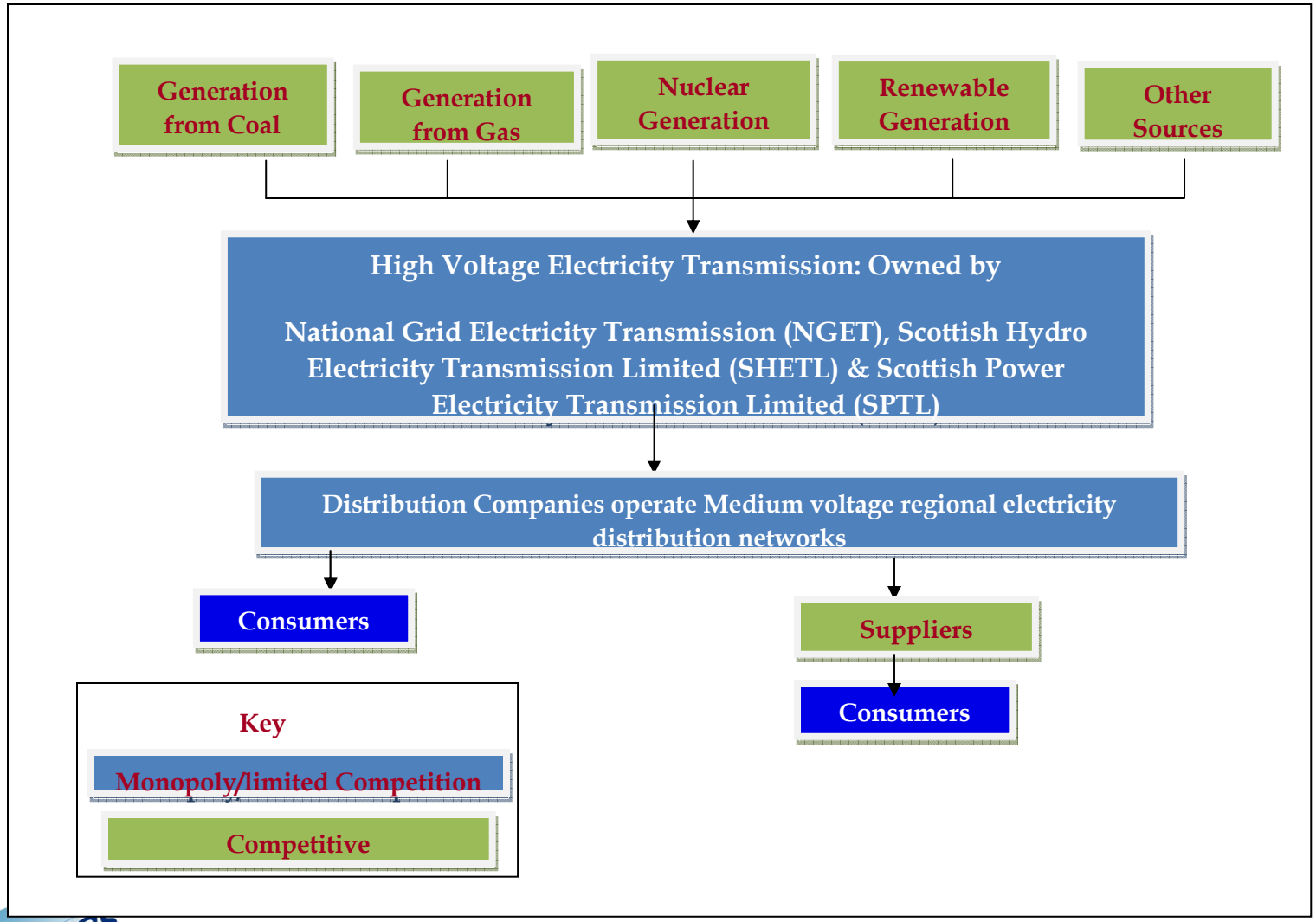
where

  - Price(t) is the maximum price that can be charged to a customer class or classes for the current period,
  - Price(t-1) is the average price charged to the same class or classes during the previous period, I is the inflation factor, X is the productivity factor, and Z represents any incremental uncontrollable costs that are not subject to the cap.

Performance Based Regulations…3/3

- **Revenue Cap Vs Price Cap Regulations**
  - PBR mechanisms can be designed using 'revenue caps' or 'price caps'.
  - Revenue cap: Cap in one year is based on the revenue in the previous year with adjustments for inflation and productivity.
  - Price Cap : Cap on price being charged to the consumers
  - Cost cutting incentives for price and revenue caps are identical.
  - The main difference is that price caps may also encourage increased sales and hence, discourage end-use energy efficiency.
- **FOR Report on MYT Framework recommends**
  - Norms for the first Control Period to be specified as close to actual level of performance as possible.
  - Specifying a trajectory to achieve desired levels of norms, which entails fixing of performance trajectory on normative basis rather than at actual levels for the second Control Period onwards.
    - **It is proposed to introduce some form of Performance Based Regulation for the second Control Period in Maharashtra.**

Electricity Industry Structure in Great Britain (GB) …(1/4)



Electricity Industry Structure in Great Britain (GB)…(2/4)

- **Salient Features of Industry Structure in GB**
  - Generation tariff and Retail tariff are deregulated in Great Britain, which means that there is no price cap for these segments.
  - Transmission and Distribution segments are regulated under price cap mechanism, where regulator regulates the price chargeable to DNOs and Suppliers, respectively.
- **Salient Features of Industry Structure in India**
  - Generation activity - Partly competitive with introduction of competitive bidding.
  - Transmission - Monopoly activity
  - Distribution - Largely a monopoly despite provisions of open access.

  All the three segments are regulated by Electricity Regulatory Commissions (ERCs) in India.
- **Dissimilarities with GB**
  - Distribution and Retail Supply are separate licensed activities in GB, whereas in India, EA 2003 does not provide for separate licences for Wheeling and Retail Supply.

Electricity Industry Structure in Great Britain (GB)…(3/4)

- **Dissimilarities with GB … Contd.**
  - GB has Common Carrier model whereas in India, EA 2003 also provides for Parallel Distribution network
- **Relevance to Indian Context**
  - Distribution and Supply Business requires separate licences in GB, whereas in India, the Wires and Supply business are clubbed under one Distribution licence.
  - In GB, there are multiple suppliers and retail tariff is determined by market forces, whereas in India, Supply business does not have competition and retail prices are regulated by Regulatory Commissions, which is essential in a Monopoly.
  - Hence, Industry Structure of India and GB are different.

- **Hence, similar structure of Price cap would be difficult to India.**
- **It is proposed to formulate a hybrid model, suitable for the electricity industry structure in India, and considering the complexity involved in tariff determination in India.**

Electricity Industry Structure in Great Britain (GB)…(4/4)

- **Need for Separate Price Cap for Wires & Supply Business**
  - **In GB, Price cap is specified for regulated Wires Business only, as Competitive market exists for Supply Business.**
  - **In India, if Price cap mechanism to be implemented, Price cap for both Wires & Supply Business needs to be specified separately because:**
    - **Unified licence for Wires & Supply Business**
    - **Competition does not exist in Supply Business.**
    - **Both the Business are regulated by ERCs.**

Critical Issues- PBR Implementation

- Productivity factor ('X' in RPI – X formula) will have important implications for Utility cost recovery and the rate at which prices are allowed to increase.
- Appropriate level of improved productivity is not easy to define.
- In most cases, it is based upon historical or projected productivity gains by the Utility and/or by the electricity industry itself.

- Moreover, a productivity adjustment may not be necessary if the price (or revenue) cap is instead linked directly to input costs determined on the basis of benchmarking with comparable Utilities.
- Adoption of simple RPI-X+Z mechanism may not be correct choice to make.
- To suit the transitional nature and complexity of Maharashtra's Power Sector, a hybrid model needs to be considered

Performance Trajectory for Input Costs

- It is proposed to specify the performance trajectories for various efficiency parameters for the Generating Companies/Businesses, Transmission Licensees, Wires Business and Retail Supply Business for the second Control Period based on
  - Past performance
  - Desired levels of performance under the MYT Regulations.
  - Benchmarking with Comparable Utilities

Possible PBR Approaches for Maharashtra…1/2

- **In the Indian context, the methods for adopting PBR mechanism are as under:**
  - **Generation Business: Price cap may be applied to Generation Company as a whole on average generation tariff or Plant-wise or Station-wise caps could be specified**
  - **Transmission Business: Revenue cap on revenue requirement may be applied for the Transmission Utility.**
  - **Wires Business: Revenue cap on revenue requirement may be applied for the Wires Business**

Possible PBR Approaches for Maharashtra…2/2

- **Retail Supply Business: Price caps for individual consumer category may be applied considering the cross subsidy reduction trajectory. Issue for consideration are:**
  - **The number of caps specified represents a trade-off for the Regulator between the goal of protecting customers and moving the Utility toward a market-driven mechanism.**
  - **A single cap would allow the Utility maximum flexibility to determine category-wise tariff. On the other hand, a cap applied to every customer category would provide greater protection for smaller customers.**
  - **Added complexity in determination of retail tariff is the cross-subsidy element, which has to be gradually reduced in accordance with the EA 2003 and Tariff Policy notified by the Ministry of Power.**

MYT General Principles…1/5

- **Business Plan**
  - **FOR report on MYT framework and Distribution Margin recommends that Distribution Licensee needs to submit Business Plan and Power Procurement Plan six months before submission of MYT Petition encompassing**
    - **Category-wise Sales projections**
    - **Load Growth details**
    - **Power Procurement Plan from short-term and long-term sources**
    - **Details of load shedding**
    - **Capital expenditure and capitalisation plans, financing pattern and impact on related expenses**
    - **Employee rationalisation**
  - **MERC Tariff Regulations, 2005 stipulates that Tariff Petition needs to be submitted four months prior to the date of applicability of such tariff**

MYT General Principles…2/5

- Hence, date for submission for the Business Plan would effectively be 31st May.
- However, in the present context, as the date has already passed for the second Control Period, it would be difficult for Utilities to file a Business Plan as per FOR recommended timelines.

- **Hence, it is proposed that**
  - **Utilities should be asked to file Business Plan in accordance with FOR Recommendations, since Business Plan is the key to the entire MYT Petition**
  - **The Utility shall file the Business Plan for the second Control Period on November 30, 2009 for the Commission's approval, along with the MYT Petition for the second Control Period.**
  - **However, for the third Control Period onwards, it is proposed to follow FOR recommended timelines.**

MYT General Principles…3/5

- **Duration of MYT Control Period (Three years or Five years?)**
  - **Clause 5.3 (h)(1) of the Tariff Policy notified by the Ministry of Power, Government of India on January 6, 2006 stipulates:**

    "The framework should feature a five-year control period. The initial control period may however be of 3 year duration for transmission and distribution if deemed necessary by the Regulatory Commission on account of data uncertainties and other practical considerations"
  - **The first Control Period in the State is for a period of three years, from April 1, 2007 to March 31, 2010.**

MYT General Principles…4/5

- **Duration of MYT Control Period (Three years or Five years?)**
  - **In accordance with the Tariff Policy and considering that the Utilities in the State of Maharashtra have already experienced the first Control Period of three years**
  - **It is proposed to have a longer Control Period of five years, over the period from April 1, 2010 to March 31, 2015.**
  - **Longer review periods reduce regulatory costs and streamlines the regulatory workload, so that the Regulators can focus on regulating quality of output rather than regulating costs.**
- **Applicability of MYT Regulations**
  - **Applicable for determination of tariff in all cases covered under these Regulations from FY 2010-11, i.e., April 1, 2010 and onwards up to FY 2014-15, i.e. March 31, 2015.**
  - **However, for all purposes including the review matters pertaining to the period till FY 2009-10, the issues related to determination of tariff shall be governed by MERC (Terms and Conditions of Tariff) Regulations, 2005, including amendments thereto.**

MYT General Principles…5/5

- **Controllable & Uncontrollable factors:**

Controllable	Uncontrollable Factors
❑ Capital Expenditure ❑ Technical and Commercial losses ❑ Operational Parameters: Availability, Station Heat Rate, etc. ❑ Provisioning for Bad Debts & Collection Efficiency ❑ Interest on Working Capital. ❑ Operation & Maintenance (O&M) Expenses ❑ Financing Pattern ❑ Quality of Supply ❑ Power Purchase Expenses ❑ Transit loss ❑ Capital Cost overrun ❑ Variation in Employee expense due to Wage revision ❑ Interest Expenses	❑ Force Majeure events ❑ Change in law ❑ Variation in fuel cost ❑ Variation in power purchase expenses ❑ Change in hydro-thermal mix due to adverse natural events

Power Purchase Expenses break-up…1/6

- **MERC (General Conditions of Distribution Licence) Regulations, 2006 stipulates**
  - **Clause 8.3.2 stipulates that the Distribution Licensee shall take all reasonable steps to ensure that all consumers connected to the Distribution Licensee's Distribution System receive supply of electricity as provided in the Standards of Performance Regulations.**
  - **Clause 8.3.3 stipulates that with prior approval of the Commission, the Distribution Licensee shall procure power for meeting the obligations under the Licence in an economical manner and under a transparent power purchase and procurement process.**
  - **Hence, one of the most important responsibilities and duties of the Distribution Licensee is to**
    - **Provide continuous supply of electricity (on a 24x7 basis) in an economical manner, which entails procuring sufficient quantum of power at optimum rates.**

Power Purchase Expenses break-up…2/6

	Particulars	Power Purchase			Percentage of total power purchase
		MU	Rs Crore	Rs/kWh	%
FY 2008-09	RInfra-D				
	Long-term Power Purchase	6,852	2,586	3.77	72.02%
	Short-term Power Purchase	2,662	2,385	8.96	**27.98%**
	Total	**9,514**	**4,971**	**5.22**	
FY 2008-09	BEST				
	Long-term Power Purchase	4,715	2,369	5.02	98.28%
	Short-term Power Purchase	83	67	8.12	1.72%
	Total	**4,798**	**2,436**	**5.08**	
FY 2008-09	TPC-D				
	Long-term Power Purchase	2,457	1,042	4.24	92.67%
	Short-term Power Purchase	194	167	8.58	7.33%
	Total	**2,651**	**1,209**	**4.56**	
FY 2008-09	MSEDCL				
	Long-term Power Purchase	76431	16941	2.22	98.5%
	Short-term Power Purchase	1136	833	7.33	1.5%
	Total	**77567**	**17774**	**2.29**	

Power Purchase Expenses break-up…3/6

- **Objections raised by consumers and consumer representatives in the Tariff determination process of RInfra-D**

- **Shri Ashok Pendse of Mumbai Grahak Panchayat (MGP), one of the authorised Consumer Representatives, submitted that**
  - **Licensee should procure power through long-term PPAs and visible efforts should be made for procuring power through competitive bidding.**
  - **Distribution licensee is responsible for not contracting for adequate quantum of power on long-term basis, which has increased the cost of power purchase**
  - **There should be some sharing mechanism, whereby the additional cost due to costly power purchase is not passed on entirely to the consumers, and the distribution licensee has to share some of the burden on this account.**

Power Purchase Expenses break-up…4/6

- **Objections …Contd.**

- **Shri Shantanu Dixit, one of the authorised Consumer Representatives, submitted that**
  - **FY 2008-09 - 20% of the total input is from bilateral sources at an average cost of Rs. 8.77 per unit**
  - **FY 2009-10 - Estimated that 29% of the total input will be from bilateral sources at an average cost of Rs. 7.00 per unit,**
  - **This exorbitant cost of procurement of power will result in placing a high tariff burden on the consumers.**
  - **In spite of being aware about the likely shortage, since the past 6 years, RInfra-D has not entered into any long or even medium term power purchase agreement with any new supplier/source.**
  - **The licensee should be financially and legally penalized for failure to ensure cost effective power procurement on timely basis.**

Power Purchase Expenses break-up…5/6

- Thus, though RInfra-D has a very high proportion of costly power, there is no planned load shedding in RInfra-D licence area.
- On the other hand, MSEDCL is procuring a very small quantum of costly power; however, the load shedding in MSEDCL licence area is very severe.
- Unless the distribution licensees enter into long-term contracts at appropriate rates for the required quantum of power, there will always be a trade-off between shedding load or procuring costly power to mitigate the load shedding, which will result in higher tariffs.

Power Purchase Expenses break-up…6/6

- Power purchase was earlier categorised as an uncontrollable parameter, hence, there is no real pressure on the distribution licensees to procure cheaper power.
- If the wires business and supply business are segregated, one of the prime differentiating factors between various suppliers would be the ability to source cheaper power and ensure continuous supply, which can only be achieved through long-term power purchase.
- Moreover, consumers should not be burdened on account of the supplier's inefficiency in fulfilling its basic function.
- It is proposed that a maximum of 5% of total power requirement can be procured through short-term contracts, and the balance power has to be procured through firm long-term contracts.

Quality of Supply…1/2

- **Regulatory Framework**
  - **Tariff Policy mandates SERCs to increasingly focus on regulation of the supply quality and service standards, rather than the regulation of costs.**
  - **Clause 5.4.2 of FOR Report on MYT framework and distribution margin recommends that**
    - **Composite Index of Supply Availability and Network Availability to be specified**
    - **Target achievement for Composite Index of Supply Availability and Network Availability may be specified as 95% for urban areas and 85% for rural areas.**
    - **However, the SERC may initially fix a lower norm for network availability for rural areas keeping in view the present levels of service with trajectory for time bound improvement.**
    - **For every 1% under-achievement in composite availability for urban or rural areas, ROE shall be reduced by 0.1% of equity. The SERC shall specify the mechanism of computing Composite Index of Supply Availability and Network Availability.**

Quality of Supply…2/2

- Since, under the proposed framework, the Wires Business and Supply Business are being segregated, the performance indices of both Businesses may be kept separate, rather than determining a Composite Index.
- In accordance with the above FOR recommendations, it is proposed that

  - Penalty for Supply Licensee - for failure to ensure at least 95% supply availability. The RoCE will be reduced by 0.1% for every 1% under-achievement of supply availability below 95%.

Sharing of Gain & Losses on account of Controllable Factors

- **FOR Report on MYT framework and distribution margin has recommended as under:**

"6.2 Sharing of benefits of efficiency gains with consumers

6.2.1 The losses on account of under achievement in controllable parameters shall not be shared with consumers as norms are being fixed at close to actual levels, except in extraordinary circumstances if decided by the SERC.

6.2.2 Efficiency gains with respect to controllable parameters shall be shared between the licensee and the consumer in the ratio of two-third and one-third at the end of every year during the truing up exercise."

- **It is proposed to adopt the FOR recommendation for sharing of Gain and losses for Generation Companies and Licensees.**

Sharing of Gain & Losses on account of Un-Controllable Factors

- **FOR Report on MYT framework and distribution margin has recommended as under:**

"...6.2.3 The entire gains and losses on account of uncontrollable factors shall be passed on to consumers during the truing up process..."

- **Variation on account of uncontrollable factors is proposed to be passed through under the 'Z' factor on a quarterly basis**

Performance Review & Truing Up

- Presently, performance review and truing up is being undertaken on an annual basis
- As a result, Utilities are not being required to plan and project on long-term basis, and the expense numbers are being revised significantly every year, resulting in tariff increase every year
- It is proposed that Review of performance of Utilities shall be undertaken only at the end of the Control Period
- Review may commence one year before the end of the Control Period, so that the revised Framework is in place before the commencement of the next Control Period.
- Annual truing up is not being proposed, as it would defeat the purpose of MYT exercise

Broad Financial Principles

General Financial Principles- ROCE vs ROE…(1/3)

- ## Approach for Giving Returns

  The Rate Base is defined as the Capital Base on which the rate of return is applied, to compute the permissible return to the investors. There are two Options for considering the Rate Base, viz.,

  - Return on Equity (ROE) approach, where the Rate Base is equal to the equity or the networth invested in the business,
  - Return on Capital Employed (ROCE) approach, where the Rate Base is the total capital employed (Equity and Debt) by the Utility.

- ## Merits of ROE approach

  - It is easy to compute and simple to implement, and is hence, easily understood by all stakeholders.
  - The investor gets assured returns on equity investment for ever, once the investment is made.
  - The Utility is protected against the risk of fluctuation of interest rates, since interest expense is allowed as a pass through expense at actuals.

General Financial Principles- ROCE vs ROE …(2/3)

- Demerits of ROE approach
  - No incentives for companies to bring down cost of capital
  - Utilities may tend to inject more equity and try to reach normative equity allowed in order to maximize their profits.
  - Even if assets are depreciated fully, Utilities get assured return on equity invested.
  - In case the equity on the Balance Sheet of the Utility is low, which is the case with quite a few State-owned Utilities as they have been largely funded through loans, then the resultant claim for RoE is also reduced, which may hamper the Utility's efforts to invest in future capital expenditure.
- Merits of ROCE approach
  - ROCE approach incentivises financial planning to optimize the debt-equity mix and bring down the cost of capital.
  - Consumers required to pay for the capital employed to fund the assets used to serve the consumers.
  - The consumers are insulated from changes in debt-equity mix and changing interest rates, etc.

General Financial Principles- ROCE vs ROE …(3/3)

- Merits of ROCE approach…Contd.
  - Once the asset is fully depreciated, then the Utility does not earn any return on its investment, and hence, the tariffs would also reduce to that extent.
  - State-owned Utilities, which may have a lower equity base, would not be adversely affected, since the Returns would be given on the total capital employed, rather than the equity invested in the business.
- Demerits of ROCE approach
  - Requires an estimation of the normative cost of debt and benchmarking of the debt-equity ratio, which could lead to windfall profits or abnormal losses depending on the ability of the Utility to undertake financial engineering to restructure its debt and equity.
  - The Public Sector entities may find it difficult to manage the inherent risks under the ROCE approach.
  - The ROCE approach may also pose an entry barrier for new entrants as they may not be able to achieve the desired debt: equity mix and also may not be able to source cheaper loans, as compared to existing companies with stronger Balance Sheet.

ROCE Approach…(1/3)

Tariff Policy

- Clause 5(a) of the Tariff Policy notified on January 6, 2006 stipulates '*Balance needs to be maintained between the interests of the consumers and the need for investments at par with, if not in preference to other sectors so that the electricity sector is able to create adequate capacity. The rate of return should be such that it allows generation of reasonable surplus for growth of the sector*'.

Maharashtra

- MERC Tariff Regulations, 2005 has stipulated ROE approach for the Utilities in the State

Delhi

- ROCE approach provided for transmission licensees and distribution licensees, with the weighted average cost of capital to be determined independently for each year of the Control Period.
- For generating companies, Return on Equity approach has been adopted.

ROCE Approach …(2/3)

- Delhi
  - Para 2.94 of Consultative paper on MYT Regulations published by DERC states

    "The ROCE concept gives incentives to the licensees to optimise the debt equity ratio. The approach recognises that the consumers should pay for the capital employed in the assets being used to serve the consumers, and ensure that the financing decisions of the distribution licensee do not affect consumer tariffs. It also makes it easier for the regulators as they do not have to monitor the debt and equity component separately and can concentrate on the overall performance of the licensees."
  - **DERC has preferred ROCE over ROE in the MYT Regulations.**
- Andhra Pradesh
  - **In Andhra Pradesh, the ROCE approach has been adopted for Generation, Transmission and Distribution Utilities.**

ROCE Approach…(3/3)

- Computation of ROCE

ROCE can be computed by applying the rate of return (weighted average cost of capital) on the capital employed, using the following formulae:

ROCE = WACC X RRB

where,

WACC is the Weighted Average Cost of Capital

RRB is the Regulated Rate Base

Rate of Return (WACC)

The weighted average cost of capital (WACC) can be computed using the following formula:

$WACC = [(1-g) * r_e] + [g * r_d]$

where,

g is the level of gearing or leverage in a Company, i.e., the proportion of debt in the total capital structure (i.e., debt + equity)

r_d is the cost of debt finance

r_e is the cost of equity finance.

Proposed Mechanism

CERC Explanatory Memorandum to CERC (Terms and Condition of Tariff) Regulations, 2009

- CERC has noted that the ROCE approach is preferable over the RoE approach, as this approach induces efficiency in fund management and encourages competition.
- CERC has cited fluctuations in the debt market and difficulty in assigning the same normative interest rate for all the Companies across the board, as the reasons for continuing with the existing RoE approach.

Proposed Mechanism

- One way to accommodate fluctuations in interest rate is to take average of last four years when interest rates were high.
- Concerns of CERC and Central Advisory Committee may be addressed by benchmarking cost of debt with Bank Rate or any other suitable benchmark rate, by specifying spread.

Benchmarking Cost of Debt in Maharashtra …(1/2)

- **Benchmarking of Cost of Debt : Benchmarking with RBI Bank rate**

	4-Year Average		
Utility	**Average Interest Rate**	**Average Bank Rate**	**Spread of Average Interest rate with respect to Bank Rate**
Distribution Licensees			
RInfra -D	9.00%	6.00%	3.00%
BEST	10.38%	6.00%	4.38%
TPC-D	9.75%	6.00%	3.75%
MSEDCL	9.60%	6.00%	3.60%
Transmission Licensees			
RInfra -T	9.11%	6.00%	3.11%
TPC-T	9.57%	6.00%	3.57%
MSETCL	11.39%	6.00%	5.39%
Generation Companies/Business			
RInfra -G	8.57%	6.00%	2.57%
TPC-G	9.81%	6.00%	3.81%
MSPGCL	8.92%	6.00%	2.92%
Average Spread for Utilities			**2.57% to 5.39%**

Benchmarking Cost of Debt in Maharashtra …(2/2)

- **Benchmarking of Cost of Debt**
  - It is proposed to adopt a spread of 4% over Bank Rate as on 31st March of previous financial year. This translates into an effective cost of debt in the range of 10% .
  - It is proposed to reset the interest rates approved for second Control Period only after the second Control period, i.e., during the Tariff determination process for the next MYT Petition, based on the trend of spread witnessed during the Control Period.

Benchmarking Cost of Equity in Maharashtra …(1/2)

- Risk associated with regulated businesses like the power sector is much lower when compared to the risks associated with the stock market.
- Return expectations should be commensurate with the risk associated with the business.
- CERC has notified the rate of return for equity as 15.5% for Generation Companies and Transmission Licensees, it is proposed to adopt the same in Maharashtra also.
- Generation & Transmission Business : 15.5%
- Distribution Wires business: the cost of equity of 15.5% may be adopted, since by nature, it is very similar to the Transmission Business, and the risks involved are similar.
- Supply business: A premium of 2% is proposed to compensate for the risks associated with the nature of business. Hence, the cost of equity for supply business may be pegged at 17.5%.

Benchmarking Debt: Equity Ratio in Maharashtra …(2/2)

- **Benchmarking of Debt: Equity Ratio**
- It is proposed to continue with the normative debt-equity ratio of 70:30, since this ratio has been standardized for the power sector across the country.
- Considering normative cost of debt, normative cost of equity and normative debt-equity ratio, ROCE works out to
  - 11.65% for Generating Companies, Transmission Licensees, Distribution Wires Licensee/Business
  - 12.25% for Distribution Supply Licensee/Business.

Post-Tax Vs Pre-tax Rate of Return …(1/3)

- MERC Tariff Regulations prescribes for allowing post-tax rate of return and has allowed income-tax as a pass through to be recovered based on actual income tax paid by the Utilities.
- **Post-tax approach:**

Demerits

- Assessment of Income tax liability at the time of determination of ARR and tariff, which can be complicated in case of entities that are undertaking other non-core businesses also, which are not regulated (for example-TPC and RInfra)
- No inducement for better tax planning.

Merits

- Tax benefits available to the sector are passed on to the consumers,

Post-Tax Vs Pre-tax Rate of Return …(2/3)

- **Pre-tax approach:**

- Encourages power sector entities to do better tax planning
- Does not have the above de-merits of post-tax return approach
- Income tax liability does not have to be projected in advance, and at the end of the year, does not have to be matched with the actual income tax paid, etc.
- The issue of estimating the income tax for Utilities operating in several States/Businesses will also not arise.

- **CERC Tariff Regulations:**

- CERC, for the tariff period 2001-04 and 2004-09, has allowed post-tax rate of return on equity and allowed income tax, in respect of income from core businesses only, as pass-through to be recovered separately at actuals.
- CERC Tariff Regulations, 2009, has provided for pre-tax rate of return on equity derived by grossing up by the proposed RoE by the prevalent tax rates to determine the appropriate Pre-tax Return on Equity.

Post-Tax Vs Pre-tax Rate of Return …(3/3)

- **Proposed Mechanism**

- Income tax is chargeable on the profit earned by the Company
- In every other business, the income taxes are paid from out of the profits earned from the business, and such payment of income tax is not allowed to be charged as an expense under the Income Tax Act, while computing the taxable profit.
- In the stock market too, while the risks as well as the returns are higher, income tax has to be paid on the profits earned through purchase and sale of shares.
- It is not appropriate for the income tax to be passed through to the consumers as an expense incurred by the Utility.
- The income tax needs to be absorbed by the Utility itself.

Pre-tax ROCE allowed for second Control Period –

- Generating Companies, Transmission Licensees/Businesses, and Distribution Wire Licensees/Businesses- 11.65%
- Retail Supply Licensees/Businesses- 12.25%

Proposed ROCE Approach…(1/5)

- In Maharashtra, for the second Control Period, the MYT Petition of the Utilities shall consist of:
  - Truing up requirement for FY 2008-09 based on Audited Accounts.
  - Provisional truing up requirement for FY 2009-10 based on six months actuals and revised estimates for the second half of FY 2009-10.
  - MYT Petition for the second Control Period, viz., FY 2010-11 to FY 2014-15
- Return on Capital Employed (RoCE) shall cover all financing costs except the interest on working capital, and no separate expenditure on account of interest on loans will be considered.
- Regulated Rate Base (RRB) shall be equal to the total capital employed, i.e., the original cost of assets less the accumulated depreciation. Capital Work In Progress (CWIP), Consumer Contribution, and Capital Subsidies/Grants shall not form part of the RRB.

- **It is proposed to consider the approved rate base for FY 2009-10 based on provisional truing up of FY 2009-10.**
- **RRB shall be determined for each year of the Control Period at the beginning of the Control Period based on the approved capital investment plan with corresponding capitalisation schedule.**

Proposed ROCE Approach…(2/5)

Regulated Rate Base for the i^{th} year of the Control Period shall be computed in the following manner:

$RRB_i = RRB_{i-1} + AB_i/2$;

Where,

- 'i' is the i^{th} year of the Control Period, i = 1,2,3,4, and 5 for the second Control Period;
- RRB_i: Regulated Rate Base for the i^{th} year of the second Control Period;
- AB_i: Change in the Regulated Rate Base in the i^{th} year of the Control Period. This component shall be the average of the value at the beginning and end of the year as the asset creation is spread across a year and shall be computed as follows:

Proposed ROCE Approach…(3/5)

$AB_i = Inv_i - D_i - CC_i$;

Where,

- Inv_i: Investments projected to be capitalised during the i^{th} year of the Control Period and approved;
- D_i: Amount set aside or written off on account of Depreciation of fixed assets for the i^{th} year of the Control Period;
- CC_i: Consumer Contributions pertaining to the RRBi and capital grants/subsidies received during i^{th} year of the Control Period for construction of service lines or creation of fixed assets;
- RRB_{i-1}: Regulated Rate Base for the Financial Year preceding the i^{th} year of the Control period. For the first year of the Control Period, RRB_{i-1} shall be the Regulated Rate Base for the Base Year, i.e., RRB_0;

Proposed ROCE Approach…(4/5)

$RRB_0 = OCFA_0 – AD_0 – CC_0$;

Where;

- $OCFA_0$: Original Cost of Fixed Assets at the end of the Base Year available for use and necessary for the purpose of the regulated business;
- AD_0: Amounts written off or set aside on account of depreciation of fixed assets pertaining to the regulated business at the end of the Base Year;
- CC_0: Total contributions pertaining to the $OCFA_0$, made by the consumers towards the cost of construction of distribution/service lines and also includes the capital grants/subsidies received for this purpose;

Proposed ROCE Approach…(5/5)

Return on Capital Employed (RoCE) for the year 'i' shall be computed in the following manner:

$ROCE_i = WACC_i$ X RRB_i

Where,

- $WACC_i$ is the Weighted Average Cost of Capital for each year of the Control Period as specified by the Commission - for the second Control Period it is proposed to be specified as 11.65% for Generating Companies, Transmission Licensees/Businesses and Distribution Wire Licensees/Businesses, and 12.25% for Retail Supply Licensees/Businesses;
- RRB_i - Regulated Rate Base is the asset base for each year of the Control Period based on the capital investment plan approved by the Commission.
- **It is proposed that the Regulated Rate Base for the Utilities should be specified in the Order on MYT Petitions of respective Utilities, for the second Control Period.**

Capital Cost…(1/8)

- MERC Tariff Regulations, 2005 provides for filing separate investment plan for approval of capital expenditure
- Prior approval of capital expenditure is critical as it has significant bearing on the tariff payable by the consumers, on account of the pass through of the related expenses like depreciation, interest on long-term loans, return, etc.

The provisions related to prior approval of capital expenditure for transmission & distribution system needs to be retained.

Capital Cost …(2/8)

- Approval Process
  - In-principle approval for the capital expenditure schemes costing above Rs. 10 Crore (together known as DPR Schemes), wherein the Utility has to submit Detailed Project Report (DPR) as well as the expected cost-benefit analysis, etc., as per well laid out guidelines.
  - Schemes costing less than Rs. 10 Crore are considered as non-DPR schemes and the Utilities are not required to submit any DPR for the approval of the same.
  - Also, the quantum of capital expenditure under non-DPR schemes should not be very high, as compared to the DPR schemes, as this defeats the very purpose of classifying schemes costing above Rs. 10 Crore as DPR schemes and requiring regulatory scrutiny of the schemes.
- In the latest APR Orders, MERC has stipulated that the ceiling on non-DPR schemes, for computation of expenses in any year should not exceed 20% of that for DPR schemes during that year.
- After implementation of the scheme, before capitalisation, the benefits are to be demonstrated by the Utility.
- The Utility is required to execute the capex schemes in a phased manner so as to minimise tariff shock attributable to capex implementation.

Capital Cost …(3/8)

- **Capex & Capitalisation of Utilities**

Comparison of Closing GFA* of Utilities

Utility	FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	% Incr.
	Actuals	Actuals	Actuals	Utility Submission	Revised Estimates	Projected	5 year
BEST	**1023**	**1085**	**1157**	**1309**	**1435**	**1572**	**54%**
RInfra-G	1295	1303	1311	1560	1592	1655	**28%**
RInfra-T	285	292	298	304	406	943	**231%**
RInfra-D	1708	1934	2347	2594	2956	3480	**104%**
Total RInfra	**3287**	**3528**	**3957**	**4458**	**4954**	**6078**	**85%**
TPC-G	2595	2678	2714	2739	3086	3307	**27%**
TPC-T	966	973	1046	1089	1262	1607	**66%**
TPC-D	282	289	395	436	523	847	**200%**
Total TPC	**3844**	**3941**	**4155**	**4263**	**4872**	**5761**	**50%**
MSPGCL	9437	9642	9985	10121	10382	11219	**19%**
MSETCL	8322	8633	8965	9831	11016	13896	**67%**
MSEDCL	8894	9428	10371	11807	14445	19911	**124%**
Total MSEB	**26653**	**27703**	**29320**	**31759**	**35843**	**45026**	**69%**

**Note: Figures taken from Audited A/c or respective Tariff Orders or ARR Petition of Utilities as available.*

Capital Cost …(4/8)

- Capex & Capitalisation of Utilities

- Gross Fixed Assets have increased in the range 19-28%, 66-231%, and 54-200% for the Generation, Transmission, and Distribution Business, respectively, over the last five years.
- The pace of asset addition has increased by leaps and bounds over the last five years.
- The addition to the asset base is clearly not commensurate either with the increase in sales or increase in demand in MW served.
- In the regulated business, the returns to the investors are linked to the equity invested in the business, which in turn is directly linked to the existing asset base and assets added every year.
- The steep increase in the asset base every year has resulted in increasing the returns from the regulated business.

Capital Cost …(5/8)

- **Capitalisation Approved for Utilities**

Utility		FY 2007-08	FY 2008-09	FY 2009-10
BEST	Petition	156	129	140
	Approved	91	69	70
	Percentage Capitalisation Approved	59%	53%	50%
RInfra				
RInfra-G	Petition	249	38	63
RInfra-T		6	102	537
RInfra-D		285	376	538
Total RInfra		540	516	1138
RInfra-G	Approved	236	23	4
RInfra-T		6	47	29
RInfra-D		121	193	196
Total RInfra		363	263	229
RInfra-G	Percentage Capitalisation Approved	95%	60%	6%
RInfra-T		100%	46%	5%
RInfra-D		42%	51%	36%
Total RInfra		67%	51%	20%

Capital Cost …(6/8)

- **Capitalisation Approved for Utilities…Contd.**

Utility		FY 2007-08	FY 2008-09	FY 2009-10
TPC				
TPC-G	Petition	54	350	220
TPC-T		51	175	345
TPC-D		42	87	324
Total TPC		148	612	889
TPC-G	Approved	25	85	87
TPC-T		51	74	118
TPC-D		42	47	11
Total TPC		118	205	216
TPC-G	Percentage Capitalisation Approved	46%	24%	40%
TPC-T		100%	42%	34%
TPC-D		100%	53%	3%
Total TPC		80%	34%	24%

Capital Cost …(7/8)

- **Capitalisation Approved for Utilities…Contd.**

Utility		FY 2007-08	FY 2008-09	FY 2009-10
MSEB				
MSPGCL	Petition	110	249	780
MSETCL		867	1185	2879
MSEDCL		1108	2860	5821
Total MSEB		2085	4293	9481
MSPGCL	Approved	110	125	127
MSETCL		245	491	618
MSEDCL		463	942	1298
Total MSEB		819	1558	2042
MSPGCL	Percentage Capitalisation Approved	100%	50%	16%
MSETCL		28%	41%	21%
MSEDCL		42%	33%	22%
Total MSEB		39%	36%	22%

- **It is clear from the above Table that the capitalisation approved by the Commission is in the range 3-60% for FY 2008-09 and FY 2009-10**

Capital Cost …(8/8)

- **Impact of Capex related expenses**

Capex related expenses per unit of Sales				Rs/kWh
	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
MSEDCL	0.21	0.22	0.21	-
RInfra-D	0.36	0.37	0.37	0.37
TPC-D	0.16	0.17	0.20	0.19
BEST	0.38	0.38	0.40	0.41

Capex related expenses as Percentage of Average Cost of Supply (ACoS)				
	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
MSEDCL	5.44%	5.98%	5.47%	-
RInfra-D	8.78%	6.75%	5.06%	5.81%
TPC-D	4.74%	3.06%	3.69%	4.99%
BEST	7.97%	6.02%	5.06%	8.31%

- **In order to limit the impact of Capex related expenses on the total Revenue Requirement of the Utility,**
- **Cap on capex related expenses is proposed, say, capex related expenses should not be more than 5% of ACoS of that financial year. This cap should not be more than 20-25 paise /unit in absolute terms**

Depreciation …(1/4)

- Rationale for Providing Depreciation
  - To create a reserve fund for replacement of Assets

    or
  - To provide cash flow for repayment of loans taken by the Utility.
- Tariff Policy
  - Clause 5 (c) of the Tariff Policy stipulates:
    - Central Commission may notify the rates of depreciation in respect of generation and transmission assets.
    - For distribution, may be prescribed by the Forum of Regulators with appropriate modification.
    - Rates of depreciation notified would be applicable for the purpose of tariffs as well as Accounting.
    - No need for any Advance Against Depreciation.
    - Benefit of reduced tariff after the assets have been fully depreciated should remain available to the consumers.

Depreciation …(2/4)

- MERC Tariff Regulations, 2005

- Straight line method for determination of Depreciation expenses for the Generation, Transmission, Distribution Wire, and Retail Supply business, and a residual value of 10%
- Advance against Depreciation (AAD) in case the cumulative loan repayment exceeds the cumulative depreciation.

Advance Against Depreciation

- The Tariff Policy also states that there should be no need of providing Advance Against Depreciation (AAD) while determining the tariff
- CERC Tariff Regulations have also removed the provision of AAD.
- It is proposed to discontinue the provision for AAD.

Amortisation of Intangible Assets

- The existing MERC Tariff Regulations provide for recovery of amortisation of intangible assets up to such level as may be approved by the Commission.
- However, such a provision does not exist under the CERC Tariff Regulations.
- It is proposed to discontinue the recovery of amortisation of intangible assets under depreciation expenses.

Depreciation …(3/4)

- CERC, in its Explanatory Memorandum to CERC (Terms and Conditions of Tariff) Regulations, 2009, has stated:

"...The entities should use their propensity to avail large amounts of loans with the FIs/banks, and negotiate for long term low cost funding.

13.11 Considering the above facts, the Commission decides that, for the purpose of refund of capital over the estimated useful life of the assets concerned, the loan repayment period of 15 years be made applicable to all normative loans and accordingly link this repayment period of 15 years to arrive at the rate of depreciation. The Commission, therefore, proposes to divide estimated life of the project into two parts for the purpose of tariff determination. The first part would be 15 years during which the loan capital would be refunded to the investors in the form of depreciation @ 4.67% and thereafter it will be applicable @ 2% in case of thermal generating stations and @ 1% in case of hydro stations and transmission stations."

Depreciation …(4/4)

Proposed Mechanism

- It is proposed to adopt the life of asset as specified by CERC, philosophy of linking depreciation with repayment of loan and depreciation rates for Generation and Transmission assets as indicated below, and for distribution assets, the depreciation rates have been proposed on similar lines as indicated below:

Description of Asset	Useful Life (in years)	Rate for first 15 years (%)	Rate for remaining life (%)
Thermal generating station	25	4.67	2
AC and DC substation	25	4.67	2
Hydro generating station	35	4.67	1
Transmission line	35	4.67	1
Distribution substation	25	4.67	2
Distribution line	35	4.67	1

Interest on Working Capital (IWC) …(1/9)

- Normative Vs Actual IWC

MERC Tariff Regulations, 2005

- Provides for allowing normative interest on working capital
- IWC is being allowed on a normative basis rather than actuals.
- Categorised as Controllable factor
- Since, IWC is treated as a controllable factor, IWC would have to continue to be allowed on normative basis.
- If IWC is allowed on actuals, it will amount to considering IWC as an uncontrollable factor.
- **Since it is desired to improve the operational and financing efficiency in this regard, it is desirable to continue allowing IWC on normative basis.**

Interest on Working Capital (IWC) …(2/9)

- Normative IWC

- In Maharashtra, the normative IWC computed in accordance with the MERC Tariff Regulations, works out to be very high as compared to the actual IWC expense incurred by the Utility, for generation and transmission business.
- In case of distribution licensees, on account of the large amount of consumers' security deposit lying with the licensee, the normative IWC works out to be nominal or negative in some cases.
- There is a need to revise the norms such that the normative levels reflect the actual working capital requirement
- Due to the increase in number of payment modes, including electronic billing and payment, the requirement for providing for two months receivables is also lesser.
- **In Andhra Pradesh and Delhi, where ROCE approach is followed, Interest on Working Capital (IWC) was inbuilt into the ROCE computations and no separate pass-through was allowed for IWC.**

Interest on Working Capital (IWC) …(3/9)

- IWC for Generating Companies

- ABPS Infra has analysed monthly coal reports published by Central Electricity Authority (CEA) and compiled actual stock days for thermal power stations in Maharashtra.

Station	Feb'09	Mar'09	Apr'09	May'09
Bhusawal TPS	5	6	2	1
Chandrapur TPS	2	2	3	4
Khaparkheda TPS	5	6	4	3
Paras TPS	3	3	2	1
Parli TPS	2	1	3	4
TPS	6	7	5	4
Koradi TPS	4	4	11	9
Dahanu TPS	8	8	10	7

- **Thermal generating stations are maintaining coal stock of around 10 days and are not maintaining the coal stock as specified in Regulations, which is two months.**

Interest on Working Capital (IWC)…(4/9)

Coal based generation Stations:

	Coal based/Lignite-fired generating stations	
	Existing	**Proposed**
Cost of Coal	**Pit Head :**1.5 Months corresponding to Target Availability & **Non-Pit Head :**2 Months corresponding to Target Availability	**Pit Head :**15 days corresponding to Target Availability & **Non-Pit Head :** 1 Month corresponding to Target Availability
Cost of Oil	2 Months corresponding to Target Availability	1 Month corresponding to Target Availability
Cost of Secondary Fuel	3 Months corresponding to Target Availability	2 Month corresponding to Target Availability
O&M Expenses	1 month of such Financial Year	1 month of such Financial Year
Maintenance Spares	1% of Historical Cost	1% of Historical Cost
Receivables	2 months of such Financial Year	1.5 months of such Financial Year
Payables	1 month of such Financial Year	1 month of such Financial Year

Interest on Working Capital (IWC) …(5/9)

Gas based generation Stations

	Gas Turbine/Combined Cycle generating stations	
	Existing	**Proposed**
Fuel Cost	1 Month corresponding to Target Availability	15 days corresponding to Target Availability
Liquid Fuel Stock	15 days corresponding to Target Availability	15 days corresponding to Target Availability
O&M Expenses	1 month of such of Financial Year	1 month of such of Financial Year
Maintenance Spares	1% of Historical Cost	1% of Historical Cost
Receivables	2 months of such of Financial Year	1.5 months of such of Financial Year
Payables	1 month of such of Financial Year	1 month of such of Financial Year

Interest on Working Capital (IWC) …(6/9)

Hydro generation Stations

	Hydro generating stations	
	Existing	**Proposed**
O&M Expenses	1 month of such of Financial Year	1 month of such of Financial Year
Maintenance Spares	1% of Historical Cost	1% of Historical Cost
Receivables	2 months of such of Financial Year	1.5 months of such of Financial Year

Interest on Working Capital (IWC) …(7/9)

Transmission Licensees

	Transmission Licensees	
	Existing	**Proposed**
O&M Expenses	One-twelfth of the amount of O&M expenses for such financial year; plus	One-twelfth of the amount of O&M expenses for such financial year; plus
Inventory Cost	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	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
Revenue From Sale of Power	1.5 months equivalent of the expected revenue from transmission charges at the prevailing tariffs	1 month of expected revenue from transmission charges at prevailing tariff
Minus Security Deposit	Amount held as security deposits from Transmission System Users	Amount held as security deposits from Transmission System Users
Minus Power purchase Cost	One month equivalent of cost of power purchased, based on the annual power procurement plan.	One month equivalent of cost of power purchased, based on the annual power procurement plan.

Interest on Working Capital (IWC) …(8/9)

Wheeling Business

	Wheeling Business	
	Existing	**Proposed**
O&M Expenses	One-twelfth of the amount of O&M expenses for such financial year; plus	One-twelfth of the amount of O&M expenses for such financial year; plus
Inventory Cost	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	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
Wheeling Charges	Two months equivalent of the expected revenue from wheeling charges at the prevailing tariffs	1.5 months of expected revenue from transmission charges of such Financial Year
Minus Security Deposit	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	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 Power purchase Cost	One month equivalent of cost of power purchased, based on the annual power procurement plan.	One month equivalent of cost of power purchased, based on the annual power procurement plan.

Interest on Working Capital (IWC) …(9/9)

Retail Supply

	Retail Supply	
	Existing	**Proposed**
O&M Expenses	One-twelfth of the amount of O&M expenses for such financial year; plus	One-twelfth of the amount of O&M expenses for such financial year; plus
Inventory Cost	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	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
Revenue From Sale of Power	2 months equivalent of the expected revenue from sale of electricity at the prevailing tariffs	1.5 months of expected revenue from transmission charges of such Financial Year
Minus Security Deposit	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	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 Power purchase Cost	One month equivalent of cost of power purchased, based on the annual power procurement plan.	One month equivalent of cost of power purchased, based on the annual power procurement plan.

MYT Framework for Generation

Agenda

- **Defining approach for setting of:**

  - **Norms and Principles for determination of tariff for Thermal Generating Stations**

  - **Norms and Principles for determination of tariff for Hydro Generating Stations**

Background…1/3

- 3 Generating Companies in the State of Maharashtra namely:
  - Maharashtra State Power Generating Company Limited (MSPGCL)
  - Tata Power Company Limited- Generating Business (TPC-G)
  - Reliance Infrastructure Limited (R-Infra-G)
- Generating companies supply power to distribution companies on long-term basis.
- GoM handed over various Hydel Generating stations to MSPGCL for operation and maintenance on lease basis

Background…2/3

Generating Stations of TPC-G:

S.No	Station Name	Capacity	Unit Details	Type and Fuel	Status
1	Trombay	2027 MW	Unit-4 (1 x 150 MW)	Thermal - Oil	Stand By*
			Unit-5 (1 x 500 MW)	Thermal - Coal/Oil	Operational
			Unit-6 (1 x 500 MW)	Thermal - Oil/Gas	Operational
			Unit-7 (1 x 180 MW)	Thermal - Gas	Operational
			Unit-8 (1 x 250MW)	Thermal - Coal	Operational
2	Khopoli	72 MW		Hydel	Operational
3	Bhivpuri	75 MW		Hydel	Operational
4	Bhira	300 MW		Hydel	Operational
	Total	**2474MW**			

*Post commissioning of Unit-8, TPC-G has proposed to operate Unit-4 on stand-by basis

Generating Station of RInfra-G:

S.No	Station Name	Capacity	Unit Details	Type and Fuel	Status
1	Dahanu	500 MW	2 x 250 MW	Thermal - Coal	Operational

Background…3/3

Generating Stations owned and operated by MSPGCL:

Station / Unit	No of Units	Installed Capacity		Considering Derated Capacity	
		Capacity of each Unit in MW	Total Capacity in MW	Derated Capacity of each Unit in MW	Total Capacity in MW
Thermal					
Uran (Gas)			**852**		**852**
Unit 2,3,4	3	60	180	60	180
Unit 5,6,7,8	4	108	432	108	432
WHR_AO, WHR_BO	2	120	240	120	240
Khaperkheda			**840**		**840**
Unit 1,2,3,4	4	210	840	210	840
Paras	1	58	**58**	**55**	**55**
Bhusawal			**478**		**475**
Unit 1	1	58	58	55	55
Unit 2,3	2	210	420	210	420
Nasik			**910**		**880**
Unit 1,2	2	140	280	125	250
Unit 3,4,5	3	210	630	210	630
Parli			**690**		**670**
Unit 1,2	2	30	60	20	40
Unit 3,4,5	3	210	630	210	630
Koradi			**1080**		**1040**
Unit 1,2,3,4	4	115	460	105	420
Unit 5	1	200	200	200	200
Unit 6,7	2	210	420	210	420
Chandrapur			**2340**		**2340**
Unit 1,2,3,4	4	210	840	210	840
Unit 5,6,7	3	500	1500	500	1500
Sub-Total			**7190**		**7152**
Hydel					
Koyna			1956		1956
Vaitarna	1	60	60	60	60
Bhira	2	40	80	40	80
Tillari	1	66	66	66	66
Others			158		158
Sub-Total			**2320**		**2320**
Total			**9510**		**9472**

Thermal Generating Stations – Issues related to determination of tariff

Capital cost and Means of Finance…1/3

- Existing practice for approving capital cost for new generating projects - After scrutinising reasonableness of expenditure, i.e., actual expenditure incurred on the completion of the project.
- Determination of per MW capital expenditure is an issue.
- Capital Cost of the project also includes capitalised initial spares subject to ceiling norms as percentage of original cost

Capital cost and Means of Finance…2/3

- Tariff Policy stipulates that all future requirement of power should be procured competitively by Distribution Licensees, except in cases of expansion of existing projects.
- For Public Sector Generating Companies, Tariff Policy provides that tariff of all new generation projects should be decided on the basis of competitive bidding after a period of five years (from January 6, 2006) or when the Regulatory Commission is satisfied that the situation is ripe to introduce such competition
- Under the competitive bidding scenario, the scope for approving the Capital Cost and Means of Finance will be limited to following projects:
  - Expansion project of Generating Companies
  - Renovation and Modernisation project of Generating Companies

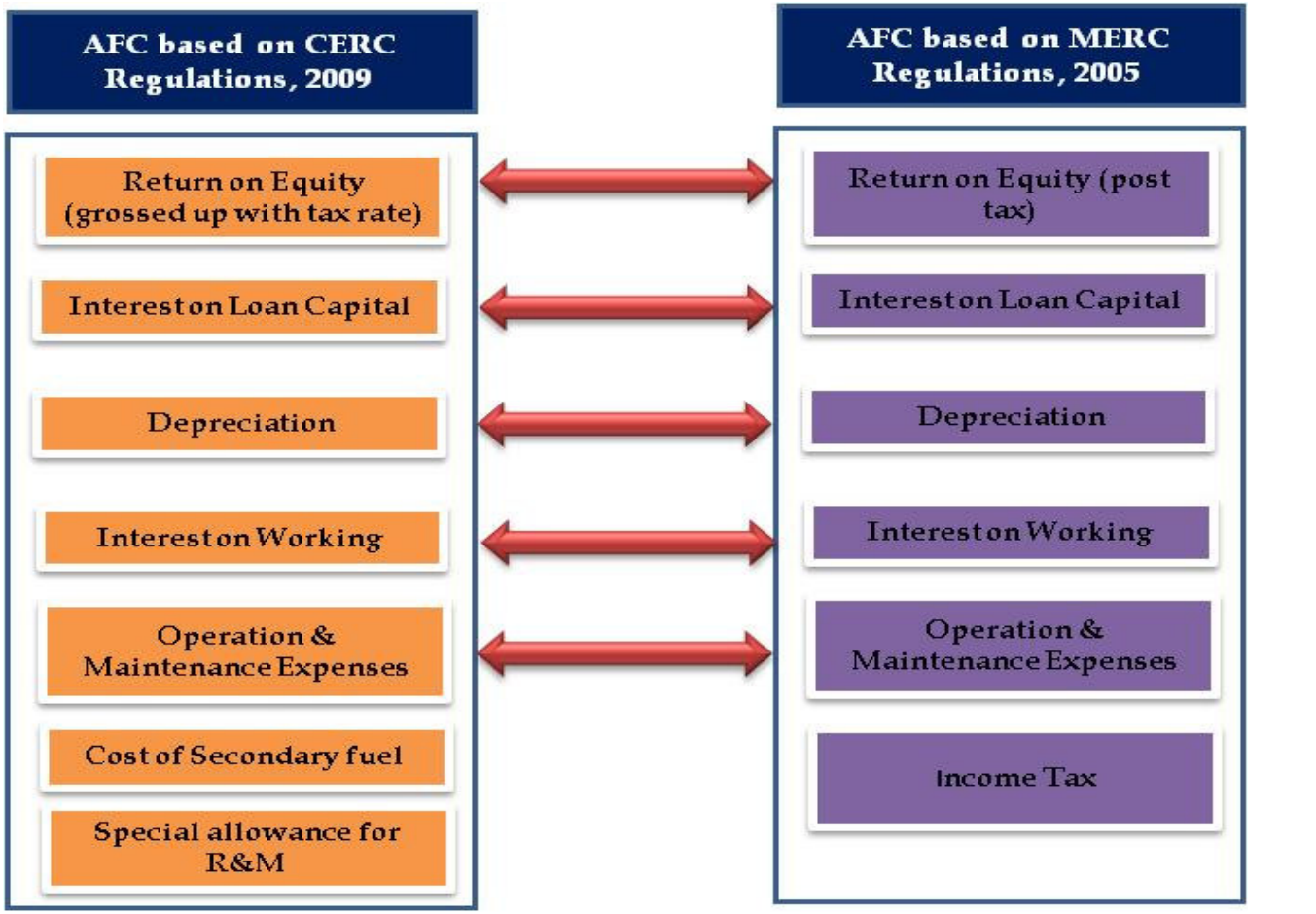
Capital cost and Means of Finance…3/3

- It is proposed to continue the present methodology of approval of capital cost based on actual capital expenditure subject to prudence check.
- Under the proposed mechanism, the Generating Company is required to file a separate Petition for approval of Tariff after achieving Commercial Operation Date (COD) of the Project.
- As regards Means of Finance, it is proposed to adopt the method of giving Return on Capital Employed (RoCE) rather than the Return on Equity (RoE) approach being followed presently.

Components of tariff…1/3

- Mechanism of cost recovery to be designed to ensure cost recovery at normative levels prescribed by the Commission.
- Tariff for thermal generating stations has two components, i.e., fixed (capacity) charge and variable charge.
- Variable charge component is intended to cover the fuel costs for the primary and secondary fuel consumption at normative parameters.

Components of tariff…2/3



CERC (Terms and Conditions of Tariff) Regulations, 2009 provides for cost of secondary fuel oil as a part of the fixed cost.

Components of tariff…3/3

- **It is proposed not to include secondary fuel oil as a part of the fixed cost and to considered the same as a part of the variable cost since the consumption of the secondary fuel oil is linked to generation, and the norm of secondary fuel oil is also specified in terms of per unit of generation.**

✓ **It is proposed to include the following elements under fixed charge (capacity charge):**

- **Depreciation**
- **O&M Expenses**
- **Return on Capital Employed**
- **Interest on Working Capital**

Less:

- **Other Income**

Fixed Cost Recovery…1/6

- **Alternative mechanisms that can be adopted for recovery of full fixed cost are as follows:**
  - **Fixed Cost Recovery linked to Plant availability**
  - **Fixed Cost Recovery linked to Plant Load Factor or Actual Generation**
- **Fixed cost recovery linked to plant availability is a widely adopted approach by CERC as well as other SERCs.**
- **The norm of availability for full recovery of AFC for Thermal stations as specified in the existing MERC Tariff Regulations, 2005 :**

  "33.1.1 Availability

  (a) Target availability for full recovery of annual fixed charges shall be 80 per cent

  (c) Target Plant Load Factor for incentive in accordance with Regulation 37 shall be 80 per cent"

Fixed Cost Recovery…2/6

- **While computing the Availability, the actual ability of the Station to generate should be considered after taking into consideration the loadability of machines and fuel related aspects, rather than considering plant availability on the basis of machine availability.**
- **In the existing MERC Tariff Regulations, 2005 availability has been defined as under:**

"Availability" in relation to a thermal generating station for any period means the average of the daily average declared capacities for all the days during that period expressed as a percentage of the installed capacity of the generating station minus normative auxiliary consumption in MW, as specified in the Regulations, and shall be computed in accordance with the following formula …"

"Declared Capacity" means-

(i) for a thermal generating station, the capability of the generating station to deliver ex-bus electricity in MW declared by such generating station in relation to any period of the day or whole of the day, duly taking into account the availability of fuel;

Fixed Cost Recovery…3/6

- **Reduction in availability due to shortage of fuel in the country needs to be appropriately considered for allowing fixed cost recovery, as reduction in fuel supply due to industry-wide shortage is an uncontrollable factor.**
- **In case adequate arrangements in terms of contracts for procuring fuel are not made by Generating Company, the relaxation in Availability should not be allowed**
- **Plant Availability is linked to vintage and the technology of the Plant and reduces as the Plant becomes older.**
- **CERC, in its CERC (Terms and Conditions of Tariff) Regulations, 2009, has specified lower availability norm for some stations, as under:**
  - **Neyveli Lignite Corporation - TPS-I (72%) and TPS-II, Stage I & II (75%)**
  - **Damodar Valley Corporation (DVC) - Durgapur TPS (74%), Bokaro TPS (75%), Chandrapura TPS (60%)**
  - **For other Generating Stations, CERC has specified the Availability norm of 85% for thermal generating stations, as compared to the earlier norm of 80%.**

Fixed Cost Recovery…4/6

- Normative Plant Availability approach ensures that the Generating Company is able to recover its fixed cost, if the plant is available for generation.
- In principle, fixed cost recovery should not be linked to generation, and only variable cost recovery should be linked to the generation.
- Approach of fixed cost recovery based on actual generation or PLF is not adopted by the Regulatory Commissions for conventional projects.
- However, most SERCs, while designing single-part tariff for renewable energy based projects, have linked the cost recovery with the actual generation or plant load factor (Capacity utilisation factor).

Fixed Cost Recovery…5/6

- **CERC in its CERC (Terms and Conditions of Tariff) Regulations, 2009 has stipulated the principles for recovery of fixed charge including the incentive component:**

  "(a) Generating stations in commercial operation for less than ten (10) years on 1st April of the financial year :
  AFC x (NDM / NDY) x (0.5 + 0.5 x PAFM / NAPAF) (in Rupees);

  Provided that in case the plant availability factor achieved during a financial year (PAFY) is less than 70%, the total capacity charge for the year shall be restricted to

  AFC x (0.5 + 35 / NAPAF) x (PAFY / 70) (in Rupees).

  (b) For generating stations in commercial operation for ten (10) years or more on 1st April of the financial year:

  AFC x (NDM / NDY) x (PAFM / NAPAF) (in Rupees).

Fixed Cost Recovery…6/6

- ✓ It is proposed to continue the existing practice of fixed cost recovery based on the normative plant availability.
- ✓ Recovery of fixed charges below the normative target availability should be on pro-rata basis and accordingly at zero availability, no recovery of fixed charges should be allowed.
- ✓ It is proposed that the Commission may specify the normative availability for existing stations after duly considering the actual availability achieved during the recent past, technology, configuration, size, etc.
- ✓ For new generating stations, the normative availability for recovery of fixed costs may be specified as 85%, as specified by CERC.
- ✓ As regards incentive, it is proposed to provide incentive linked to actual generation, rather than as part of Fixed Charge

Norms of Operation

- **Performance norms to be specified for a thermal generating stations include:**
  - **Station Heat Rate**
  - **Auxiliary Power Consumption**
  - **Secondary Fuel Consumption**
  - **Transit Losses**

Norms for New Generating Stations to be commissioned after the Date of Effectiveness of the MERC MYT Regulations…1/6

a. Relaxed Norm during Stabilisation Period:

- **Existing MERC Tariff Regulations, 2005 stipulate separate norms for some of the operational parameters of the thermal generating stations during stabilization period.**
- **CERC in its third Amendment to Tariff Regulations, viz., CERC (Terms and Conditions of Tariff) (Third Amendment) Regulations, 2007, has amended this provision and specified that**

  "The stabilization period and relaxed norms applicable during stabilization period shall cease to apply from April 1, 2006".

Norms for New Generating Stations to be commissioned after the Date of Effectiveness of the MERC MYT Regulations…2/6

- **CERC (Terms and Conditions of Tariff) Regulations, 2009, has again not stipulated any relaxed norm for the stabilisation period.**
- **It is proposed not to specify the stabilization period and relaxed norms during stabilization period for new thermal generating stations.**

b. Station heat rate (SHR)

- **SHR norm is proposed in accordance with the norms specified by CERC in its Tariff Regulations, 2009 for various technologies and Unit sizes stipulated as under:**

For Coal-based and lignite-fired Thermal Generating Stations

= 1.065 X Design Heat Rate (kcal/kWh)

Where the Design Heat Rate of a Unit means the Unit heat rate guaranteed by the supplier at conditions of 100% Maximum Continuous Rating (MCR), zero percent make up, design coal and design cooling water temperature/back pressure.

Norms for New Generating Stations to be commissioned after the Date of Effectiveness of the MERC MYT Regulations…3/6

b. Station heat rate

Gas-based / Liquid-based thermal generating Unit (s)/block (s)

= 1.05 X Design Heat Rate of the unit/block for Natural Gas and RLNG (kcal/kWh)

= 1.071 X Design Heat Rate of the unit/block for Liquid Fuel (kcal/kWh)

Where the Design Heat Rate of a Unit shall mean the guaranteed heat rate for a Unit at 100% MCR and at site ambient conditions; and the Design Heat Rate of a block shall mean the guaranteed heat rate for a block at 100% MCR, site ambient conditions, zero percent make up, design cooling water temperature/back pressure.

c. Auxiliary consumption

- **Auxiliary consumption norm is proposed in accordance with the norms specified by CERC in its Tariff Regulations, 2009 for various technologies and Unit sizes stipulated as under.**

Norms for New Generating Stations to be commissioned after the Date of Effectiveness of the MERC MYT Regulations…4/6

c. Auxiliary consumption

For Coal based generating stations:

Auxiliary consumption	With Natural Draft cooling tower or without cooling tower
(i) 200 MW series	8.50%
(ii) 500 MW & above	
Steam driven boiler feed pumps	6.00%
Electrically driven boiler feed pumps	8.50%

For Gas Turbine/Combined Cycle generating stations:

(i) Combined cycle : 3.0%

(ii) Open cycle : 1.0%

For Lignite-fired thermal generating stations:

All generating stations with 200 MW sets and above: 0.5 percentage point more than the auxiliary energy consumption norms of coal based generating stations. For lignite fired stations using CFBC technology, auxiliary energy consumption norms shall be 1.5 percentage point more than the auxiliary energy consumption norms of coal based generating stations.

Norms for New Generating Stations to be commissioned after the Date of Effectiveness of the MERC MYT Regulations…5/6

c. Auxiliary consumption

For Flue Gas Desulphurisation (FGD) generating stations:

- **It is proposed to continue with the methodology of separately approving the auxiliary consumption for FGD plant over and above the normative auxiliary consumption for the station till the actual performance data for at least 2-3 years is available.**

d. Transit Loss

- **Proposed in accordance with the norms specified by CERC in its Tariff Regulations, 2009 stipulated as under:**

  Transit losses for coal based generating stations, as a percentage of quantity of coal dispatched by the coal supply company during the month shall be as given below:

  - *Pit head generating stations - 0.2%*
  - *Non-pit head generating stations - 0.8%*

- **Transit losses for imported coal not specified by CERC.**
- **No Transit losses may be approved for imported coal for new generating stations to be commissioned after the date of effectiveness of the MYT Regulations.**

Norms for New Generating Stations to be commissioned after the Date of Effectiveness of the MERC MYT Regulations…6/6

e. **Secondary Fuel Oil Consumption:**

- **Proposed in accordance with the norms specified by CERC in its Tariff Regulations, 2009 stipulated as under:**
  - **Coal-based generating stations: 1.0 ml/kWh**
  - **Lignite-Fired generating stations except stations based on CFBC technology: 2.0 ml/kWh**
  - **Lignite-Fired generating stations based on CFBC technology: 1.25 ml/kWh**

Norms of Operation for Existing Generating Stations…1/3

B. **Norms for Existing Generating Stations – Commissioned/To be Commissioned after Notification of MERC Tariff Regulations, 2005 and before Notification of MERC MYT Regulations, 2009**

- **It is proposed to continue with the norms of operation as specified in MERC Tariff Regulations for next Control Period.**

Norms of Operation for Existing Generating Stations…2/3

C. Norms for Existing Generating Stations – Existing before the date of effectiveness of MERC Tariff Regulations, 2005.

MSPGCL

- The Commission, in its MYT Order for the first Control Period of 3 years from FY 2007-08 to FY 2009-10 specified trajectory for various performance parameters after benchmarking MSPGCL's generating stations with other generating stations of similar capacity and vintage.
- MSPGCL challenged Commission's MYT Order before the ATE
- ATE vide its Judgment dated April 10, 2008 in Appeal Nos. 86 and 87 of 2007, directed MERC to engage an appropriate agency to assess the achievable performance parameters
- The Commission appointed M/s Central Power Research Institute (CPRI) to carry out a detailed study of various performance parameters

Norms of Operation for Existing Generating Stations…3/3

- It is suggested that the norms for existing stations of MSPGCL may be approved after considering the study of CPRI and further regulatory process in this regard

TPC-G and RInfra-G

- ABPS Infra has compared the performance parameters for the generating stations in the State of Maharashtra with their own past performance as well as with the generating stations in other States and Central Generating Stations which are of similar vintage, technology, configuration and operating performance.
- Generating stations of TPC-G have capability to fire multiple fuels and hence it is not appropriate to benchmark performance with other generating stations
- Thus, the past performance of generating Units of TPC-G has been considered for stipulating various performance parameters for the next Control Period.
- For RInfra-G, benchmarking of performance parameters with similar size and vintage stations has been carried out

Norms of Operation-Station Heat Rate…1/4

- **Analysed the past Performance of TPC-G, RInfra-G and MSPGCL in the context of SHR as under:**

Station	Unit	Fuel	Capacity (MW)	Actual						Approved				
				2004-05	2005-06	2006-07	2007-08	Average (04-08)	2008-09*	2004-05	2005-06	2006-07	2007-08	2008-09
Trombay	Unit 4	Oil	150	2555	2564	2517	2497	2533	2522	2555	2564	2560	2565	2570
	Unit 5	Oil	500	2456	2458	2488	2567	2492	2539	2456	2458	2484	2500	2494
	Unit 6	Oil	500	2328	2322	2339	2306	2324	2353	2328	2322	2373	2400	2400
	Unit 7	Gas	180	1977	1971	1971	2001	1980	1968	1977	1971	1977	1992	1971
Dahanu	Unit-1 & -2	Coal	2 x 250	2272	2286	2278	2289	2281	2308	2319	2286	2500	2500	2500
Khaparkheda		Coal	840	2642	2600	2612	2755	2652	2783	2725	2725	2644	2556	2561
Paras		Coal	58	3340	3197	3261	3291	3272	3243	3200	3197	3105	3106	3105
Bhusawal		Coal	478	2668	2636	2666	2914	2721	2933	2735	2636	2561	2649	2654
Nasik		Coal	910	2594	2649	2672	2659	2644	2807	2663	2649	2584	2648	2653
Parli		Coal	690	2647	2662	2678	2779	2692	2871	2649	2662	2573	2652	2657
Koradi		Coal	1080	2950	2978	2997	3249	3044	3280	2996	2978	2907	2786	2792
Chandrapur		Coal	2340	2660	2611	2600	2599	2618	2713	2502	2611	2480	2545	2551
Uran Gas		Gas	852	1992	2026	1969	1973	1990	2000	1966	2026	1950	1980	1980

Station heat rate for TPC-G

- **Average station heat rate of the generating Units of TPC-G for the last four years (i.e., FY 2004-05 to FY 2007-08) is lower than the normative station heat rate specified by the Commission for the first Control Period, except for Unit-5.**

Norms of Operation-Station Heat Rate…2/4

Station heat rate for TPC-G

- Station heat rate for the next Control Period may be specified based on the average heat rate actually achieved during the period from FY 2004-05 to FY 2007-08.
- TPC-G has already been allowed to retain efficiency gain during first control period and adopting such a method for specifying heat rate can further incentivise to improve the performance during second Control Period
- It is proposed to consider the average heat rate achieved during the period from FY 2004-05 to FY 2007-08 as heat rate at middle of this period and consider a degradation factor of 0.2% per year for Unit-4, Unit-5 and Unit-6

Particulars	Station Heat Rate				
	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15
Unit-4	2549	2554	2559	2564	2569
Unit-5	2507	2512	2517	2522	2527
Unit-6	2338	2342	2347	2352	2357
Unit-7	1971	1971	1971	1971	1971

Norms of Operation- Station Heat Rate…3/4

Station heat rate for RInfra-G

- **Average station heat rate of the Dahanu Thermal Power Station (DTPS) of RInfra-G for the last four years (i.e., FY 2004-05 to FY 2007-08) is much lower than the normative value of station heat rate specified by the Commission.**
- **Station heat rate achieved by DTPS and some of the other stations in the country of similar vintage and Unit size is as under:**

Parameter						SHR (kcal/kWh)			
Generating Stations	State	Unit Capacity (MW)	COD	Type	Age	2004-05	2005-06	2006-07	2007-08
GHTP	Punjab	2x210	1998	Coal	11	2402	2407	-	-
Ropar	Punjab	6x210	1984-93	Coal	16-25	2500	2541	-	-
Dahanu	Maharashtra	2x250	1995	Coal	14	2272	2286	2278	2289
Gandhi Nagar	Gujarat	211	1998	Coal	11		2694	2804	2520
Wanak Bori	Gujarat	210	1998	Coal	11		2763	2485	2474
Dadri Thermal	Uttar Pradesh	4x210	1991-94	Coal	21-24	2434	2421	2414	
Budge Budge	West Bengal	2x250	1997-99	Coal	12-Oct		2460	2468	2472

Source: SERC Tariff Orders and ABPS Infra Analysis

- **Compared the station heat rate of DTPS with that of generating stations in other States having Unit size and vintage comparable to Unit size of 250 MW of DTPS**

Norms of Operation- Station Heat Rate…4/4

Station heat rate for RInfra-G:

- DTPS has performed much better than other generating stations in the country of comparable Unit size and vintage.
- It is proposed to consider the average heat rate achieved during the period from FY 2004-05 to FY 2007-08 as heat rate at middle of this period and consider a degradation factor of 0.2% per year for Unit-4, Unit-5 and Unit-6 for specifying heat rate norm for the next Control Period

Particulars	Station Heat Rate				
	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15
DTPS	2295	2300	2304	2309	2313

Station heat rate for MSPGCL:

- Average station heat rate for most of the generating stations of MSPGCL for last four years (i.e., FY 2004-05 to FY 2007-08) has been higher than the normative station heat rate specified by the Commission for the first Control Period
- Station heat rate of existing stations of MSPGCL to be approved after considering the outcome of the study being carried out by CPRI.

Norms of Operation-Auxiliary Consumption…1/5

b. Auxiliary consumption

- **Existing norms of auxiliary consumption specified in MERC Tariff Regulations are as under:**

Coal-based Generating Stations

Auxiliary consumption	With Cooling Tower	Without Cooling Tower
(i) 200 MW series	9.00%	8.50%
(ii) 500 MW series	7.50%	7.00%
Steam driven boiler feed pumps	7.50%	7.00%
Electrically driven boiler feed pumps	9.00%	8.50%

Gas Turbines/Combined Cycle Generating Stations

- **Combined cycle : 3.0%**
- **Open cycle : 1.0%**

Lignite-fired thermal power generating stations

- **The auxiliary energy consumption norms shall be 0.5 % more than the auxiliary energy consumption norms of coal-based generating stations specified above.**

Norms of Operation-Auxiliary Consumption…2/5

- **Norms set by the Commission takes into consideration the Unit size and technology of the plant.**
- **Past Performance of TPC-G, RInfra-G and MSPGCL in the context of auxiliary consumption is as under:**

Generating company	Station	Fuel	Capacity (MW)	Actual						Approved				
				2004-05	2005-06	2006-07	2007-08	Average (04-08)	2008-09*	2004-05	2005-06	2006-07	2007-08	2008-09
TPC-G	Trombay	Oil	150	7.79	8.32	7.47	7.39	7.74	7.49	7.79	8.32	7.73	8.00	8.00
		Oil	500	5.00	5.12	4.93	4.87	4.98	4.79	5.00	5.12	5.14	5.50	5.50
		Oil	500	3.20	3.31	3.43	3.07	3.25	3.26	3.20	3.31	3.39	3.50	3.50
		Gas	180	2.31	2.29	2.38	2.37	2.34	2.42	2.31	2.29	2.33	2.75	2.75
RInfra-G	Dahanu	Coal	2 x 250	7.53	7.59	7.64	7.67	7.61	8.50	7.34	7.59	8.50	8.50	8.50
MSPGCL	Khaparkheda	Coal	840	8.88	9.58	9.06	8.90	9.11	9.26			8.50	8.50	8.50
	Paras	Coal	58	10.50	9.58	10.47	11.39	10.49	11.53			9.70	9.70	9.70
	Bhusawal	Coal	478	9.69	9.29	9.87	10.07	9.73	10.00			9.75	9.75	9.75
	Nasik	Coal	910	9.21	9.07	9.16	9.08	9.13	9.54			9.00	9.00	9.00
	Parli	Coal	690	8.99	9.20	9.48	10.06	9.43	10.56			9.00	9.00	9.00
	Koradi	Coal	1080	9.93	9.64	9.99	10.19	9.94	10.75			9.80	9.80	9.80
	Chandrapur	Coal	2340	7.72	7.79	8.37	7.40	7.82	7.80			8.50	7.80	7.80
	Uran Gas	Gas	852	2.29	2.27	2.13	2.17	2.22	2.25			2.30	2.40	2.40

Norms of Operation-Auxiliary Consumption…3/5

TPC-G

- Average auxiliary consumption for the generating Units of TPC-G for the last four years (i.e., FY 2004-05 to FY 2007-08) has been lower than the normative value of auxiliary energy consumption specified by the Commission.
- It is proposed that the auxiliary consumption for the next Control period may be stipulated based on past performance.
- Auxiliary consumption norm proposed for TPC-G Units for the next Control Period based on the average auxiliary consumption for the period from FY 2004-05 to FY 2007-08:

Particulars	Auxiliary Consumption
Unit-4	7.74
Unit-5	4.98
Unit-6	3.25
Unit-7	2.34

Norms of Operation-Auxiliary Consumption…4/5

RInfra-G

- Average auxiliary consumption for the generating Units of RInfra-G for the last four years (i.e., FY 2004-05 to FY 2007-08) has been lower than the normative value of auxiliary energy consumption specified by the Commission.
- Auxiliary consumption achieved by DTPS and some of the other stations of similar vintage and Unit size in the country is as under:

Parameter						Auxiliary Consumption (%)			
Generating Stations	State	Unit Capacity (MW)	COD	Type	AGE	2004-05	2005-06	2006-07	2007-08
GHTP	Punjab	2x210	1998	Coal	11	9.58	8.97	8.79	-
Ropar	Punjab	6x210	1984-93	Coal	16-25	8.57	8.51	8.38	8.35
Dahanu	Maharashtra	2x250	1995	Coal	14	7.53	7.59	7.64	7.67
Gandhi Nagar	Gujarat	211	1998	Coal	11		8.61	9.85	9.19
Wanak Bori	Gujarat	210	1998	Coal	11		8.76	8.94	8.48
Dadri Thermal	Uttar Pradesh	4x210	1991-94	Coal	21-24	7.34	7.35	7.61	7.22
Budge Budge	West Bengal	2x250	1997-99	Coal	12-Oct	9.17	8.32	8.13	7.91

Norms of Operation-Auxiliary Consumption…5/5

- DTPS has performed much better than other generating stations in the country of comparable Unit size and vintage.
- Considering the actual auxiliary consumption achieved during the past years, the proposed Auxiliary Consumption norm is 7.61%.
- It is proposed to continue with the methodology of separately approving the auxiliary consumption for FGD plant over and above the normative auxiliary consumption for the station till the actual performance data for at least 2-3 years is available.

MSPGCL

- Average auxiliary consumption for most of the generating stations of MSPGCL for last four years (i.e., FY 2004-05 to FY 2007-08) has been higher than the normative station heat rate specified by the Commission for the first Control Period
- Auxiliary consumption of existing stations of MSPGCL to be approved after considering the outcome of the study being carried out by CPRI.

Norms of Operation- Secondary Fuel Oil Consumption…1/5

c. Secondary Fuel oil consumption

- Existing norms of secondary fuel consumption specified in MERC Tariff Regulations are as under:

Coal-based Generating Stations

During Stabilization period	*Subsequent period*
4.5 ml/kWh	2.0 ml/kWh

Lignite-fired generating stations

During Stabilization period	*Subsequent period*
5.0 ml/kWh	2.5 ml/kWh

- Existing norms specified by the Commission are relaxed norms as compared to the norms specified by CERC in its CERC (Terms and Conditions of Tariff) Regulations, 2009 for coal based generating stations (1 ml/kWh).

Norms of Operation- Secondary Fuel Oil Consumption…2/5

- **Past Performance of TPC-G, RInfra-G and MSPGCL in context to secondary fuel oil consumption is as under:**

Norms of Operation- Secondary Fuel Oil Consumption…3/5

TPC-G

- TPC-G fires liquid fuels as primary fuel also, and hence, it is not possible to distinguish between primary fuel and secondary fuel oil consumption
- The Commission in the past has not stipulated any norm for secondary fuel oil consumption for TPC-G.
- It is proposed that no specific secondary fuel oil consumption norm may be stipulated for existing generating Units of TPC-G.

RInfra-G

- Average Secondary Fuel Oil consumption for the last four years (i.e., FY 2004-05 to FY 2007-08) is in the range of 0.12 to 0.18 ml/kWh, which is substantially lower than the Secondary Fuel Oil consumption norm of 2 ml/kWh as specified by the Commission for the first Control Period.

Norms of Operation- Secondary Fuel Oil Consumption…4/5

Secondary fuel oil consumption for RInfra-G

- Secondary Fuel Oil consumption achieved by DTPS and some of the other stations in the country of similar vintage and Unit size is as under:

- Secondary Fuel Oil consumption of DTPS is lower than that of other generating stations having high PLF.
- It is proposed to specify the secondary fuel oil consumption norm for DTPS as 0.14 ml/kWh

Norms of Operation- Secondary Fuel Oil Consumption…5/5

MSPGCL

- Average secondary fuel oil consumption for most of the generating stations of MSPGCL for the last four years (i.e., FY 2004-05 to FY 2007-08) has been higher than the normative secondary fuel oil consumption specified by the Commission for the first Control Period (except Khaperkheda and Chandrapur plant).
- Secondary fuel oil consumption of existing stations of MSPGCL to be approved after considering the outcome of the study being carried out by CPRI.

Norms of Operation- Transit Loss…1/3

d. Transit Loss

- **Transit and handling losses are very common in fuel transportation, especially for coal transportation.**
- **The norms specified in MERC Tariff Regulations, 2005 are as under:**

"(a) Transit losses for coal based generating stations, as a percentage of quantity of coal dispatched by the coal supply company during the month shall be as given below:

Pit head generating stations - 0.3%

Non-pit head generating stations - 0.8%"

Norms of Operation- Transit Loss…2/3

- The transit loss norms approved by CERC in its CERC (Terms and Conditions of Tariff) Regulations, 2009 are as under:

  "Pit head generating stations - 0.2%

  Non-pit head generating stations - 0.8%"

- Existing transit loss norms specified by the Commission are higher than the norms specified by the CERC.
- Transit losses approved by the Commission and transit losses actually recorded by RInfra-G and MSPGCL over the period from FY 2004-05 to FY 2007-08 shown in the table below:

Norms of Operation- Transit Loss…3/3

- It is proposed that CERC norms regarding transit losses may be made applicable for all types of indigenous coal including washed coal.
- RInfra-G also reports transit loss on imported coal whereas TPC-G and MSPGCL have never reported any such losses on imported coal
- The Commission, in its latest APR Order for RInfra-G has disallowed transit losses on imported coal and directed RInfra-G to procure imported coal on delivery basis
- It is proposed not to allow the transit losses on imported coal

Operations and Maintenance expenses…1/6

- O&M expenses consist of Employee Expenses, R&M Expenses and A&G expenses.
- ERCs have adopted different approaches after duly considering the State specific requirements
- ERCs have mainly adopted the following two approaches:
  - Actual O&M expenses in the previous year with certain escalation factor for ensuing years
  - O&M expenses based on certain performance benchmarks
- MERC has specified the O&M expenses based on the actual expenditure incurred during the previous year escalated using certain escalation factors for projecting the ensuing years' O&M expenses.
- Issue - Whether the Commission should detail the normative parameters and escalation factors for each of the expense heads (i.e., Employee, A&G and R&M) or provide a normative framework for consolidated O&M expenses

Operations and Maintenance expenses…2/6

- Existing MERC Regulations, 2005 provides for O&M expenses for existing and new generating stations.
- CERC, while setting the framework for determination of tariff for Thermal and Hydro generating stations under CERC (Terms and Condition for Tariff determination) Regulations, 2009 provided norms for overall O&M expenses.
- Actual O&M expenses of the existing generating stations in Maharashtra are as under:

Rs. Lakh/MW

Generating company	Station	Unit	Capacity	Actual O&M Expenses/MW		
				2005-06	2006-07	2007-08
TPC-G	Trombay	Unit 4	150		12.89	12.67
		Unit 5	500		17.51	19.00
		Unit 6	500		12.72	18.40
		Unit 7	180		16.18	17.78
RInfra-G	Dahanu		500	12.49	12.478	15.50
MSPGCL	Khaparkheda		840	9.11	10.75	11.42
	Paras		58	31.53	32.11	41.69
	Bhusawal		478	15.02	15.51	16.74
	Nasik		910	12.42	12.77	15.93
	Parli		690	12.72	14.96	15.36
	Koradi		1080	12.42	13.90	13.55
	Chandrapur		2340	8.04	9.06	9.84
	Uran Gas		852	3.06	4.85	9.40

Operations and Maintenance expenses…3/6

- O&M expenses of smaller unit stations in Rs Lakh/MW terms is much higher as compared to large unit size thermal stations.
- O&M expenses for thermal stations also depends upon vintage of stations and hence the O&M expenses of older vintage stations are higher as compared to new stations.
- It is proposed to fix the norms for O&M expenses on consolidated basis instead of specifying the norms for individual components of O&M expenses as it will give flexibility to the Utility to manage its expenditure.
- CERC, in its CERC (Terms and Conditions of Tariff) Regulations, 2009 has stipulated norms for O&M expenses for various range of capacity of the Generating stations.

  A. New Stations
- It is proposed to specify the norms of O&M expense as specified in CERC Tariff Regulations, 2009 for new stations to be commissioned after the date of effectiveness of MERC MYT Regulations.

Operations and Maintenance expenses…4/6

B. **Existing Generating Stations – Commissioned/To be Commissioned after Notification of MERC Tariff Regulations, 2005 and before Notification of MERC MYT Regulations, 2009**

- **It is proposed to continue with the norms as specified in MERC Tariff Regulations for the next Control Period.**

Operations and Maintenance expenses…5/6

C. **Generating Stations Existing before the date of effectiveness of MERC Tariff Regulations, 2005.**

- Normative O&M expenses to be derived on the basis of the average of the actual O&M expenses for the five (5) years ending March 31, 2009, based on the audited financial statements, excluding abnormal O&M expenses, if any, subject to prudence check.
- The average of such O&M expenses will be considered as the expenses for the financial year ended March 31, 2007, which will be escalated based on the escalation factor to be determined based on the CPI and WPI over the past three years, to arrive at O&M expenses for the base year commencing April 1, 2010.
- For subsequent years, Escalation Factor to be determined based on CPI and WPI over last three years

Other Income….1/2

- Existing MERC Tariff Regulations do not specifically specify the treatment of other income for generating companies, i.e., income other than income from sale of electricity.
- MSPGCL had appealed against the Commission's Orders in Case No. 48 of 2005 and Case No. 68 of 2006. Para 73 of the ATE Judgment in Appeal No. 86 and 87 of 2007 stipulates as under:

  "However, if the income can not be reasonably linked to any cost item allowed by the Commission as part of the ARR, the same should not be adjusted against the ARR of the Appellant, in the absence of specific Regulations."

- Generating Companies may earn Other Income through sale of ash generated from coal based generating stations, sale of scrap, rent received from part of land given on lease, interest income on investments, etc.
- Any income earned by Generating Company can be categorised as income either from the assets or activities, for which all the expenses have been allowed to be recovered from the tariffs, other than the interest income on investments made out of returns

Other Income….2/2

- Since all the legitimate costs are allowed to be recovered through tariffs, it is important that the Other Income earned by Generating Companies should be considered and adjusted from Fixed (Capacity) charges as otherwise it will lead to additional profit to Generating Company in excess of permissible return
- It is proposed that income earned by Generating Companies other than income from sale of power should be considered and adjusted from Fixed (Capacity) charges.
- Income corresponding to interest on investment made out of permissible Return on Equity should not be considered as other Income

Incentive mechanism…1/3

- For incentive purpose, three alternative approaches are possible:
  - (i) Additional Return on Equity or Return on Capital Employed linked with increase in target PLF
  - (ii) Paise/unit linked to scheduled/actual generation beyond normative PLF
  - (iii) Availability based incentive linked to Annual Fixed Charge
- Incentive provided on basis of approach (i), will vary for each Generating Station based on capital cost and means of finance (in case of RoE approach) of the Generating Station.
- Approach (ii) has been a mechanism widely adopted by various ERCs due to simplicity in implementation and uniform incentive to all generating stations.
- CERC in its CERC (Terms and Conditions of Tariff) Regulations, 2009 has specified the availability based incentive scheme for the thermal generating stations.
- Existing MERC Tariff Regulations provides for incentive mechanism linked to the generation in excess of target PLF.

Incentive mechanism…2/3

- Analysis of availability and PLF for various generating stations in the State of Maharashtra for the period from FY 2004-05 to FY 2007-08 as under:

- The approach to link the incentive to the AFC in some proportion will also conversely provide more incentive to generating stations with higher AFC.
- It is proposed to continue with the existing incentive mechanism as stipulated under the MERC Tariff Regulations, i.e., Linked to target PLF but based on actual generation instead of scheduled generation

Incentive mechanism…3/3

- **As the proposed mechanism for incentive is linked to the actual generation, it is proposed to modify the definition of the Plant Load Factor as under:**

"Plant Load Factor", for a given period, means the total sent-out energy corresponding to actual generation during such period, expressed as a percentage of sent out energy corresponding to installed capacity in that period and shall be computed in accordance with the following formula:

$$\text{Plant Load Factor (\%)} = 10000 \times \sum_{i=1}^{N} AG \; / \{ N \times IC \times (100 - AUXn) \} \%$$

where - N = number of time blocks in the given period

AG = Actual Generation in MW for the i^{th} time block in such period

IC = Installed Capacity of the generating station in MW

AUX = Normative Auxiliary Consumption in MW, expressed as a percentage of gross generation

Treatment of infirm power…(1/2)

- The power generated prior to commercial operation of the Unit of a generating station is treated as infirm power.
- CERC, in its CERC (Terms and Conditions of Tariff) Regulations, 2009 has linked the infirm power price with the Unscheduled Interchange (UI) rate under the Availability Based Tariff (ABT) mechanism.
- Pricing of infirm power linked to frequency results in the tariffs not being reflective of the costs, and may lead to artificially increasing the price, when the cost of generation may be far less than the prevailing UI rate.
- Also, there may be a perverse incentive to the generator to delay declaring COD, in case the UI rate is high, and generation can be done during periods of low frequency
- Further, generators may end up recovering part of their fixed costs before achieving COD, which is against basic principles

Treatment of infirm power …(2/2)

- It is proposed that the price of infirm power from thermal generating stations may be fixed at variable cost to recover the fuel costs only.
- If the revenue from sale of infirm power is higher than the fuel cost, the recovery in excess of fuel cost needs to be adjusted from the capital cost.
- The pricing of infirm power at variable charge is a simple mechanism and will avoid complications in tariff determination and will also ensure that the capital cost recovery in terms of Fixed (Capacity) charge is allowed after COD of the Generating Station.

Fuel cost adjustment charge

- The Commission approves the fuel costs and energy charge for the generating companies based on certain fuel price and calorific value assumptions.
- Fuel prices, especially of imported coal and oil, vary according to national and international market prices and hence, electricity generation cost varies in proportion to the variation in fuel cost.
- Under the MERC Tariff Regulations, the adjustment in fuel prices and calorific value is allowed to be passed through on monthly basis.
- As regards the adjustment of rate of energy charge on account of variation in price and heat value of fuels, it is proposed that initially, Gross Calorific Value of coal/lignite or gas or liquid fuel or secondary fuel oil shall be taken as per actuals of the preceding three months.
- The generating companies should submit the computation to the Commission on quarterly basis for post-facto approval of Fuel Adjustment Charge.

Hydro Generating Stations – Issues related to determination of tariff

Capital Cost and Means of Finance

- Capital cost in hydro generating stations includes the cost of dam, intake water system, turbines, generators and discharge water system.
- Issue with respect to capital cost of hydro projects is ascertainment of total capital cost of hydro project apportioned to power generation.
- The current methodology of approval of capital cost based on actual capital expenditure subject to prudence check may be continued.
- The Generating Company should file a separate Petition for approval of Tariff on Cost plus basis after achieving COD of the Project.
- The Generating Company should also submit the details of total Capital Cost of the Project and Capital Cost apportioned to power generation activity along with the detailed rationale for the same.

Components of tariff…1/6

- Existing MERC Tariff Regulations stipulate two-part tariff for sale of electricity from a hydro power generating station comprising of Capacity Charges and Primary Energy, where;
  - Annual Capacity Charges = Annual Fixed Charges - Energy Charge
  - Annual Fixed Charges comprises the following elements:
    - Interest on Loan Capital
    - Depreciation including Advance Against Depreciation and amortisation of intangible assets
    - O&M Expenses
    - Return on Equity Capital
    - Interest on Working Capital
    - Taxes on Income
- MERC Tariff Regulations stipulates that rate of energy for hydro stations shall be worked out on the basis of paise per kWh rate on ex-bus energy scheduled to be sent out from the hydro generating stations.

Components of tariff…2/6

- It is proposed that present approach of two-part tariff for hydro stations as specified in the MERC Tariff Regulations be continued, as it is reasonable from the generator as well as distribution licensee point of view.
- However, as present MERC Tariff Regulations do not provide any incentive for generating more than the design energy, it is proposed that some incentive should be provided for Hydel generating stations generating energy more than the design energy.
- The Commission since FY 2007-08 has approved differential peak and non-peak tariff to encourage the shift of hydel generation from peak to non-peak hours
- Also, 5% of the excess recovery from peak and non-peak hours tariff (in excess of capacity charge) has been shared between the generating company and the distribution licensee.

Components of tariff…4/5

- Month-wise comparison of hydel generation during peak and off peak hours for Koyna Hydel Station of MSPGCL for FY 2006-07 and FY 2007-08 is shown in table below:

- Peak hour generation for Koyna Complex has been in the range of 45% and there is not much shift from non-peak hour generation to peak hour generation.

Components of tariff…3/5

- **Month-wise comparison of hydel generation during peak and off peak hours for Hydel Stations of TPC-G for FY 2006-07 and FY 2007-08 is shown in table below:**

Month	FY 2006-07				FY 2007-08			
	Peak Hours	Non-peak Hours	Total	% during Peak Hrs	Peak Hours	Non-peak Hours	Total	% during Peak Hrs
April	67	106	173	39%	63	63	12517	50%
May	62	74	136	46%	63	72	13408	47%
June	76	97	173	44%	69	93	16161	43%
July	95	169	265	36%	95	194	289	33%
August	108	257	364	30%	57	58	11487	50%
September	89	155	244	37%	53	46	9837	53%
October	72	72	145	50%	60	41	101.5	59%
November	51	47	98	52%	51	35	8663	59%
December	55	50	105	52%	45	34	7935	57%
January	74	71	145	51%	62	42	10369	60%
February	78	81	159	49%	55	33	8859	62%
March	62	55	118	53%	57	49	10628	54%
Total	890	1234	2124	42%	729	760	148914	49%

- **Peak hour generation for generating stations of TPC-G has increased from 42% in FY 2006-07 to 49% in FY 2007-08.**

Components of tariff…4/5

- Analysis of actual generation during peak and non-peak hours reveals that differential hydro generation tariff has not resulted in the desired shift in the generation from non-peak to peak hours.
- MSPGCL submitted that it is not possible for them to shift the generation from non-peak hours to peak hours due to several reasons.
- It is proposed that since no real benefit is being derived from the differential hydro tariff mechanism for peak and non-peak hours, the same may be discontinued.
- CERC (Terms and Conditions of Tariff) Regulations, 2009 allows recovery of 50% of fixed costs through the capacity charge and 50% of the fixed costs through the energy charge corresponding to design energy.

Components of tariff…5/5

- The mechanism stipulated by CERC also provides for incentive towards generation in excess of the design energy.
- It is proposed that the tariff mechanism for hydro stations may be specified as stipulated in the CERC (Terms and Conditions of Tariff) Regulations, 2009.

Norms of Operations…1/4

a. Normative Capacity Index for Recovery of Annual fixed Charges

- Existing MERC Tariff Regulations for hydro generating stations are as under:

Particulars	First Year of Commercial Operation	After First year of Commercial Operation
Purely Run-of-river power station without pondage	85%	90%
Storage type and Run-of-river power stations with pondage	80%	85%

- It is proposed to adopt the tariff mechanism specified in CERC (Terms and Conditions of Tariff) Regulations, 2009,
- For new generating stations to be commissioned after the date of effectiveness of the MERC MYT Regulations, the Normative Plant Availability Factor (NAPAF) may be specified in accordance with the norms specified by CERC in its CERC (Terms and Conditions of Tariff) Regulations, 2009.

Norms of Operations…2/4

a. Normative Capacity Index for Recovery of Annual fixed Charges

Particulars	Normative Availability
Storage and Pondage type plants with head variation between Full Reservoir Level (FRL) and Minimum Draw Down Level (MDDL) of up to 8%, and where plant availability is not affected by silt	90%
Storage and Pondage type plants with head variation between FRL and MDDL of more than 8%, where plant availability is not affected by silt	Plant-specific allowance to be provided in NAPAF for reduction in MW output capability as reservoir level falls over the months. As a general guideline the allowance on this account in terms of a multiplying factor may be worked out from the projection of annual average of net head, applying the formula: (Average head / Rated head) + 0.02 Alternatively in case of a difficulty in making such projection, the multiplying factor may be determined as: (Head at MDDL/Rated head) × 0.5 + 0.52
Pondage type plants where plant availability is significantly affected by silt	85%
Run-of-river type plants	to be determined plant-wise, based on 10-day design energy data, moderated by past experience where available/relevant

Norms of Operations…3/4

a. Normative Capacity Index for Recovery of Annual fixed Charges

- It is proposed that for existing stations NAPAF may be specified in the MYT Order after considering the past performance and based on methodology stipulated in CERC (Terms and Conditions of Tariff) Regulations, 2009.

b. Auxiliary Energy Consumption

- Auxiliary energy consumption norm as per existing MERC Tariff Regulations for hydro generating stations are as under:
  - Surface hydro electric power generating stations with rotating exciters mounted on the generation shaft – 0.2% of energy generated
  - Surface hydro electric power generating stations with static excitation system - 0.5% of energy generated
  - Underground hydro electric power generating stations with rotating exciters mounted on the generator shaft - 0.4% of energy generated
  - Underground hydro electric power generating stations with static excitation system - 0.7% of energy generated

Norms of Operations…4/4

b. Auxiliary Energy Consumption

- **Existing MERC Tariff Regulations stipulates transformation losses of 0.5% from generation voltage to transmission voltage.**
- **It is proposed that auxiliary consumption norm may be specified (which includes transformation losses also) as specified by CERC in its CERC (Terms and Conditions of Tariff) Regulations, 2009 for various types of stations, as follows:**
  - **Surface hydro generating stations**
    - ✓ **With rotating exciters mounted on the generator shaft: 0.7%**
    - ✓ **With static excitation system: 1%**
  - **Underground hydro generating stations**
    - ✓ **With rotating exciters mounted on the generator shaft: 0.9%**
    - ✓ **With static excitation system: 1.2%**

Operations and Maintenance Expenses…1/2

- **CERC, in its CERC (Terms and Conditions of Tariff) Regulations, 2009 has stipulated norms for O&M expenses for Hydro Generating stations.**
- **For existing stations, it is suggested that the norm for O&M expenses may be specified based on actual O&M expenses during the last five years.**
- **Principles for determination of O&M norms for existing stations norms are proposed as under:**
  - **The normative O&M expenses for the second Control Period will be derived on the basis of the average of the actual O&M expenses for the five (5) years ending March 31, 2009, based on the audited financial statements, excluding abnormal O&M expenses, if any, subject to prudence check by the Commission.**
  - **The average of such O&M expenses will be considered as the expenses for the financial year ended March 31, 2007, which will be escalated based on the escalation factor to be determined based on the CPI and WPI over the past three years, to arrive at O&M expenses for the base year commencing April 1, 2010.**

Operations and Maintenance Expenses…2/2

- In case of the hydro generating stations, which have not been in commercial operation for a period of five years as on 31.3.2009, operation and maintenance expenses may be fixed at 2% of the original project cost (excluding cost of rehabilitation and resettlement works) for first year of operation, which may be escalated based on the escalation factor to be determined based on the CPI and WPI to arrive at O&M expenses for the base year commencing April 1, 2010.

- **For new Generating Stations:**
  - It is proposed that, the norms for O&M expenses for first year of operation may be specified as 2% of the original project cost (excluding cost of rehabilitation and resettlement works) for the first year of operation.
  - O&M expenses for each subsequent year to be determined by escalating the base expenses determined above for FY 2009-10, at the escalation factor arrived based CPI and WPI over last three years.

Treatment of Infirm Power

- **Two alternative approaches for treatment of infirm power from hydro generating stations are as under:**
  - **Option 1: Rate of Infirm Power equivalent to Primary Energy Rate**
  - **Option 2: Supply of Infirm Power free of charge**
- **In case of hydro generating stations, there is no question of fuel cost, and recovery from primary energy rate is intended for part recovery of Annual Fixed Costs.**
- **Under Option 1, the revenue earned from sale of infirm power needs to be deducted from the Capital Cost.**
- **Under Option 2, the infirm power may be supplied free of cost as there are no fuel costs involved**
- **Any power supplied to the Distribution Licensee should not be free of charge, hence, it is proposed to adopt Option 1 for treatment of infirm power in case of hydro generating stations.**

MYT Framework for Transmission

Agenda

- Historical Background of Transmission Pricing within Maharashtra
- Regulatory Framework and Recent Regulatory Developments
- Key issues in Transmission for New Control Period
- Regulating Transmission Licensees & Performance Standards
- Regulating Transmission System Users/Usage (TSUs)

Historical Background of Transmission Pricing within Maharashtra

Historical Background - Transmission

- Prior to enactment of Electricity Act 2003 (EA 2003) and even for a considerable time later, most of these licensees had integrated operations
- Pursuant to enactment of EA 2003, 'transmission' has to be viewed as a distinct licensed activity to be regulated in accordance with the provisions of the EA 2003.
- Further, for determination and allocation of transmission cost to various users, a separate accounting for the transmission function of the Utility must be in place.
- Accordingly, the Commission had directed all licensees to undertake 'function-wise' segregation of the assets and liabilities and furnish their Petitions for Annual Revenue Requirement for each function separately.

Integrated utilities	After Functional Segregation		
MSEB => G-T-D	MSPGCL	MSETCL	MSEDCL
TPC Ltd => G-T-D	TPC-G	TPC-T	TPC-D
REL => G-T-D	REL-G	REL-T	REL-D

Historical Background - Transmission

- MSETCL notified by GoM as State Transmission Utility (STU)
  - MSETCL as STU, is responsible to undertake all activities related to transmission planning, co-ordination and ensuring development of an efficient, co-ordinated and economical system of intra-state transmission for smooth flow of electricity from generating stations to the load centers, within State.
- Rinfra and TPC also owns and operates transmission assets (lines and sub-stations) in the state.
  - Transmission assets of TPC and RInfra caters only to the requirement of their 'distribution business' in their respective distribution license area.
- Other Private Transmission licensees viz. Jaigad Power Transco and Adani Tx also likley to commence operations in the State.

Thus, there exist multiple transmission licensees in the State which constitutes the Intra-State transmission system (InSTS). However, parity in transmission pricing across the State was required which led to framing of a Transmission Pricing framework for Intra-State Transmission System

Historical Background - Transmission

Relevant Orders by the Commission ....(1/2)

- The Commission passed the Order on "Development of Transmission Pricing Framework for the State of Maharashtra" on June 27, 2006.
- The Order covered the 'Transmission Pricing Framework' for Maharashtra and elaborated on various features of the Transmission Pricing framework after considering the views of various stake holders.
- Aggregate of Annual Revenue Requirement of all licensees, as approved by the Commission, shall form "Pooled Cost" (or termed as "Total Transmission System Cost – TTSC) of the intra-State transmission system, to be recovered from the Transmission System Users (TSUs).
- 'Base Transmission Tariff' for each financial year shall be derived as 'TTSC' of intra-State transmission system divided by 'Base Transmission Capacity Rights' and denominated in terms of "Rs/kW/month" or "Rs/MW/day" or "Rs/kWh".
- Recovery of revenue requirement of transmission licensees achieved by way of "composite charge" for use of intra-State transmission system.
- Postage Stamp Method based recovery of transmission charge.

Historical Background - Transmission

Merits and Demerits of Order on "Development of Transmission Pricing Framework for the State of Maharashtra" on June 27, 2006.

Merits

- ✓ Avoids the problem of pan-caking.
- ✓ No need to review or track physical transactions.
- ✓ Augmentation and network expansion benefits all – as integrated Tx system.
- ✓ Transmission planning and network expansion without any bias.
- ✓ Will encourage multiple OA transactions.
- ✓ Treat all open access transactions of consumers connected to InSTS on par, irrespective of location of consumer.

Demerits

- ✓ Pricing methodology is insensitive to distance.
- ✓ Does not recognize the direction and quantum of power flow.
- ✓ NEP and TP mandates that the national tariff framework implemented should be sensitive to distance, direction and related to quantum of flow.
- ✓ Such framework is under development at regional level by CERC.

Historical Background - Transmission

Relevant Orders by the Commission ....(2/2)

- The Commission issued another Order dated November 13, 2007 (Case 34 of 2007). The following issues were discussed in the Order.
  - Whether 'evacuation arrangement' forms part of 'dedicated transmission line' or part of 'intra-State transmission system'?
  - Who should develop transmission projects /evaluation arrangement and what is MSETCL's role in development of such projects?
  - What is the procedure for approval of Investment Plan and can in-principle approval be sought for Investment Plan?
  - Whether transmission/evacuation arrangement for generating stations of State generating company, independent power producers and merchant generator be treated uniformly?
  - What should be the nature of commercial arrangement between transmission licensee and generating company?
  - Whether MSETCL has freedom to incorporate suitable clauses/commercial conditions such as security requirements under the commercial arrangements with generating companies to safeguard its interests on case-to-case basis?

Historical Background - Transmission

- The Commission made the following rulings in the Order dated November 13, 2007 (Case 34 of 2007).
  - The expenditure incurred for evacuation arrangement including transmission lines for generation projects of MSPGCL, private developers under the CBG route or otherwise, forms part of TTSC.
  - In case MSETCL undertakes to develop such evacuation infrastructure, the expenditure made by MSETCL shall form part of its ARR.
  - 'Investment Plan', which is formulated in line with 'Transmission System Plan' to be submitted for approval of the Commission.
  - licensees need to enter into appropriate commercial arrangements including Connection Agreement and Bulk Power Transmission Agreement.
  - Transmission tariff applicable to generators for injection of power to the extent of power wheeled outside the State and such recovery of transmission cost from Merchant Generators shall be adjusted against TTSC for InSTS to be recovered from Transmission System Users (TSU) within State.
  - The Generating Company and transmission licensees need to devise appropriate commercial agreements such as Transmission Development Agreement in order to safeguard their respective interests.

Regulatory Framework and Recent Regulatory Developments

Regulatory Framework and Recent Regulatory Developments … 1/4

National Electricity Policy

"To facilitate cost effective transmission of power across the region, a national transmission tariff framework needs to be implemented by CERC. The tariff mechanism would be sensitive to distance, direction and related to quantum of flow. As far as possible, consistency needs to be maintained in transmission pricing framework in inter-State and intra-State systems."

Tariff Policy

The Tariff Policy notified by Ministry of Power (MoP), GoI on January 6, 2006 deals with several aspects pertaining to Transmission as under –

- ✓*Transmission Planning*
- ✓*Transmission Pricing*
- ✓*Infrastructure*
- ✓*Approach for Transmission Loss*
- ✓*Other issues in transmission*

Regulatory Framework and Recent Regulatory Developments … 2/4

Guidelines for Private sector participation in Transmission

- April 13, 2006 - "Guidelines for Encouraging Competition in Development of Transmission Projects" were notified in pursuance of Tariff policy, by Ministry of Power
- April 17, 2006 - "Tariff based Competitive-bidding Guidelines for Transmission Service" was notified in pursuance of Tariff Policy, by Ministry of Power .

  June 14, 2006 - The Empowered Committee was constituted by the MoP implement the provisions of "Guidelines for Encouraging Competition in Development of Transmission Projects".

- ✓ The above referred guidelines issued by MOP has clearly specified **the role of State Govt** to notify an Organisation for coordinating the procurement of transmission services required for intra-State transmission is clearly specified.
- ✓ The Commission has given **timely recommendations and requested the GoM** regarding notification of such an Organisation, foreseeing the growing interest of private participation in the Transmission sector of the State.

Regulatory Framework and Recent Regulatory Developments … 3/4

CERC Approach Paper on formulating pricing methodology for Inter-State transmission

- The approach paper analyses various methodologies and recommends the Marginal Participation (MP) Method for determining Inter State transmission prices
- MP method has features based on economic and technical principles.
- Provides clear locational signals to generation and demand customers
- Utilization of the network branches as determined based on actual power flows on the network
- Each user of the network will be required to pay a fixed charge depending on its location in the network
- Provide clear signals based on distance and direction

✓ This Approach Paper is under the discussion stage and CERC is yet to come out with the final Regulations based on the recommendations of the paper

Regulatory Framework and Recent Regulatory Developments … 4/4

Requirements/Roadblocks for implementation of MP method at Intra State Level

- Data requirement in high intensity
  - ✓ Generation and demand forecasting with seasonal variations
  - ✓ Technical characteristics of the Transmission Network stretching to circuit branch-wise details
  - ✓ Load flow analysis
- Contractual framework at State level akin to CUSA (Connection and Use of System Agreement) at Inter-State level with necessary clauses
- Other major issues
  - ✓ Identification of Nodes and Interface Points
  - ✓ Energy accounting and Measurement, and
  - ✓ Separation of assets into connection assets and grid assets.

Objectives of Transmission Pricing and Key Issues related to Transmission in next Control Period

Objectives of Transmission Pricing framework for New Control Period

- Should meet the transmission revenue requirement of licensees
- Needs to be guided by key considerations such as economic and efficient use of transmission network
- Adopt non-discriminatory approach
- Encourage investment in transmission sector
- Support the development of market/trading opportunities
- Provide economic signals for location of new generation and loads
- Be simple and practical

Key Issues related to Transmission in next Control Period …1/2

A] Regulating performance of Transmission Licensees

- How should performance of existing transmission licensees be regulated?
- What should be operating norms and performance standards for transmission licensees within State?
- How should transmission investments by transmission licensees be regulated in order to yield optimal transmission system meeting with planning standards under IEGC and State Grid Code?
- How should transmission licensees be encouraged to prioritise investments?
- How should private sector participation in transmission be encouraged?
- How should open access to use intra-State transmission network be ensured?

Key Issues related to Transmission in next Control Period …2/2

B] Regulating Transmission System Usage

- How should transmission system usage be defined and monitored in case of usage by various transmission system users (TSUs)?
- Whether distinction in transmission pricing be made depending on tenure of usage (long term/medium term/short term)?
- Whether distinction should be made in case of renewable energy transactions entailing transmission system use?
- What should be the mechanism for recovery for usage of intra-State transmission system for inter-State wheeling transactions?
- What should be the principles for treatment of transmission losses?
- Should the existing principles for Transmission pricing based on co-incident peak demand, denominations, recovery etc. be modified?

Key Issues - Regulating Performance of Transmission Licensees

Regulating Performance of Tx Licensees : Capex & Investment Plan …1/2

Regulating Capital Investment & Optimal Investment Plan ...(1/2)

- The existing MERC Tariff Regulations, 2005, mandates the transmission licensees to submit an investment plan with full details of the licensee's proposed capital expenditure projects to the Commission for its approval.

Review of past data

- However, during the first control period, the Commission observed that, utilities in the shade of capital expenditure are engaged in building their asset base and is giving less significance to the need for improving their performance efficiency.
- ABPS Infra proposes that instead of just an investment plan, licensees should come up with a comprehensive Business plan which will set the track for necessary growth as well as systematic improvement in their performance efficiency of the licensee.
- Such a Comprehensive Business plan should cover the following factors.
  - ✓ Capital Investment Plan
  - ✓ Financing Plan
  - ✓ Loss Reduction Plan
  - ✓ Human Resource Management Plan

Regulating Performance of Tx Licensees : Capex & Investment Plan ...2/2

Regulating Capital Investment & Optimal Investment Plan ...(2/2)

- Such business plan should be formulated in a way to ensure the following
  - ✓ Improvement in efficiency and availability of transmission system
  - ✓ Reduction transmission loss
  - ✓ Motivate personnel to enhance performance and increase employee contribution
  - ✓ Increase system reliability, safety and security
  - ✓ Increase transparency and accountability of operations
  - ✓ Promote business development to improve financial standing
  - ✓ Improve metering to achieve optimal control of the transmission system
- The Utility should submit and propose the trajectory for the achievement of quality targets along with its Business Plan
- This Business plan shall be submitted before the start of the control period for approval of Commission

Regulating Performance of Tx Licensees : Operating Performance…1/3

Regulating Operating Performance: O&M Norms

- The MSETCL under its MYT Petition for the earlier Control Period (FY 2007-08 to FY 2009-10) had projected its O&M expenses considering the O&M norms developed by the Central Electricity Regulatory Commission (CERC) for the regional transmission network.
- The Commission through it MYT Order had opined that it may not be appropriate to consider the regional O&M norms as the basis for projecting O&M expenses for State transmission network since the configuration, network topology, organisation structure, compensation plan, and maintenance practices, etc. are different for the State transmission system as against that applicable for the regional transmission system.
- The Commission also opined that any other suitable norms for allowance of O&M expenses could be adopted after undertaking a thorough study of the O&M expenditure, the cost drivers of the same, and the comparison of the per bay and per circuit km norms across different transmission Utilities, through a separate process. Till any such norm for O&M expenditure is determined, the Commission is considering the individual elements of O&M expenditure based on the increase linked to inflation indices for the first Control Period of MYT.

Regulating Performance of Tx Licensees : Operating Performance…2/3

Regulating Operating Performance: O&M Norms

- However, the Commission in the MYT Order outlined the principles for derivation of O&M norms for MSETCL which is reproduced as below

  "The O&M expense norms for the Control Period shall be derived on the basis of the average of the actual O&M Costs per bay and O&M Costs per circuit-km for the five (5) years ending March 31, 2006, based on the audited financial statements, excluding abnormal operation and maintenance expenses, if any, subject to prudence check by the Commission"

- The Commission further directed MSETCL to submit the details of O&M expenses per circuit Kilometre of line length and per bay for the last five years or submit the asset details of bays and assets details of lines which would help in deriving appropriate norms.
- Subsequently, the Hon'ble Appellate Tribunal for Electricity (ATE) in its Judgment in Appeal No. 76 of 2007 ruled that projection of O&M expense for the remaining duration of the Control Period should be carried out by extrapolating the actual audited expenses for FY 2006-07 subject to prudence check and this approach shall be continued till norms are finalised.
- Thus, it is important to stipulate norms for O&M expenses before commencement of the next Control Period.

Regulating Performance of Tx Licensees : Operating Performance…3/3

Premise for Development of Norms for O&M expenses

- ABPS Infra proposes to derive the O&M norms for the transmission licensees in the State of Maharashtra based on its judgement of the relationship between
  - The drivers of O&M expenses and
  - parameters such as Line length in circuit km, number of bays, and transformation capacity in MVA.
- O&M expenses comprise
  - Employee Expenses,
  - Repair & Maintenance expenses and
  - Administrative & General expenses.
- With increase in transmission capacity and corresponding increase in asset base, the manpower resources and repairs and maintenance activities needs to be augmented adequately to cater to the enhanced maintenance requirement (preventive and break-down) of the asset base.
- Further, there is a direct co-relation between O&M expenses and on-line transmission/network capacity, number of bays and transmission line length (ckt-km) put into service.

Development of Norms for O&M …1/13

Premise for Development of Norms for O&M expenses

- In order to derive the O&M Norms, ABPS Infra has adopted following four step approach as presented below:

Comparison of Network Configuration and other technical parameters across various State level Transmission Utilities in India.

Comparison of O&M expense components and structure across State level Transmission Utilities in India

Comparison of physical, technical and cost parameters across Intra-State Transmission licensees within Maharashtra.

Comparison of O&M expenses of the intra-State Transmission Licensees of Maharashtra with that of CTU (PGCIL)/CERC norms

Development of Norms for O&M …2/13

Comparison of Network Configuration and other technical parameters across various State level Transmission Utilities in India.

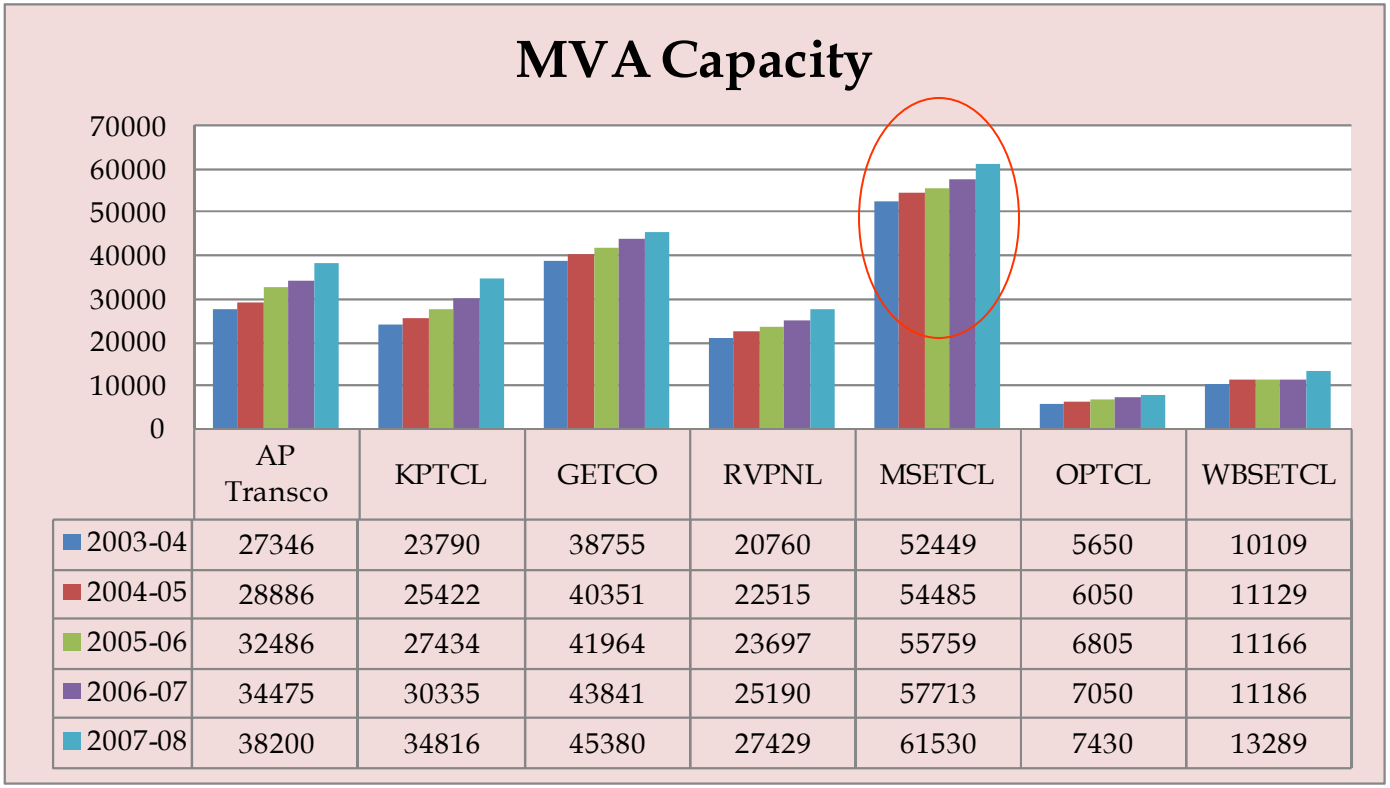
- For comparison purposes, at least two Transmission Utilities each from the Northern Region, Southern Region, Eastern Region and Western Region have been considered. The Transmission Utilities considered are
  - Transmission Corporation of Andhra Pradesh Limited (AP Transco),
  - Karnataka Power Transmission Corporation Ltd (KPTCL),
  - Rajasthan Rajya Vidyut Prasaran Nigam Ltd (RVPNL),
  - Delhi Transco Ltd (DTL)*
  - Orissa Power Transmission Co. Ltd (OPTCL),
  - West Bengal State Electricity Transmission Co. Ltd (WBSETCL)
  - Gujarat Energy Transmission Co. Ltd (GETCO), and
  - MSETCL.

**(DTL was later removed from the comparison because of substantial variations in parameters)*

Development of Norms for O&M …3/13

Comparison of Network Configuration and other technical parameters across various State level Transmission Utilities in India.

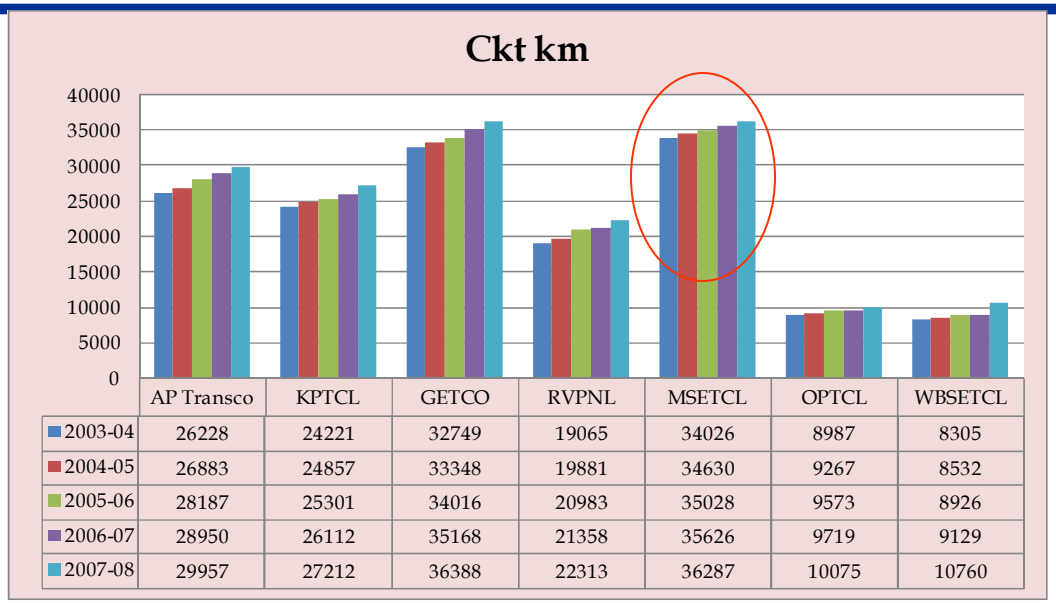
Growth of Transmission Utilities in terms of their grid substation capacity (MVA), transmission line length (ckt-km) and number of substations (no.) during the period from FY 2003-04 to FY 2007-08.



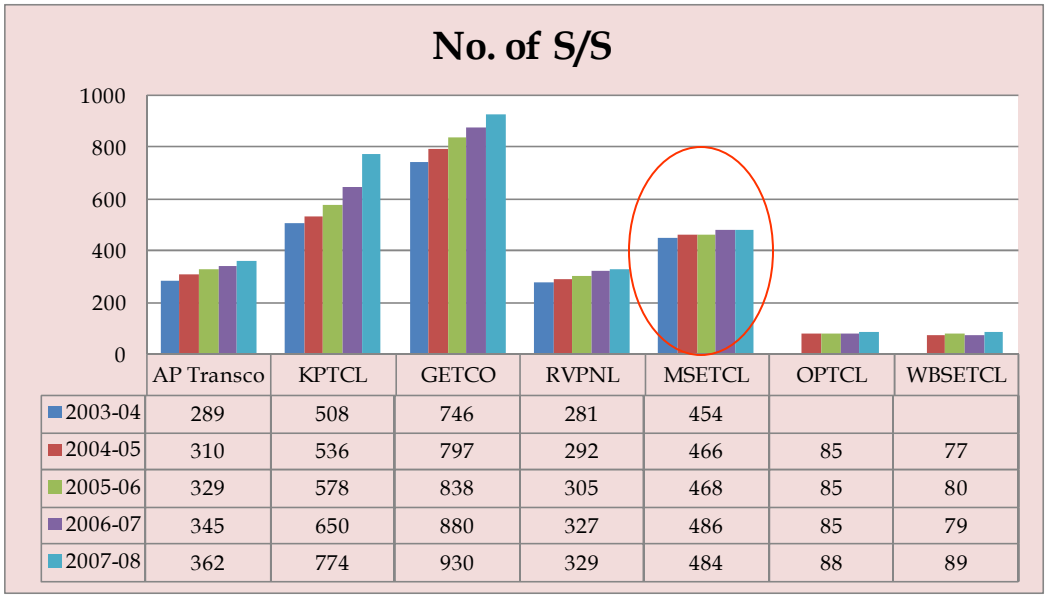
	AP Transco	KPTCL	GETCO	RVPNL	MSETCL	OPTCL	WBSETCL
2003-04	27346	23790	38755	20760	52449	5650	10109
2004-05	28886	25422	40351	22515	54485	6050	11129
2005-06	32486	27434	41964	23697	55759	6805	11166
2006-07	34475	30335	43841	25190	57713	7050	11186
2007-08	38200	34816	45380	27429	61530	7430	13289

Development of Norms for O&M …4/13

Growth in transmission line length during FY 2003-04 to 2007-08



	AP Transco	KPTCL	GETCO	RVPNL	MSETCL	OPTCL	WBSETCL
2003-04	26228	24221	32749	19065	34026	8987	8305
2004-05	26883	24857	33348	19881	34630	9267	8532
2005-06	28187	25301	34016	20983	35028	9573	8926
2006-07	28950	26112	35168	21358	35626	9719	9129
2007-08	29957	27212	36388	22313	36287	10075	10760



	AP Transco	KPTCL	GETCO	RVPNL	MSETCL	OPTCL	WBSETCL
2003-04	289	508	746	281	454		
2004-05	310	536	797	292	466	85	77
2005-06	329	578	838	305	468	85	80
2006-07	345	650	880	327	486	85	79
2007-08	362	774	930	329	484	88	89

Growth in no. of substation

Development of Norms for O&M …5/13

Comparison of Network Configuration and other technical parameters across various State level Transmission Utilities in India.

- The technical/physical profile of a Transmission Utility mainly includes the following.

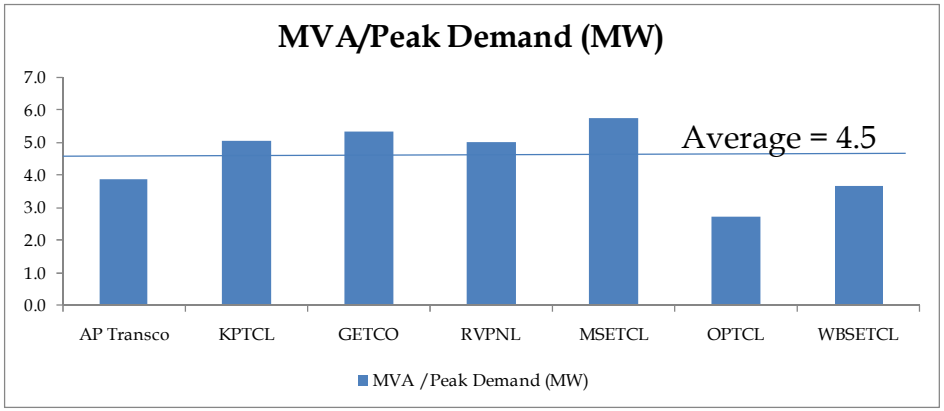
✓Length of Transmission Line (in Ckt Km)
✓Transmission capacity (in MVA)
✓Number of substations/Number of bays

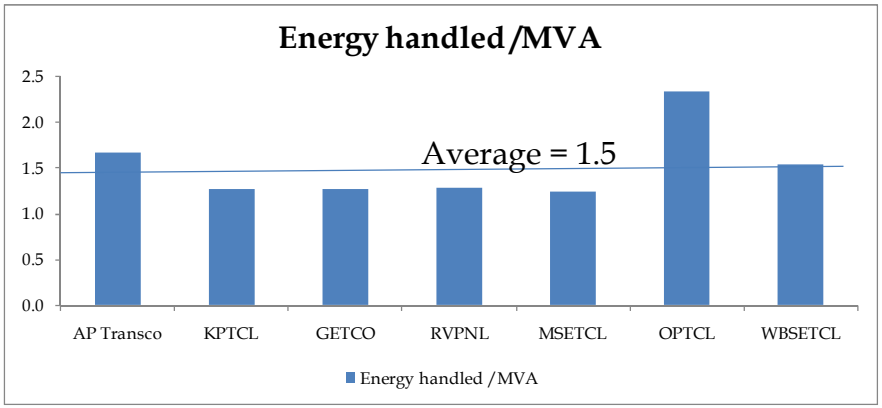
✓ Operating Voltage levels
✓ Energy handled (MU)
✓ Average/Peak demand catered by the transmission system (MW)

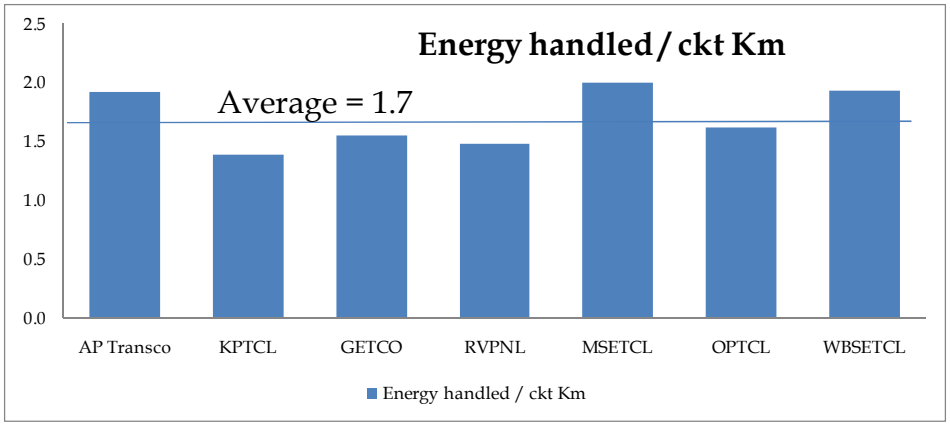
- In order to compare the technical parameters of selected Transmission Utilities, certain ratios have been derived for various physical parameters as outlined below:
- Grid Substation Installed capacity (in MVA) / Peak demand catered by the network (in MW)
- Energy units handled (in MU) / Grid Substation Installed capacity (in MVA)
- Energy units handled (in MU) / Transmission line length (in ckt km)
- Transmission line length (in ckt km) / No. of substations
- Grid Substation installed capacity (in MVA) / No. of substations.

Development of Norms for O&M …6/13

Comparison of Network Configuration and other technical parameters across various State level Transmission Utilities in India.



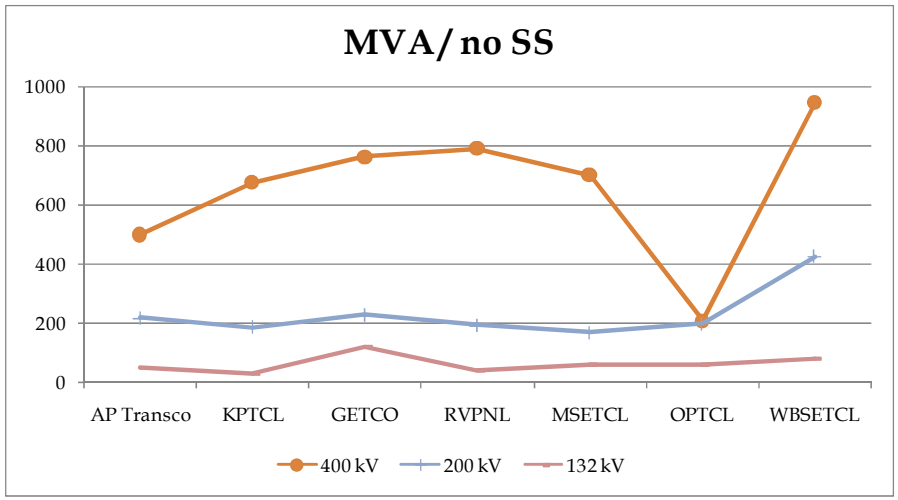


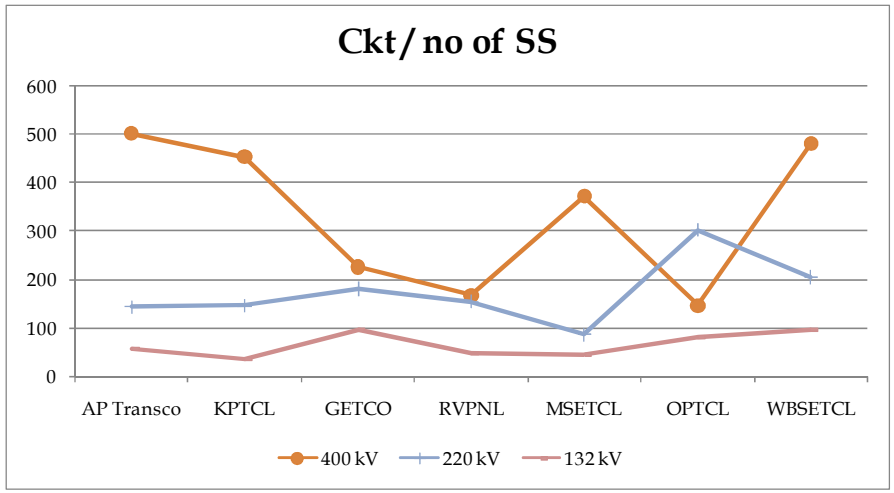


(The parameters considered here are based on the average of five years data for the period from FY 2003-04 to FY 2007-08)

Development of Norms for O&M …7/13

Comparison of Network Configuration and other technical parameters across various State level Transmission Utilities in India.





(The parameters considered here are based on the average of five years data for the period from FY 2003-04 to FY 2007-08)

Development of Norms for O&M …8/13

Inference: Comparison of network parameters

- While comparing voltage wise configuration of the selected transmission Utilities, it is seen that the Utilities have a comparable technical configuration at lower voltage levels (220 kV and below) of operation whereas the homogeneity is found to be lower at higher voltage level (440 kV).
- The selected transmission Utilities are broadly comparable despite certain distinct characteristics shown by some Utilities.
- The comparison of the above ratios and technical parameters reveals that on aggregate level represented by ratios such as (i) grid substation capacity (MVA) to peak demand catered (MW) (ii) energy units handled to grid substation capacity (iii) energy units handled to transmission line length (ckt km) etc., MSETCL is almost at par with the physical configuration of other transmission Utilities considered for comparison.
- However, significant differences exist in terms of network configuration at different voltage levels. The network configuration of Utilities in terms of transmission line length and number of substation is more uniform at lower voltage levels of operation whereas the network configuration is uneven at higher voltage levels of operation.

Development of Norms for O&M …9/13

Inference: Comparison of network parameters

- The capital cost and operating costs at different voltage levels such as 400 kV, 220 kV, 132 kV etc. vary significantly. In view of above, although catered demand (MW) or energy units handled (MU) are comparable across utilities, the norms for operation will depend on composition of network, viz. transmission lines, substations and number of bays etc. at various voltage levels.
- Thus, network topology and configuration at various voltage levels shall play key role in determining the O&M norms for each transmission utilities. While broad parameters in terms of units handled and peak demand catered is comparable to installed grid substation capacity (MVA) and transmission line length (ckt km) across transmission Utilities, the difference in network topology and configuration at various voltage levels (400 kV, 220 kV and 132 kV) is evident across transmission Utilities.

Hence, it may be noted that while benchmarking across transmission Utilities at aggregate level can be undertaken, it is preferable to derive norm for each transmission Utility considering its historical performance, its network topology/configuration, historical growth pattern and cost structure, etc.

Development of Norms for O&M …10/13

Comparison of O&M expense components and structure across State level Transmission Utilities in India

- Comparison of O&M expense components across various transmission Utilities for FY 2007-08

Particulars	APTransco	KPTCL	GETCO	RVPNL	MSETCL	WBPTCL
Employee Expenses	110.23	168.81	232.08	257.35	248.44	51.53
A&G Exp	23.31	53.34	41.5	22.81	70.62	12.72
R&M Exp	68.21	25.2	86.65	53.73	165.35	14.59
Net O&M Expenses (Rs Crore)	**201.75**	**247.35**	**360.23**	**333.89**	**484.41**	**78.84**
Op. GFA, (Rs Crore)	5104.74	4,360	4865.17	3951.89	8965.25	2302.15
O&M expense as % of Op. GFA	**4.0%**	**5.7%**	**7.4%**	**8.4%**	**5.4%**	**3.4%**

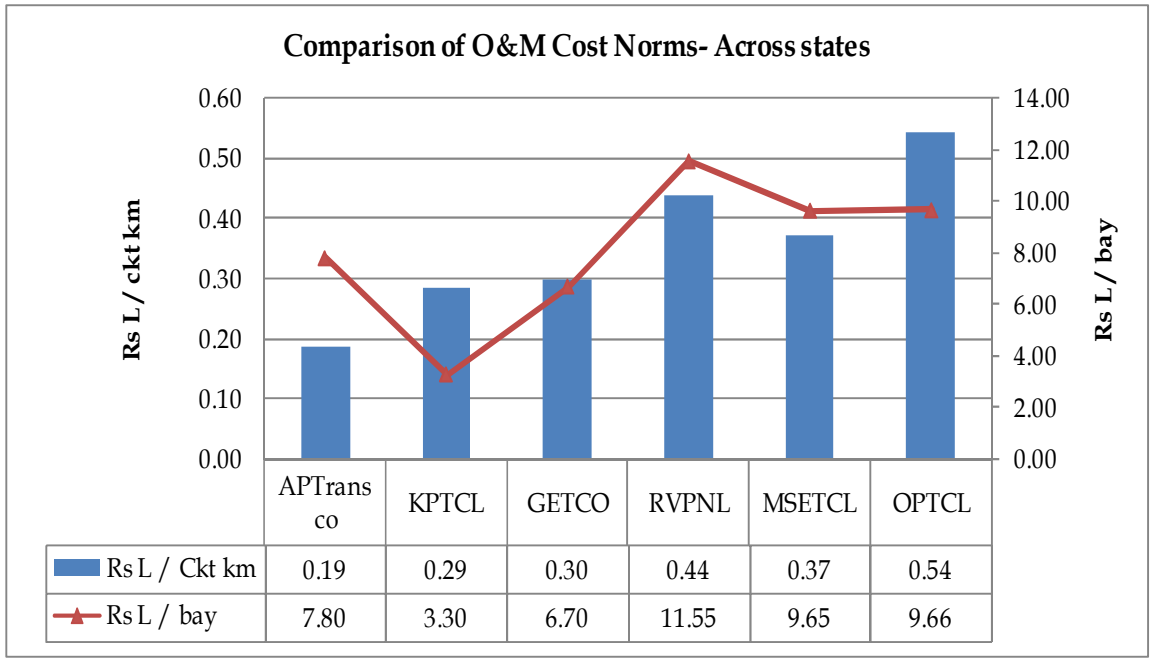
- In case of MSETCL, the ratio amounts to 5.4% while average for above Utilities amount to 5.7%
- It can be inferred from the above comparison that percentage mix of various O&M components such as Employee expenses (55% - 75%), A&G expenses (10% - 25%) and R&M expenses (15% - 30%) are less comparable across various State Transmission Utilities.
  - From the above comparisons of physical configuration and O&M expenses across various State Transmission Utilities, it is evident that the parameters are less comparable across State transmission utilities.

Per unit ARR

Development of Norms for O&M …11/13

Cost drivers for deriving norms for O&M expense

- The norms for O&M expenses can be derived considering two important cost drivers (the transmission line length (ckt-km) and no. of substations (or bays))in terms of *Rs Lakh per bay* and *Rs Lakh per ckt-km*.
- For comparison purposes, average O&M expense norms for three years (FY 2005-06 to FY 2007-08) for each Utility have been considered. In order to derive the norms, the O&M expenses have been allocated amongst the number of bays (no) and transmission line length (ckt km) in the ratio of 70:30.



	APTransco	KPTCL	GETCO	RVPNL	MSETCL	OPTCL
Rs L / Ckt km	0.19	0.29	0.30	0.44	0.37	0.54
Rs L / bay	7.80	3.30	6.70	11.55	9.65	9.66

Development of Norms for O&M …12/13

Inference: Comparison of Cost parameters

- O&M expenses as percentage of Opening GFA in respect of various transmission Utilities are comparable. However, differences due to specific cost components such as terminal benefits, accounting standard treatment, etc., exists across transmission Utilities, which need to be addressed while undertaking comparative analysis.
- The structure of O&M expense components comprising employee expenses, A&G expenses and R&M expenses is less comparable across the State Transmission Utilities due to differences in organisation structure and cost thereof. Further, the variation in cost components (within a range), particularly for R&M expenses shall continue to exist on account of differences in network topology and other physical network parameters.
- The transmission line length (ckt-km) and no. of substation (or bays) represents important cost drivers for the O&M costs. The norms for O&M expenses can be derived considering these two important cost drivers in terms of Rs Lakh per bay and Rs Lakh per ckt-km. O&M expenses need to be allocated amongst substation bays and ckt-km in some ratio (say, 70:30) for deriving O&M expense norms thereof.
- Voltage-wise distinction in terms of norms is not desirable at this stage.

Development of Norms for O&M …13/13

Inference: Comparison of Cost parameters

Hence, while benchmarking across transmission Utilities at aggregate level can be undertaken, it is preferable to derive norm for each transmission Utility considering its historical performance, its network topology/configuration, historical growth pattern and cost structure, etc.

O&M norms within Maharashtra…1/7

Comparison of technical parameters across the Intra-State Transmission licensees in Maharashtra

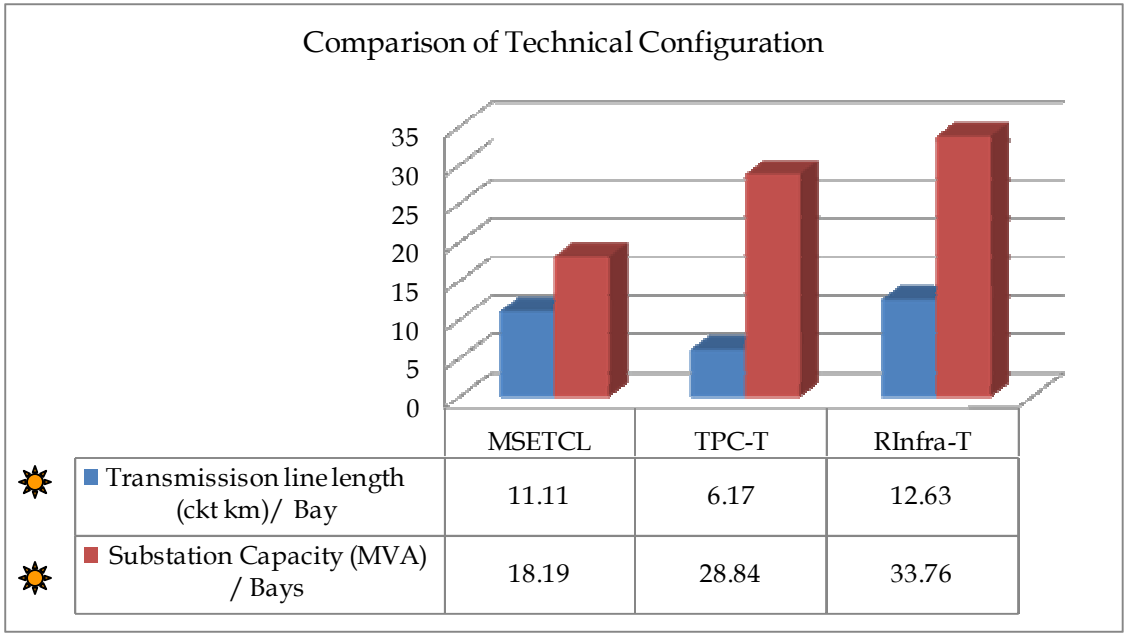
- At present, the intra-State transmission system (InSTS) within Maharashtra comprises the transmission network of MSETCL, The Tata Power Company – Transmission Business (TPC-T) and Reliance Infrastructure Limited – Transmission Business (RInfra-T).
- The nature of Transmission Licensees varies significantly on the technical, financial and operational front.
- Comparison of the technical configuration of the three Transmission Utilities in Maharashtra in terms of MVA capacity, transmission line length in ckt km and number of bays for FY 2008-09.

Particulars	units	MSETCL	TPC-T	RInfra-T
Transmission line length	ckt Km	36409	1191	481
MVA capacity	MVA	62459	6644	1100
no of substation	no	484	16	3
no of bays	no	3412	192	31
Transmission line length / Bays	ckt Km / bay	10.67	6.20	15.50
Substation Capacity / Bays	MVA/ bay	18.31	34.60	35.48

O&M norms within Maharashtra…2/7

Comparison of technical parameters across the Intra-State Transmission licensees in Maharashtra

- The ratio of Transmission line length to number of bays and the ratio of Substation capacity to number of bays have been derived to compare the technical configuration of the three transmission Utilities.
- The ratio brings out the structural difference in network configuration and topology amongst the three transmission licensees in the State of Maharashtra.



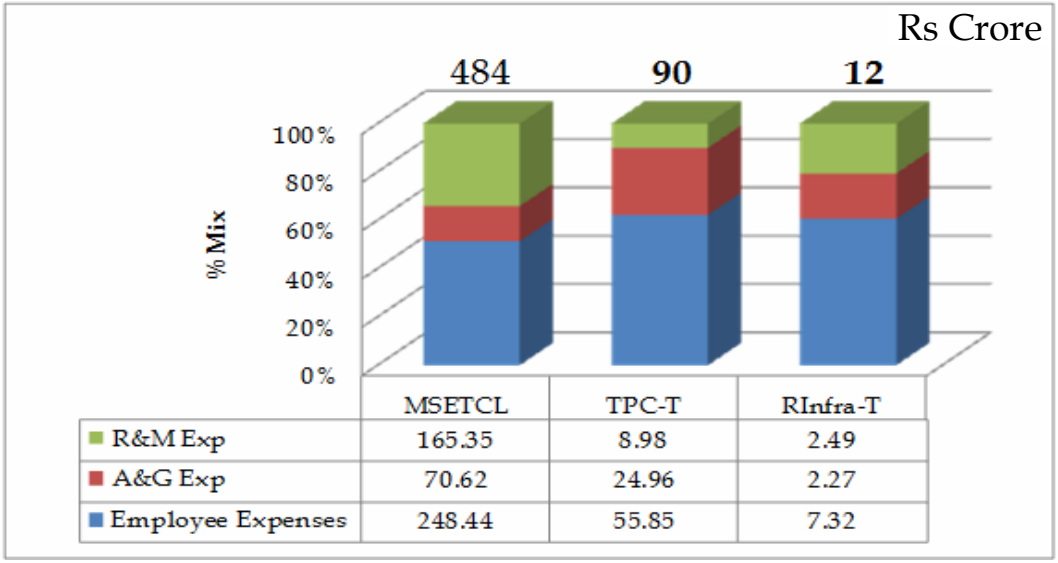
	MSETCL	TPC-T	RInfra-T
Transmissison line length (ckt km)/ Bay	11.11	6.17	12.63
Substation Capacity (MVA) / Bays	18.19	28.84	33.76

✸ Average of ratios for past 5 years (FY 2004-05 to FY 2008-09)

O&M norms within Maharashtra…3/7

Comparison of O&M expense amongst the Intra-State Transmission licensees in Maharashtra

- Comparison of the composition of O&M expenses of MSETCL, TPC-T and RInfra-T for FY 2007-08.



	MSETCL	TPC-T	RInfra-T
R&M Exp	165.35	8.98	2.49
A&G Exp	70.62	24.96	2.27
Employee Expenses	248.44	55.85	7.32

- O&M expense as a percentage of GFA of FY 2007-08

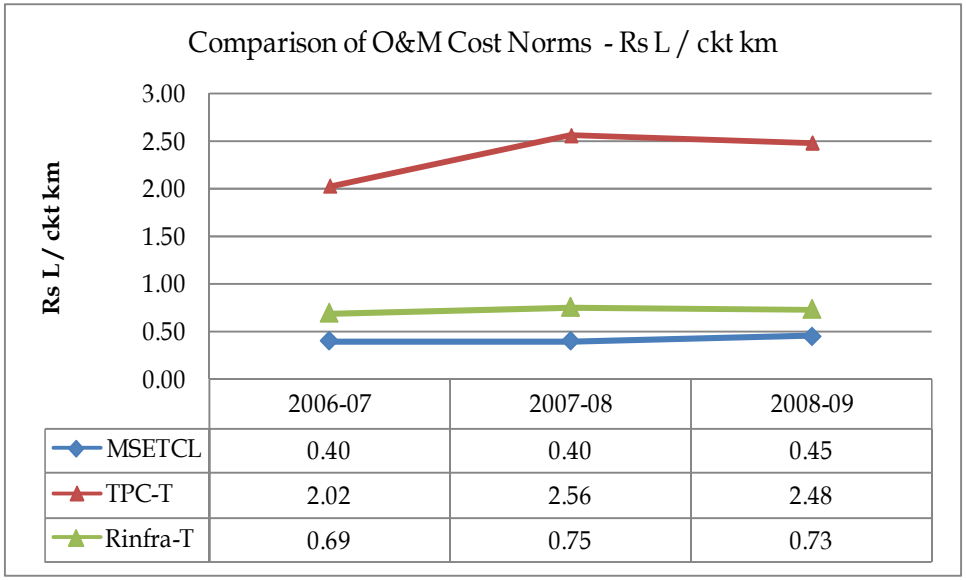
Particulars	MSETCL	TPC-T	Rinfra-T
O&M Expense	484.41	89.79	12.08
GFA	9831	1089	406
O&M as % of GFA	4.93%	8.25%	2.98%

Per unit ARR

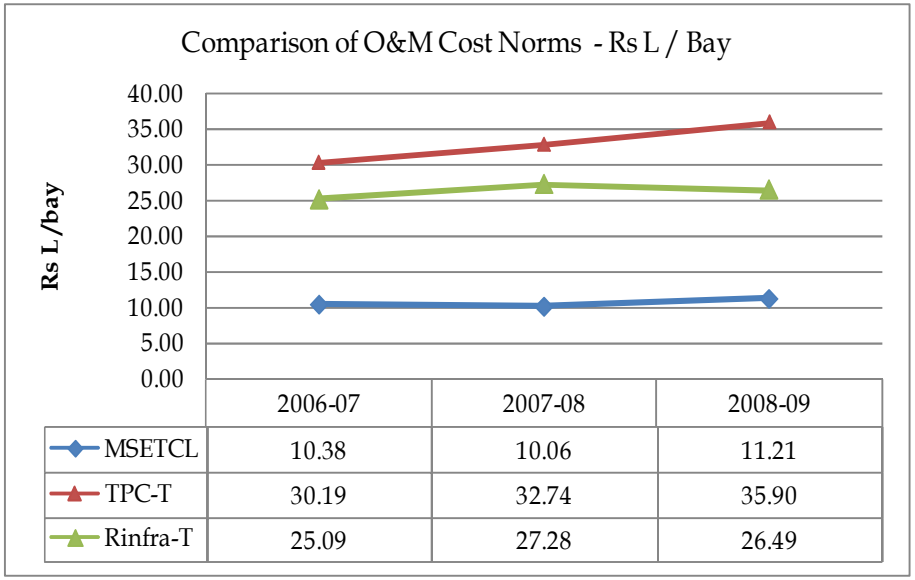
O&M norms within Maharashtra…4/7

Comparison of O&M norms amongst the Intra-State Transmission licensees in Maharashtra

- Comparison of the composition of O&M norms of MSETCL, TPC-T and RInfra-T for FY 2007-08.



	2006-07	2007-08	2008-09
MSETCL	0.40	0.40	0.45
TPC-T	2.02	2.56	2.48
Rinfra-T	0.69	0.75	0.73

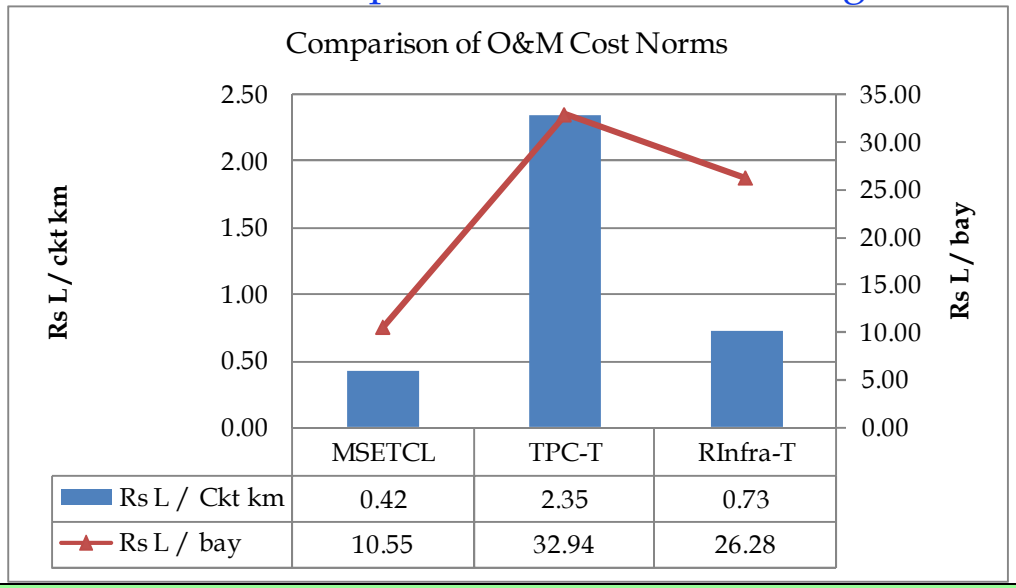


	2006-07	2007-08	2008-09
MSETCL	10.38	10.06	11.21
TPC-T	30.19	32.74	35.90
Rinfra-T	25.09	27.28	26.49

O&M norms within Maharashtra…5/7

Comparison of O&M expense norms amongst the Intra-State Transmission licensees in Maharashtra

- The average norm (FY 2006-07 to FY 2008-09) for O&M expenses in terms of Rs L/ckt km and Rs L/Bay in respect of all the three transmission licensees, viz., MSETCL, TPC-T and RInfra-T, is presented in the following chart:



	MSETCL	TPC-T	RInfra-T
Rs L / Ckt km	0.42	2.35	0.73
Rs L / bay	10.55	32.94	26.28

From the above comparison, it is evident that the three transmission licensees within the State of Maharashtra differ significantly in their characteristics and setting a single norm for all the three Utilities may not be a practical option.

O&M norms within Maharashtra…6/7

Comparison of O&M expenses of the Intra-State Transmission licensees in Maharashtra with that of CTU (PGCIL)/CERC norms

Norms for O&M expenditure for Transmission System

	2009-10	2010-11	2011-12	2012-13	2013-14
Norms for sub-station (Rs Lakh per bay)					
765 kV	73.36	77.56	81.99	86.68	91.64
400 kV	52.40	55.40	58.57	61.92	65.46
220 kV	36.68	38.78	41.00	43.34	45.82
132 kV and below	26.20	27.70	29.28	30.96	32.73
Norms for AC and HVDC lines (Rs Lakh per km)					
Single Circuit (Bundled conductor with four or more sub-conductors)	0.537	0.568	0.600	0.635	0.671
Single Circuit (Twin & Triple Conductor)	0.358	0.378	0.400	0.423	0.447
Single Circuit (Single Conductor)	0.179	0.189	0.200	0.212	0.224
Double Circuit (Bundled conductor with four or more sub-conductors)	0.940	0.994	1.051	1.111	1.174
Double Circuit (Twin & Triple Conductor)	0.627	0.663	0.701	0.741	0.783
Double Circuit (Single Conductor)	0.269	0.284	0.301	0.318	0.336
Norm for HVDC Stations					
HVDC Back-to-back stations (Rs lakh per 500 MW)	443.00	468.00	495.00	523.00	553.00
Rihand-Dadri HVDC bipole scheme (Rs Lakh)	1450.00	1533.00	1621.00	1713.00	1811.00
Talcher-Kolar HVDC bipole scheme (Rs Lakh)	1699.00	1796.00	1899.00	2008.00	2122.00

Difference

- Norm on per km basis rather than on the basis of per ckt km
- CERC has made distinction in terms of type of conductor as well
- CERC norms in terms of Rs Lakh/bay are significantly higher than that derived in case of the State transmission network.

O&M norms within Maharashtra…7/7

Proposed formulation of O&M norms

- Based on the analysis presented, it is proposed to derive separate norms for each transmission licensee to address characteristic features and historical developments of transmission network and operating structure of these transmission licensees.
- The norm for the next Control Period has been derived based on the average of the norms for the period from FY 2006-07 to FY 2008-09 in terms of Rs Lakh/ckt km and Rs Lakh/bay in respect of these transmission licensees.
- The average norm so derived may be escalated linked to suitable inflation indices comprising weighted average of wholesale price index (WPI) and consumer price index (CPI). Such escalation factor may be applied for 2 years to derive applicable O&M norm for FY 2010-11 (i.e., first year of the next Control Period).

Rs L/ckt km	2006-07	2007-08	2008-09	Average	Inflation factor	Esclation factor	Proposed Norm (Rs L/ckt km)
MSETCL	0.40	0.40	0.45	0.42	5.72% for 2 yrs	1.12	0.47
TPC-T	2.02	2.56	2.48	2.35	5.72% for 2 yrs	1.12	2.63
Rinfra-T	0.69	0.75	0.73	0.73	5.72% for 2 yrs	1.12	0.81

Rs L/bay	2006-07	2007-08	2008-09	Average	Inflation factor	Esclation factor	Proposed Norm (Rs L/ bay)
MSETCL	10.38	10.06	11.21	10.55	5.72% for 2 yrs	1.12	11.79
TPC-T	30.19	32.74	35.90	32.94	5.72% for 2 yrs	1.12	36.82
Rinfra-T	25.09	27.28	26.49	26.28	5.72% for 2 yrs	1.12	29.38

Regulating Performance of Competitively Awarded Tx Licensees

Regulating performance of Competitively awarded Transmission Licences

- The Electricity Act, 2003 envisages competition in transmission and has provisions for grant of transmission licenses by the Central Electricity Regulatory Commission (CERC) as well as State Electricity Regulatory Commissions (SERCs).
- Section 61 & 62 of the Act provide for tariff regulation and determination of tariff of generation, transmission, wheeling and retail sale of electricity by the Appropriate Commission. Section 63 of the Act states that –

  ".....the Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government."

- In this context, the Commission shall adopt such Transmission Service Charge (TSC) as determined through transparent process of bidding and pool the TSC along with the ARR of other transmission licensees which constitute the InSTS to form the Total Transmission System Cost (TTSC)
- The TSC and ARR of all transmission licensees would be recovered from the beneficiaries/transmission system users (TSUs) as part of the Transmission Tariff.
- However, the successful bidder/developer should obtain a transmission licence from the Commission as stipulated in the competitive guidelines.

Key Issues - Transmission System Users/Usage (TSUs)

Transmission System Users/Usage (TSUs) …1/2

- The existing Transmission Pricing framework was introduced within Maharashtra through Commission's Order (Case 58 of 2005) dated June 27, 2006 and the same has been under operation over past three years.
- Further, CERC has recently initiated process for review of Transmission Pricing framework for inter-State transmission system, which is still under finalisation.
- As per National Tariff Policy framework, upon finalisation of such transmission pricing mechanism at regional level, the same could be evaluated for introduction at State level upon detailed analysis through Forum of Regulators.
- The preparatory work necessary for introduction of such framework has already been deliberated in the earlier part of the discussion paper.
- Thus, existing transmission pricing framework may need to be continued for some time upon addressing some of the operational issues or emergence of new issues due to recent regulatory and market developments such as
  - **Collective transactions through power exchange,**
  - **Introduction of medium term access at regional level,**
  - **Emergence of new private transmission licensees,**
  - **Operationalisation of competitive bidding framework for private sector participation in transmission etc.**

Transmission System Users/Usage (TSUs) …2/2

The following issues have been identified which needs to be addressed:

- How should transmission system usage be defined and monitored in case of usage by various transmission system users (TSUs)?
- Whether distinction in transmission pricing be made depending on tenure of usage (long term/medium term/short term)?
- Whether distinction should be made in case of renewable energy transactions entailing transmission system use?
- What should be the mechanism for recovery for usage of intra-State transmission system for inter-State wheeling transactions?
- What should be the principles for treatment of transmission losses?
- Should the existing principles for Transmission pricing based on co-incident peak demand, denominations, recovery etc. be modified?

Transmission System Users/Usage (TSUs) : Tenure …1/3

Transmission System Usage : Nature & Tenure of Agreement

- The key issue that need to be addressed is whether distinction for the purpose of revenue recovery should be made amongst long-term consumers and short-term consumers and if yes, to what extent.
- MERC (Transmission Open access) Regulations 2005, do not distinguish the transactions in terms of tenure. Various provisions under Transmission Open Access Regulations, pertaining to transmission capacity rights (TCRs) advocate that there is no need for any distinction in terms of transmission charges on the basis of tenure of the agreement.
- CERC in its recently notified regulations for Open Access namely, (i) CERC (Grant of Connectivity, Long term access and Medium term Open access in inter-State transmission and related matters) Regulations, 2009 notified on August 7, 2009 and (ii) CERC (Open Access in inter-State Transmission)(Amendment) Regulations, 2009 notified on May 20, 2009 has clearly defined the tenure of access as

✓ **Long term access : For period exceeding 12 years but not exceeding 25 years**

✓ **Medium term access: For period exceeding 3 months but not exceeding 3 years**

✓ **Short term access: For Period upto 1 month at one time**

Transmission System Users/Usage (TSUs) : Tenure …2/3

Transmission System Usage : Nature & Tenure of Agreement

Suggestion:

- For the purpose of use of intra-State transmission system within Maharashtra, the open access transactions may be classified as under:
- Long term access : For period exceeding 7 years but not exceeding 25 years
- Medium term access: For period exceeding 1 year but not exceeding 7 years
- Short term access: For Period upto 1 year

Period of long term (exceeding 7 years) and medium term (upto 7 years) has been suggested, which shall be consistent with timelines outlined under competitive bidding guidelines for procurement of power.

- In case of congestion, the short term open access transactions shall be curtailed first followed by medium term, followed by long term.
- Amongst the particular category of customers, the curtailment shall be carried out on pro-rata basis. Further, within short term open access transactions, bilateral transactions shall be curtailed first followed by collective transactions through power exchange.

Transmission System Users/Usage (TSUs) : Tenure …3/3

Transmission System Usage : Nature & Tenure of Agreement

Suggestion(…contd):

- In terms of pricing, no distinction in terms of long term, medium term or short term access has been proposed, which shall be consistent with MERC Transmission open access Regulations.
- However, the transactions for long term and medium term shall be denominated in Rs/kW/month whereas, the short term bilateral transactions may be denominated in Rs/MW/day derived from transmission tariff specified for long term/medium term access considering thirty (30) number of days per month.
- The transmission tariff for short term collective transactions through power exchange shall be denominated in Rs/kWh (per unit basis) considering energy units (MU) projected to be handled by the intra-State transmission system (InSTS) for the ensuing year.
- In view of lower capacity utilization factors for renewable energy transactions and in order to simplify the process of energy accounting and billing for renewable energy transactions, Transmission Tariff for renewable energy transactions shall also be denominated in Rs/kWh (per unit basis) as derived for short term open access collective transactions.

Treatment of transmission loss…1/2

Treatment of Transmission Loss

- The composite intra-State transmission losses in case of Maharashtra are considered to be borne by all transmission system users on pro-rata basis based on their actual energy drawal.
- This method is simple, easy to understand and implement and energy accounting is also simplified.
- However, clause 7.2 of National Tariff Policy specifies that it would be desirable to move to a system of loss compensation based on incremental losses as present deficiencies in transmission capacities are overcome through network expansion.
- This method provides scientific basis and rational for recovery of transmission losses, but is complex as far as multiple transactions and energy accounting is concerned
- However, CERC, in its Order dated March 28, 2008, regarding sharing of regional transmission charges and losses has preferred to continue with existing approach.
- Under recent approach paper circulated by CERC for revision in Transmission Pricing has also stated that issue of 'treatment of loss' by way of incremental loss allocation etc. through power tracing technique or otherwise, is being dealt with as part of separate study, outcome of which is still awaited.

Treatment of transmission loss…2/2

Treatment of Transmission Loss

- As per clause 7.2 of the Tariff Policy, based on methodology to be devised by CERC in this regards for inter-State transmission, Forum of Regulators may evolve a similar approach for intra-State transmission. The relevant extract of National Tariff Policy is as under:

"Transactions should be charged on the basis of average losses arrived at after appropriately considering the distance and directional sensitivity, as applicable to relevant voltage level, on the transmission system. Based on the methodology laid down by the CERC in this regard for inter- state transmission, the Forum of Regulators may evolve a similar approach for intra-state transmission."

Suggestion

In view of above, it is proposed to continue with existing approach of treatment of uniform transmission loss across the intra-State transmission system to be borne by all transmission system users in proportion to their actual drawal.

Transmission Pricing : Distance sensitivity …1/2

Transmission pricing methodology sensitive to Distance

- Presently, the intra State transmission pricing framework in the State of Maharashtra is based on a "Postage Stamp" approach which is inline with the existing CERC Regulations, which is insensitive to the distance but offering significant other advantages such as simplicity, ease in understanding/usage, and is also a time tested approach.
- However the same approach is not in accordance with NEP and NTP notified by the Central Government.
- Clause 5.3.4 of the National Electricity Policy notified by the Central Government has advocated that in order to facilitate cost effective transmission of power across the region, a national transmission tariff framework needs to be implemented by CERC by April 2006 and the same needs to be sensitive to distance, direction and related to quantum of flow.
- Further, the Tariff Policy notified by GoI has stated that in order to achieve consistency in approach within inter-State transmission system and intra-State transmission system, a similar approach should be implemented by SERCs in next two years after implementation of such framework for inter-State transmission system.

Transmission Pricing : Distance sensitivity …2/2

Transmission pricing methodology sensitive to Distance

- The CERC has recently come out with an approach paper on formulating pricing methodology for Inter State transmission, initiating the process of modifying the Regulations to make it in line with the requirements of NEP and NTP. The stakeholder consultation of the same Regulation is underway.
- The selection of distance sensitive approach would require careful evaluation of implications for various distribution companies (DISCOMs) on account of power flow from source (generating stations) to various regions.
- Besides, process for review of Transmission Pricing framework for regional transmission system initiated by CERC may be evaluated by Forum of Regulators before introduction at State level, as per provisions of the National Tariff Policy.

Hence, at this stage, it may be preferable to continue uniform Postage Stamp approach across the State.

Transmission pricing : Reactive Energy …1/3

Transmission Price Components for Reactive energy drawal/injection linked to voltage profile

- For the inter-State energy transactions, the associated reactive energy has not been assigned a price, but there is a scheme under IEGC, which penalizes reactive energy drawal and rewards reactive energy injection @ 5.25 paise/kVARh, when the voltage at the inter-State connection point is below 97% or above 103% of nominal value.
- The reactive energy accounting is done by the RLDCs based on the readings of the Special Energy Meters (SEMs) installed at the point of interconnections over the inter-State transmission system.
- In case of State level transmission network, implementation of transmission tariff component linked to reactive energy (consumption or injection) assumes significant dimension, since reactive power compensation and/or management is the responsibility of various stake-holders including generators, consumers as well as transmission licensees.
- CERC in its Background Note for notification of IEGC has stated that SERCs will have to devise mechanism for Reactive Power management and compensation thereof.

Transmission pricing : Reactive Energy …2/3

Transmission Price Components for Reactive energy drawal/injection linked to voltage profile

- CERC has further recognized that mechanism for reactive power management and compensation would vary on account of state specific factors.
- In this context, it is also observed that as per Regulaiton 9.7 of the State Grid Code, STU should undertake planning studies to evaluate reactive power compensation requirement of the Grid.

- ✓ **In view of the above, it is proposed that until State Transmission Utility undertakes planning studies for Reactive Power compensation of intra-State transmission system, reactive power injection and drawal shall be charged in accordance with following methodology, as an interim measure.**
- ✓ **Further, it is clarified that following mechanism can be implemented only after adequate metering, energy accounting and billing infrastructure covering all interchange points on the intra-State transmission system is put in place by STU and the concerned agencies, as may be applicable.**

Transmission pricing : Reactive Energy …3/3

Transmission Price Components for Reactive energy drawal/injection linked to voltage profile

Party responsible for reactive energy compensation	Threshold performance	Voltage at Inter-change point (V_p)	Rate for compensation
Transmission Licensees	Permissible voltage variation as per IEGC/State Grid Code.	- If $V_p > 103\%$ of V_{nom} - If $V_p < 97\%$ of V_{nom} - If $97\% < V_p < 103\%$	- Penalty at the rate of Rs 0.25/RkVAh for additional injection. - Incentive at the rate of Rs 0.25/RkVAh for additional injection. - Nil
TSU (Distribution Licensee / OA Users directly connected to State transmission network)	Maximum reactive energy drawal at each interchange point to be limited corresponding to power factor of 0.9	- If $V_p > 103\%$ of V_{nom} - If $V_p < 97\%$ of V_{nom} - If $97\% < V_p < 103\%$	- Incentive at the rate of Rs 0.25/RkVAh for additional drawal. - Penalty at the rate of Rs 0.25/RVkAh for additional drawal. - Nil

Tx Availability & Performance Incentives …1/3

Pricing Incentives linked to performance

- The norms of availability for full recovery Annual Transmission Charges of existing MERC Tariff Regulation, 2005, is as
  - (a) AC system :- 98 per cent
  - (b) HVDC bi-pole links and HVDC back-to-back stations :- 95 per cent
  - Recovery of annual transmission charges below the level of target availability shall be on pro rata basis. At zero availability, no transmission charges shall be payable.
- Further, the Commission has specified formula for incentive as follow.

Incentive = Annual Transmission Charges x [Annual availability achieved − Target Availability] / Target Availability;

Where,

- ✓ Annual transmission Charges shall correspond to ARR for the particular transmission licensee within State, as the case may be.
- ✓ Provided that no incentive shall be payable above the availability of 99.75% for AC system and 98.5% for HVDC system."

Tx Availability & Performance Incentives …2/3

Pricing Incentives linked to performance

- Past performance of the transmission licensees (for FY 2007-08) in terms of Transmission system availability and incentives earned is summarised below:

Particulars (for FY 2007-08)	Availability (%)	Incentives (Rs Crore)
HVAC		
- MSETCL	98.99%	13.10
- TPC-T	99.46%	2.99
- RInfra-T	99.44%	0.71
HVDC		
- MSETCL	92.28%	(6.53)

- The issue to be addressed in this case are:
  - Whether target availability norm for HVAC and HVDC should be revised for the next Control Period? To what extent?
  - Whether incentive structure formulation be modified?
  - Whether voltage-wise monitoring of transmission system availability be undertaken and whether incentive/dis-incentive structure be operationalised at each voltage level?

Tx Availability & Performance Incentives …3/3

Pricing Incentives linked to performance

- In this context, it is proposed that transmission system availability of the transmission licensee needs to be certified by Maharashtra State Load Despatch Centre (MSLDC). Accordingly, the MSLDC should formulate appropriate procedure to monitor and certify the Transmission System Availability of various transmission licensees on regular basis.

Incentives/Dis-incentives for transmission loss reduction:

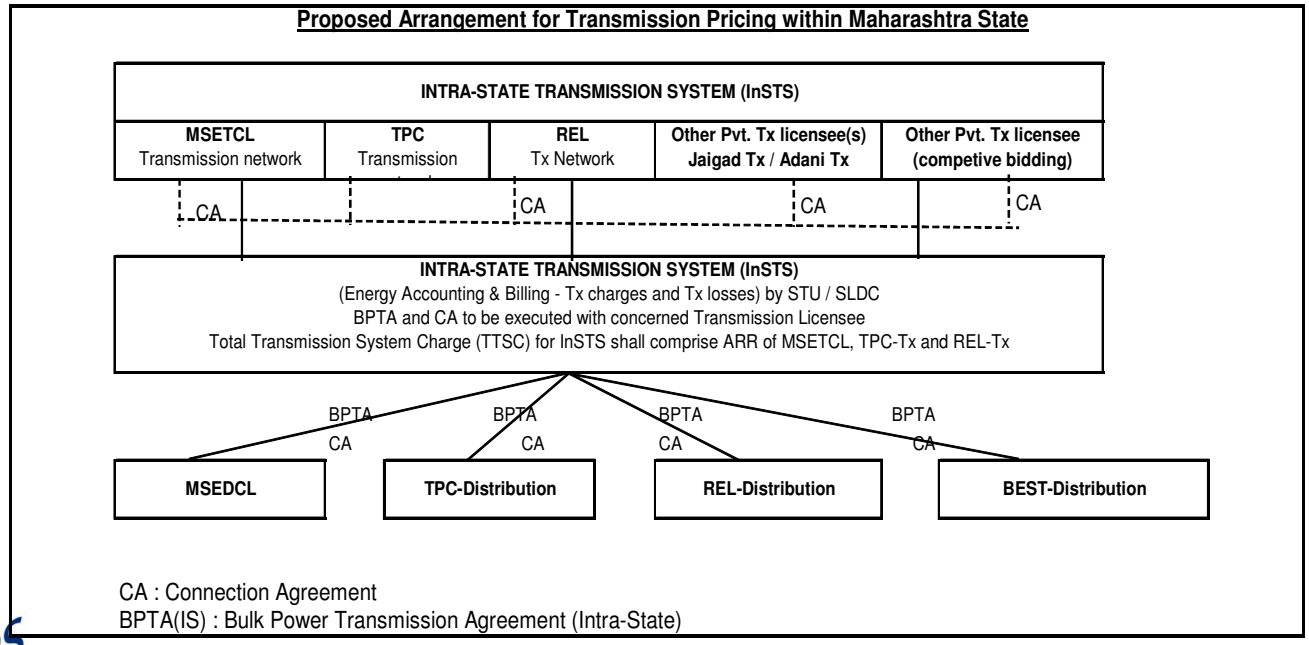
It is also proposed to devise a mechanism in order to incentivise the transmission licensees who achieve the transmission loss reduction target as approved by the Commission in the respective utility's Comprehensive Business Plan for loss reduction in a Financial Year for which the annual transmission charges are determined.

- The computation of incentives/dis-incentives for excess or shortfall in achievement of target loss reduction applicable to transmission licensees may be denominated in paise/kWh (say, 5-10 paise/kWh).
  - Feasibility of such an incentive mechanism would depend greatly on the availability of data and accurate ascertainment of transmission losses of each utility, and such information would be available once the ongoing interface metering is completed.

Proposed Mechanism for Tx Pricing …1/4

Proposed Mechanism for Intra-State Transmission Pricing

- In the State of Maharashtra, the recovery of ARR of transmission utilities or Transmission Service Charge (TSC) in case of competitively awarded transmission projects, as the case may be, shall be based on a 'pooled cost' principle wherein the ARR/TSC of all the transmission Utilities will be pooled together and shared among the transmission system users (Distribution licensees) based on their share in the coincident peak demand of the State.



Proposed Mechanism for Tx Pricing …2/4

Salient features - Proposed Mechanism for Intra-State Transmission Pricing

- Intra-State transmission system comprise composite transmission network of MSETCL, TPC, RInfra, Jaigad Power Transco, Adani Power Transmission Co. and any other private transmission licensee in future.
- Aggregate of Annual Revenue Requirement of all licensees, as approved by the Commission, shall form the "Pooled Cost" (or hereinafter termed as "Total Transmission System Cost – TTSC) of the intra-State transmission system, to be recovered from the Transmission System Users (TSUs).
- The revenue from collective transactions over power exchange and short term bilateral transactions shall be used to reduce TTSC for long term/medium term transactions.
- The Commission shall approve 'Base Transmission Capacity Rights' for measuring the "Capacity Utilisation' of intra-transmission system and accordingly determine "Base Transmission Tariff" for the same.
    - 'Base Transmission Tariff' for each financial year is derived as 'TTSC' of intra-State transmission system divided by 'Base Transmission Capacity Rights' and denominated in terms of "Rs/kW/month" (for long term/medium term) or "Rs/MW/day " (for short term bilateral transactions) or "Rs/kWh" (for collective transactions over power exchange).

Proposed Mechanism for Tx Pricing …3/4

Salient features - Proposed Mechanism for Intra-State Transmission Pricing

- Each distribution licensee and transmission open access user (TSU) having connection with the "intra-State Transmission system" shall enter into Bulk Power Transmission Agreement (BPTA) and Connection Agreement with concerned transmission licensee. The STU, in turn, enter into contracts with various transmission licensees within the State for usage of their transmission system.
- MSETCL, in its capacity as STU and as Government Company operating the SLDC, is responsible for undertaking recording of state-wide energy accounts, monitoring power flows and recording utilization of capacity across intra-State transmission system.
- Each TSU (distribution licensee or Transmission OA User), shall be required to pay intra-State transmission system charges (i.e. Transmission Tariff) at the approved rate of "Base Transmission Tariff" corresponding to its utilization of 'intra-State transmission' capacity.
- The proposed arrangement for 'Transmission Pricing' is scalable in the sense that, as the system of metering, energy accounting and billing evolves, and power flows across intra-State transmission system can be monitored more accurately from instant to instant, the 'Base Transmission Capacity Rights' can be modified to adopt 'MW-mile' method for charging the 'Transmission Tariff'.

Proposed Mechanism for Tx Pricing …4/4

Salient features - Proposed Mechanism for Intra-State Transmission Pricing

- Besides, future addition to transmission capacity (in accordance with the approved Transmission Plan) within the State can be undertaken by STU or existing other transmission licensee or any other new transmission licensee. The ARR pertaining to such transmission capacity addition shall form part of overall 'TTSC' of intra-State transmission system (For example, ARR of recently awarded transmission licensees - Jaigad Power Transmission Company and Adani Transmission Company).
- The competitive bidding guidelines for procurement of transmission capacity additions can be easily adopted for future capacity addition programme without modification to 'Transmission Tariff' framework.
- SLDC shall continue to undertake State-wide energy accounting and determination of transmission losses for intra-State transmission system.

Transmission pricing : Design Issues

Design Issues related to Transmission Pricing

- In the context of Transmission pricing framework for recovery of ARR, the following issues need to be addressed:

  - Issue-1: Charge linked to energy drawal and/or energy injection depending on nature and type of Customers (Licensees, Generating Companies, Open Access consumers)
  - Issue-2: Charges for Use of network and/or Access of network
  - Issue-3: Charge linked to Capacity (kW) or Quantum of energy (kWh)
  - Issue-4 : Transmission Tariff components and design basis

Transmission pricing : Design Issue-1 …1/2

Issue-1: Charge linked to energy drawal and/or energy injection depending on nature and type of Customers (Licensees, Generating Companies, Open Access consumers)

- Section 39(2)(d) of the EA 2003 provides for payment of Transmission Charges by all the categories users for use of the transmission network.
- CERC in its Regulations for Open Access for the purpose of inter-State transmission using CTU network, has adopted an approach such that Transmission Charges are recovered from beneficiaries/off-takers including open access consumers and not from generating companies.
- However, it is envisaged that generating companies located within State would be required to use STU (MSETCL) network for wheeling power within as well as outside of State under open access regime.
- In case, 'transmission tariff' is devised such that the recovery is linked only to "drawal" within State and not linked to 'injection', the Transmission System Users within State would be required to bear cost of transmission facilities (evacuation facilities) created mainly for wheeling power outside the State.
- Hence, it is critical to determine whether recovery of annual revenue requirement (or Total Transmission System Cost - TTSC) of other transmission licensees -

Transmission pricing : Design Issue-1 …2/2

Issue-1: Charge linked to energy drawal and/or energy injection depending on nature and type of Customers (Licensees, Generating Companies, Open Access consumers)

-within State and the corresponding design of Transmission Tariff should be linked to only drawal of power and/or linked to injection of power as well.

- One option is to charge the generating companies for injection of energy and use of transmission network only if they seek open access for supply to captive consumers or for sale to consumers / licensees outside the State.
- In all other cases, where generating companies are using transmission network for supplying power within the State, the transmission charges shall be recovered only from distribution licensees and transmission system users.

Suggestion

- **It is proposed that the long term transmission tariff shall be linked to 'drawal' to be recovered from the transmission system users such as distribution licensees and open access users within State. However, in case transmission system is used by generators for wheeling power outside the State, the same shall be recovered from generators to the extent of 'injections' or contracted capacity used for wheeling power outside State.**

Transmission pricing : Design Issue-2 …1/1

Issue-2: Charges for Use of network and/or Access of network

- The Transmission Tariff can, be structured on two part basis, viz.,
  - (a) Network Access Charge, representing revenue requirement corresponding to Connection Assets for access of network from respective consumers, including all Generating Companies, on pro-rata basis;
  - (b) Network Use Charge, representing revenue requirement corresponding to Core Grid Assets for use of network from all customers based on usage linked to capacity (kW) or units handled (kWh).
- However, separation of revenue requirement and assets into Connection Assets and Core Grid Assets is a rigorous and intensive process and would be difficult unless appropriate accounting systems are adopted. Until accounting systems are put in place, apportionment or allocation of costs amongst connection assets and Grid assets based on technical information can be adopted.

- Under the MYT framework, the Transmission Utilities may be directed to separate account related information pertaining to Connection Assets and Core Grid Assets for the purpose of determination of Transmission Tariff in terms of Connection Charge and Access Charge, separately.

Transmission pricing : Design Issue-3 …1/2

Issue-3: Charge linked to Capacity (kW) or Quantum of energy (kWh)

- In case of inter-State transmission network of CTU, prior to implementation of Availability Based Tariff (ABT) regime, the transmission charge recovery was linked to drawal of energy units (kWh) by the beneficiary on pro-rata basis.
- However, subsequent to implementation of ABT in all the regions, the recovery of Transmission charges and revenue requirement is linked to capacity allocation amongst the beneficiaries.
- The capacity allocation includes allocation of inter-State Generating Stations (ISGS) as well as capacity tied through bilateral contracts.
- Recently, with amendment to short term Open Access Regulations, particularly to deal with issues of collective transactions over power exchanges, CERC has once again introduced the concept of transmission charges based on energy units (kWh), albeit, for the purpose of short term OA transactions alone.
- Linking the recovery of ARR to energy units transmitted and denominating the Transmission Tariff in Rs/kWh would provide a mechanism that would be very simple to understand and easy to implement.

Transmission pricing : Design Issue-3 …2/2

Issue-3: Charge linked to Capacity (kW) or Quantum of energy (kWh)

- However, the same may expose the transmission licensee to risk of under-recovery of transmission charges in case actual energy units handled by transmission licensee are lower than the base energy units assumed to be handled by transmission system for the purpose of determination of Transmission Tariff.
- On the other hand, in case actual energy units handled by transmission licensee are more than base energy units assumed, it would lead to over-recovery of transmission charges necessitating Transmission System User (TSUs) to pay excess transmission charges than that required to meet revenue requirement of transmission licensee.
- Suggestion

It is proposed to specify Transmission Tariff as under:

- ✓For Long term and medium term transactions: in terms of Rs/kW/month
- ✓For short term bilateral transactions: in terms of Rs/MW/day
- ✓For collective transactions over power exchange and renewable energy transactions: in terms of Rs/kWh

Transmission pricing : Design Issue-4 …1/2

Issue-4: Transmission Tariff Components and Design Basis

- A transmission licensee may be allowed to recover his revenue requirement of transmission charges as one or combination of the following charges:
- ✓ Network Access charge - A fixed charge corresponding to cost recovery for Connection Assets.
- ✓ Network Usage charge - A fixed charge (in Rs. per KW per month) based on capacity contracted or allotted
- ✓ A charge based on energy transmitted
- ✓ Connectivity charge.
- ✓ Reactive energy charge.
- Various alternatives for Transmission Tariff Design based on denomination of Transmission Capacity Rights depending on modality of capacity allocation as outlined below.
  - Sharing based on Contracted Capacity
  - Share of Installed Generation Capacity
  - Contribution to Co-incident Peak Demand (CPD)
  - Share based on Non-coincident Peak Demand (NCPD)

Transmission pricing : Design Issue-4 …2/2

Issue-4: Transmission Tariff Components and Design Basis

Suggestion:

For the next Control Period, it is proposed to continue with the existing practice of determining Transmission Tariff based on share or contribution of TSUs towards 'Co-incident peak' demand based on co-incident peak demand recorded in the previous year.

- This approach is in line with the approach for determining the Cost of Service for determining the actual cost involved in servicing the consumers.
- The Discom, as a demand-aggregator, would benefit from the diversity of consumer mix which would result in a gap between the non-coincident peak and the coincident peak and therefore, the Discom would incur a lower transmission cost.

Norms & Principles of Wires Business

Separation of Accounts…(1/2)

- **Separation of Accounts for Wire related and Retail Supply related business**
  - Section 62 of the EA 2003 requires the State Electricity Regulatory Commission (SERC) to determine the tariff for Wheeling and Retail supply of electricity.
  - Section 42 of the EA 2003 requires the SERC to introduce open access in the distribution system in a phased manner and stipulates that the duties of the distribution licensee with respect to such supply shall be of a common carrier providing non-discriminatory open access.
  - Also, under Section 9 of the EA 2003, captive consumers are required to pay wheeling charges for availing open access, and are exempted from payment of cross-subsidy surcharge and additional surcharge.
  - **Wheeling charges are to be paid by any person for availing open access using the distribution licensee's network.**

Separation of Accounts…(2/2)

- **Separation of Accounts for Wire related and Retail Supply related business**
  - MERC, in its various Tariff Orders for distribution licensees, has directed the distribution licensees to separate the accounting of network related costs and supply related costs.
  - The need for segregation of network costs in terms of voltage level (HT and LT level) has also been emphasised.
  - The existing MERC Tariff Regulations also stipulate that the distribution licensees should maintain separate records for Distribution (Wire) Business.
  - **None of the distribution licensees have complied with the above Regulation.**
  - **RInfra-D, MSEDCL and TPC-D have used different method for allocation of expenses between the Wires and Retail Supply business, in their respective Tariff Petitions.**
  - **BEST is exempted from providing Open Access to consumers within its distribution licence area, in accordance with Section 42 of the EA 2003 – however, parallel licensing requirements may require determination of wheeling charges for BEST also.**

Wheeling Charge determination…(1/6)

- **Apportioning of wires and supply cost**

Particulars	RInfra-D (FY 2009-10)		TPC-D (FY 2009-10)		MSEDCL (FY 2008-09)	
	Wires Business (%)	Supply Business (%)	Wires Business (%)	Supply Business (%)	Wires Business (%)	Supply Business (%)
Power Purchase Exp.	0%	100%	0%	100%	0%	100%
Standby Charges	0%	100%	0%	100%		
Employee Expenses	65%	35%	75%	25%	60%	40%
A&G expenses	63%	37%	33%	67%	50%	50%
R&M expenses	94%	6%	100%	0%	87%	13%
Depreciation	78%	22%	91%	9%	87%	13%
Interest Expenses	87%	13%	90%	10%	87%	13%
IOWC	7%	93%	0%	100%	9%	91%
Bad Debts Written off	0%	100%	0%	100%	9%	91%
Other Expenses	0%	0%	0%	0%	0%	100%
Income Tax	0%	100%	95%	5%	87%	13%
Transmission Charges intra-State	0%	100%	0%	100%	0%	100%

Wheeling Charge determination…(2/6)

- **Apportioning of wires and supply cost…contd.**

Particulars	RInfra-D (FY 2009-10)		TPC-D (FY 2009-10)		MSEDCL (FY 2008-09)	
	Wires Business (%)	Supply Business (%)	Wires Business (%)	Supply Business (%)	Wires Business (%)	Supply Business (%)
Contribution to contingency reserves	85%	15%	100%	0%	92%	8%
Return on Equity Capital	88%	12%	97%	3%	80%	20%
Less: Non Tariff Income	0%	100%	88%	12%	0%	100%
ARR	**13%**	**87%**	**6%**	**94%**	**13%**	**87%**

Wheeling Charge determination …(3/6)

- **Apportioning of wires and supply cost**
  - There is no uniformity of approach in allocation of expenses between the Wires and Retail Supply Business, amongst various distribution licensees
  - Allocation is mainly done based on certain assumptions.
  - To bring uniformity and clarity on this issue, voltage level wise separate accounting of network related costs and supply related costs needs to ensured
- **Recovery of the Wires Cost**
  - The following two mechanisms can be used for recovery of wires cost from the consumers:
    - **On energy wheeled basis - in terms of Rs/kWh**
    - **On contracted capacity basis - in terms of Rs/kW/month**

Wheeling Charge determination …(4/6)

- **Recovery of the Wires Cost…Contd.**
  - Tariff Policy notified by the Government of India stipulates as follows:

"8.5.4 …The fixed costs related to network assets would be recovered through wheeling charges.

8.5.5 Wheeling charges should be determined on the basis of same principles as laid down for intra-state transmission charges and in addition would include average loss compensation of the relevant voltage level."

  - Regulation 66 of the MERC Tariff Regulations stipulates

"66.1 The Commission shall specify the wheeling charges of the Distribution Licensee in its Order passed under sub-section (3) of Section 64 of the Act:

Provided that the charges payable by a Distribution System User under this Part G may comprise any combination of fixed charges and variable charges, as may be specified by the Commission in such Order."

Wheeling Charge determination …(5/6)

- **Recovery of the Wires Cost…Contd.**
  - Wheeling charges were earlier being specified in terms of Rs/kW/month, in order to be consistent with the parameter used for levy of transmission charges
  - There was a need to simplify the levy of wheeling charges and wheeling losses, to facilitate supply of electricity by parallel distribution licensee to consumers.
  - In order to operationalise the system and to enable the consumers and distribution licensees to understand the implications correctly, these Wheeling Charges have now been expressed in terms of Rs/kWh.

Wheeling Charge determination …(6/6)

	33kV			22 kV / 11 kV			LT level		
	TPC-D	RInfra-D	MSEDCL	TPC-D	RInfra-D	MSEDCL	TPC-D	RInfra-D	MSEDCL
Wheeling Charge (Rs/kWh)	0.18	0.46	0.05	0.18	0.46	0.25	0.37	0.88	0.43
Wheeling losses (%)	0.66%	1.50%	6.00%	0.66%	1.50%	9.00%	0.66%	9.00%	14.00%

Distribution loss Vs AT&C losses …(1/2)

- **Distribution Loss vs. AT&C loss**
  - MERC, in the existing MERC Tariff Regulations as well as in Tariff Orders has adopted the distribution loss reduction approach for measuring the performance of distribution licensees.

Merits and Demerits of Distribution loss approach

- Distribution loss reduction is a widely used approach at the national and international level to measure the performance of the distribution licensee.
- Distribution loss is simple to compute as it takes into account the energy input and energy billed to the consumers.
- However, in many cases, the actual distribution losses are estimated to be higher or lower than the reported losses, on account of the assessment of un-metered agricultural consumption.
- Thus, distribution loss method has certain limitations, particularly in case of significant un-metered consumption.

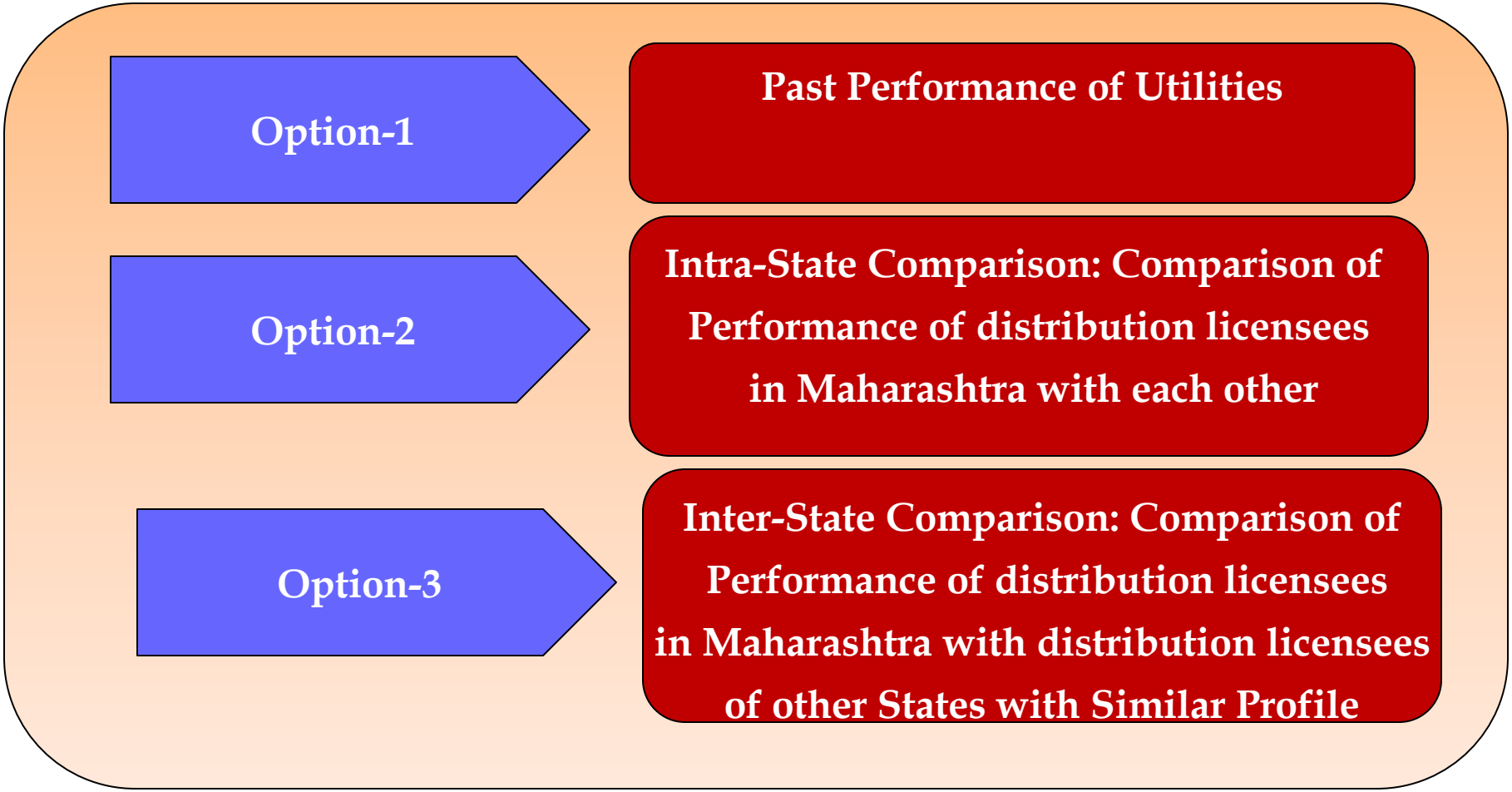
Distribution loss Vs AT&C losses …(2/2)

Merits and Demerits of AT&C loss approach

- If units sold, units billed and units collected can be computed accurately, then AT&C loss method would be the best indicator of measuring the efficiency of the distribution licensee.
- Computation of AT&C losses leads to creation of complexities as it combines technical and commercial parameters, i.e., energy input in units and amount collected in Rupees.
- Units realised have to be derived based on units billed and collection efficiency
- Units billed may not be measured accurately due to un-metered consumption, thus having the same deficiency as distribution loss method
- Revenue collected may include the past arrears
- Amount collected against other charges may not be separately accounted for

- **Hence, it proposed to continue with existing Distribution loss approach.**

Methodology for Benchmarking



Profile of Distribution Licensees …(1/3)

Sl.	Distribution Licensees	Abbreviation	Type of License Area	Profile
A	**Andhra Pradesh**			
1	Andhra Pradesh Central Power Distribution Company Ltd	APCPDCL	State	Heterogeneous (City and Rural Mixed)
2	Andhra Pradesh Eastern Power Distribution Company Ltd	APEPDCL	State	Heterogeneous (City and Rural Mixed)
3	Andhra Pradesh Northern Power Distribution Company Ltd	APNPDCL	State	Heterogeneous (City and Rural Mixed)
4	Andhra Pradesh Southern Power Distribution Company Ltd	APSPDCL	State	Heterogeneous (City and Rural Mixed)
B	**Karnataka**			
1	Chamundeshwari Electricity Supply Company Ltd	CESC-K	State	Heterogeneous (City and Rural Mixed)
2	Gulbarga Electricity Supply Company Ltd	GESCOM	State	Heterogeneous (City and Rural Mixed)
3	Hubli Electricity Supply Company Ltd	HESCOM	State	Heterogeneous (City and Rural Mixed)
4	Mangalore Electricity Supply Company Ltd	MESCOM	State	Heterogeneous (City and Rural Mixed)
5	Bangalore Electricity Supply Company Ltd	BESCOM	State	Heterogeneous (City and Rural Mixed)

Profile of Distribution Licensees …(2/3)

Sl.	Distribution Licensees	Abbreviation	Type of License Area	Profile
C	**Delhi**			
1	BSES Yamuna Power Ltd	BYPL	City	Urban
2	BSES Rajdhani Power Ltd	BRPL	City	Urban
3	North Delhi Power Ltd	NDPL	City	Urban
D	**Gujarat**			
1	Paschim Vij Co.Ltd.	PGVCL	State	Heterogeneous (City and Rural Mixed)
2	Dakshin Gujarat Vij Co.Ltd.	DGVCL	State	Heterogeneous (City and Rural Mixed)
3	Uttar Vij Co.Ltd.	UGVCL	State	Heterogeneous (City and Rural Mixed)
4	Madhya Gujarat Vij Co Ltd.	MGVCL	State	Heterogeneous (City and Rural Mixed)
5	Torrent Power Ltd.-Ahmedabad and Gandhi Nagar	TPL- Ahmd	City	Urban
6	Torrent Power Ltd.-	TPL-Surat	City	Urban

Profile of Distribution Licensees …(3/3)

Sl.	Distribution Licensees	Abbreviation	Type of License Area	Profile
E	**Rajasthan**			
1	Jaipur Vidyut Vitran Nigam Ltd	Jaipur Discom	State	Heterogeneous (City and Rural Mixed)
2	Ajmer Vidyut Vitran Nigam Ltd	Discom	State	Heterogeneous (City and Rural Mixed)
3	Jodhpur Vidyut Vitran Nigam Ltd	Discom	State	Heterogeneous (City and Rural Mixed)
F	**Calcutta Electricity Supply Company ltd**	CESC	City	Urban
G				
1	Maharashtra State Electricity Distribution Company Ltd	MSEDCL	State	Heterogeneous (City and Rural Mixed)
2	Reliance Infrastructure Ltd-Distribution	RInfra-D	City	Urban
3	The Tata Power Company Ltd-Distribution	TPC-D	City	Urban
4	Brihanmumbai Electricity Supply & Transport undertaking	BEST	City	Urban

Proposed Benchmarking Methodology

- **Proposed Mechanism for Inter-State Comparison**
  - **Inter-State comparison has been done based on type of licence area, as discussed below:**
    - **RInfra-D, TPC-D and BEST have been benchmarked with their own past performances and also with city based licensees (Urban profile) like BRPL, BYPL, NDPL, CESC, Torrent Power – Ahmedabad & Surat, etc.**
    - **MSEDCL has been benchmarked with its own past performances and also with State based Licensees having heterogeneous profile in AP, Karnataka and Gujarat.**

Distribution Loss Trajectory- City Based Licensees…1/2

Past Performance

	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
RInfra-D	10.77%	11.00%	10.75%	10.50%
TPC-D	2.93%	2.21%	2.93%	0.66%
BEST	11.90%	11.00%	10.50%	10.00%

Inter-State Comparison with City Based Licensees

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
CESC		15.36%	15.11%	14.90%
BYPL	39.03%	33.42%	29.99%	25.89%
BRPL	35.63%	30.89%	22.88%	19.83%
NDPL	27.30%	20.72%	19.75%	18.27%
RInfra-D	10.77%	11.00%	10.75%	10.50%
TPC-D	2.93%	2.21%	2.93%	0.66%
BEST	11.90%	11.00%	10.50%	10.00%
TPL- Ahmd		10.48%	10.43%	10.25%
TPL- Surat		6.01%	6.00%	6.00%

- **Mumbai Licensees are comparable with Other City Based Licensees.**

Distribution Loss Trajectory- City Based Licensees…2/2

- **Hence, it is proposed to determine the trajectory for the distribution licensees in Mumbai area based on their own past performance. Hence, following loss reduction trajectory is proposed to be adopted:**
  - **RInfra-D: A loss reduction trajectory of 0.25% per year for each year of the second Control Period is proposed, in view of the prevailing low loss levels.**
  - **TPC-D: It is proposed to specify the loss reduction trajectory for each year of the second Control Period, based on the estimate of additional consumers added to TPC-D's consumer base, HT-LT ratio, etc..**
  - **BEST: A loss reduction trajectory of 0.25% per year for each year of the second Control Period is proposed, in view of the prevailing low loss levels.**

Distribution Loss Trajectory- MSEDCL…1/2

- **Inter-State Comparison with State based Licensees**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
APCPDCL	20.76%	19.15%	17.87%	13.04%
APEPDCL	17.55%	16.37%	15.27%	11.12%
APNPDCL	21.07%	19.05%	17.97%	14.71%
APSPDCL	19.74%	18.43%	17.17%	12.50%
CESC-K	22.00%	22.00%	21.00%	19.50%
GESCOM	27.05%	31.00%	30.50%	29.10%
HESCOM	25.00%	25.30%	24.30%	22.80%
MESCOM	15.00%	14.90%	14.80%	14.50%
BESCOM	20.50%	21.35%	20.40%	18.90%
PGVCL	34.22%	32.00%	30.00%	28.00%
DGVCL	16.59%	15.59%	14.45%	13.45%
UGVCL	19.45%	16.95%	16.00%	15.00%
MGVCL	18.24%	16.74%	15.00%	14.00%
Jaipur Discom	29.51%	26.56%	23.90%	
Discom	34.08%	30.67%	27.60%	
Discom	31.29%	28.16%	25.35%	
MSEDCL	30.20%	26.20%	22.20%	18.20%

- **MSEDCL is well behind AP Discoms and Gujarat Discoms**

Distribution Loss Trajectory- MSEDCL…2/2

- **Relevant Rulings of MERC & ATE**
  - MERC has been repeatedly directing MSEDCL to accomplish 100% metering, but MSEDCL is still very distant from achieving it.
  - The Appellate Tribunal for Electricity (ATE), in a recent Judgment dated July 21, 2009 in Appeal No. 108 of 2007, has *advised the MERC to sharpen its focus for accelerated meterisation of consumers and reduction of Distribution losses in a time bound manner.*
  - MSEDCL should achieve Feeder level and DTC level metering, as well as individual metering, to present the distribution losses in a more accurate manner.

- **Proposed loss reduction trajectory: 1% per year for each year of the second Control Period such that the distribution loss level in the last year of the second Control Period will be 13.2%.**

O&M Expenses- Identification of Growth drivers

OPTIONS		PROPOSED METHOD
❑ No of Consumers ❑ Energy Sales	Employee Expenses	No of consumers or per unit of sales based on past trend & escalated at CPI, if required
❑ No of Consumers ❑ Energy Sales	A&G Expenses	No of consumers or per unit of sales based on past trend & escalated based on WPI: CPI, if required
❑ No of Consumers ❑ Energy Sales ❑ GFA	R&M Expenses	Percentage of Opening GFA

Employee Expenses- City based Licensees…(1/3)

- **Past Performance & Intra-State Comparison**

Employee Expenses/unit Sales **Rs/unit**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
RInfra-D	0.30	0.34	0.35	0.35	0.34
TPC-D	0.04	0.05	0.07	0.09	0.07
BEST	0.36	0.33	0.35	0.36	0.35

Employee Expenses/Consumer **Rs Lakh /'000 consumer**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
RInfra-D	8.94	9.90	10.47	10.92	10.06
TPC-D	46.43	57.77	66.02	70.24	60.11
BEST	14.66	14.11	14.89	15.72	14.84

- **It will be difficult to benchmark the distribution licensees within Maharashtra based on comparison with each other.**
- **For TPC-D, it is proposed to do benchmarking with its own past performance. Hence, it is proposed that norm of employee expenses shall be 7 paise per unit of sales.**
- **For RInfra-D and BEST, inter-State benchmarking with city based distribution licensees is a better option.**

Employee Expenses- City based Licensees…(2/3)

Inter –State Comparison.

Employee Expenses/unit Sales **Rs/unit**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
CESC	0.24	0.28	0.27	0.28	0.27
BYPL	0.46	0.30	0.40	0.33	0.37
BRPL	0.23	0.24	0.26	0.22	0.24
NDPL	0.33	0.28	0.30	0.27	0.30
RInfra-D	0.30	0.34	0.35	0.35	0.34
TPC-D	0.04	0.05	0.07	0.09	0.07
BEST	0.36	0.33	0.35	0.36	0.35
TPL-Ahmd			0.13	0.12	0.13
TPL- Surat		0.19	0.11	0.11	0.11

Employee Expenses/Consumer **Rs Lakh /'000 consumer**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
CESC	8.62	10.03	10.29	10.81	9.94
BYPL	14.48	11.08	13.43	11.57	12.64
BRPL	11.74	12.99	12.90	10.88	12.12
NDPL	18.21	15.23	15.29	14.02	15.69
RInfra-D	8.94	9.90	10.47	10.92	10.06
TPC-D	46.43	57.77	66.02	70.24	60.11
BEST	14.66	14.11	14.89	15.72	14.84
TPL-Ahmd			4.21	4.34	4.28
TPL- Surat		6.83	5.73	5.84	5.78

Employee Expenses- City based Licensees…(3/3)

- For RInfra-D and BEST
  - employee expenses have been increasing in absolute terms
  - Average employee expenses have ranged around 34 to 35 paise per unit of sales over the years
  - Quite high as compared to CESC and TPL
  - Hence, the proposed norm for employee expenses for RInfra-D and BEST is 25 paise per unit of sales.

A&G Expenses- City based Licensees…(1/3)

- **Past Performance & Intra-State Comparison**

A&G Expense/unit **Rs/unit**

Licensee	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
RInfra-D	0.13	0.13	0.13	0.13	0.13
TPC-D	0.05	0.05	0.06	0.05	0.05
BEST	0.19	0.17	0.18	0.18	0.18

A&G Expense/consumer **Rs lakh /'000 Consumer**

Licensee	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
RInfra-D	3.8	3.7	3.9	4.0	3.84
TPC-D	49.1	52.3	51.9	42.1	48.85
BEST	7.7	7.2	7.6	7.9	7.60

- **It will be difficult to benchmark the distribution licensees within Maharashtra based on comparison with each other.**
- **For TPC-D, it is proposed to do benchmarking with its own past performance. Hence, it is proposed that norm of A&G expenses shall be 5 paise per unit of sales.**
- **For RInfra-D and BEST, inter-State benchmarking with city based distribution licensees is a better option.**

A&G Expenses- City based Licensees…(2/3)

Inter –State Comparison.

A&G Expenses/unit Sales **Rs/unit**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
CESC	0.05	0.09	0.08	0.09	0.08
BYPL	0.13	0.11	0.12	0.11	0.12
BRPL	0.11	0.10	0.12	0.12	0.11
NDPL	0.07	0.06	0.06	0.06	0.06
RInfra-D	0.13	0.13	0.13	0.13	0.13
TPC-D	0.05	0.05	0.06	0.05	0.05
BEST	0.19	0.17	0.18	0.18	0.18
TPL- Ahmd			0.06	0.06	0.06
TPL- Surat		0.19	0.08	0.08	0.08

A&G Expenses/Consumer **Rs Lakh /'000 consumer**

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
CESC	1.90	3.14	3.19	3.43	2.92
BYPL	4.14	4.13	3.92	3.82	4.00
BRPL	5.80	5.72	5.92	5.96	5.85
NDPL	3.73	3.35	3.14	3.09	3.33
RInfra-D	3.80	3.69	3.86	3.98	3.84
TPC-D	49.08	52.26	51.90	42.15	48.85
BEST	7.71	7.24	7.55	7.88	7.60
TPL- Ahmd			2.14	2.20	2.17
TPL- Surat		6.68	4.19	4.27	4.23

A&G Expenses- City based Licensees…(3/3)

- **For RInfra-D and BEST**
  - **A&G expenses have been increasing in absolute terms**
  - **Average A&G expenses have ranged around 13 to 18 paise per unit of sales over the years**
  - **around Rs. 4 lakh to 8 lakh per thousand consumer**
  - **Quite high as compared to other city based licensees**
  - **Hence, the proposed norm for A&G expenses for RInfra-D and BEST is 10 paise per unit of sales.**

R&M Expenses- City based Licensees

Past Performance & Intra-State Comparison

R&M Expense /GFA %

Licensee	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
RInfra-D	5.37%	5.72%	5.81%	5.70%	5.6%
TPC-D	1.36%	1.59%	1.52%	1.44%	1.5%
BEST	4.01%	2.24%	2.19%	2.19%	2.7%

- **It will be difficult to benchmark the distribution licensees within Maharashtra based on comparison with each other.**
- **For TPC-D, it is proposed to do benchmarking with its own past performance. Hence, it is proposed that norm of R&M expenses shall be 1.5% of opening GFA of the financial year.**
- **For RInfra-D and BEST, the proposed norm for R&M expenses for RInfra-D and BEST is 4% of opening GFA of the financial year.**

O&M Expenses- MSEDCL…(1/2)

Inter –State Comparison- Employee Expenses.

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
PGVCL	0.24	0.23	0.21	0.20	0.22
DGVCL	0.11	0.11	0.14	0.13	0.12
UGVCL	0.16	0.15	0.22	0.21	0.18
MGVCL	0.28	0.28	0.41	0.37	0.33
MSEDCL	0.32	0.32	0.28		0.31

Inter –State Comparison- A&G Expenses.

Utility	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	4 year-Average
PGVCL	0.06	0.05	0.05	0.04	0.05
DGVCL	0.02	0.03	0.03	0.03	0.03
UGVCL	0.04	0.03	0.03	0.03	0.03
MGVCL	0.05	0.05	0.06	0.06	0.06
MSEDCL	0.03	0.03	0.03	-	0.03

O&M Expenses- MSEDCL…(2/2)

MSEDCL	FY 2006-07	FY 2007-08	FY 2008-09	4 year-Average
R&M Expense /GFA (%)	4.42%	4.14%	3.63%	4.1%

- MSEDCL's employee expenses have ranged around 31 paise per unit of sale over the years, as compared to less than 20 paise per unit for Gujarat Utilities.
- MSEDCL's A&G expenses have been around 3 paise per unit of sale, which is comparable to that of Gujarat Utilities.
- MSEDCL's R&M expenses have ranged between 3.63% and 4.42% of the opening Gross Fixed Assets (GFA) with an average of 4.1% of GFA.

Based on the above analysis, the following norms are proposed for determination of O&M expenses for MSEDCL:

Employee Expenses	:	25 paise per unit of sale
A&G Expenses	:	3 paise per unit of sale.
R&M Expenses	:	3.5% of opening GFA (which amounts to approximately 7 paise per unit of sale)

Norms & Principles of Supply Business

Uniform Vs Differential Tariff…(1/5)

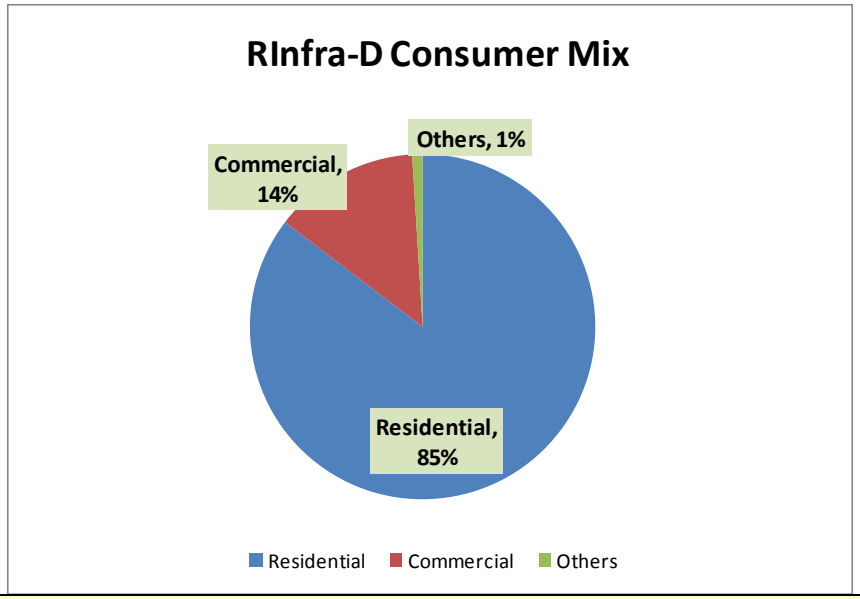
- Various Stakeholders have been representing to MERC in the past, that the retail tariffs should be uniform across the city of Mumbai
- it is difficult to have an uniform Retail Supply Tariff in the State across all licensees, given the difference in the cost of supply, consumer mix, consumption mix, etc., and
- The cost of supply depends upon various factors such as cost of power procured, distribution losses, operational and administrative expenses, capital related expenditure such as depreciation and interest, etc., which is bound to vary between different licensees,
- It is practically not possible to determine uniform Retail Supply Tariff in the State across all licensees.

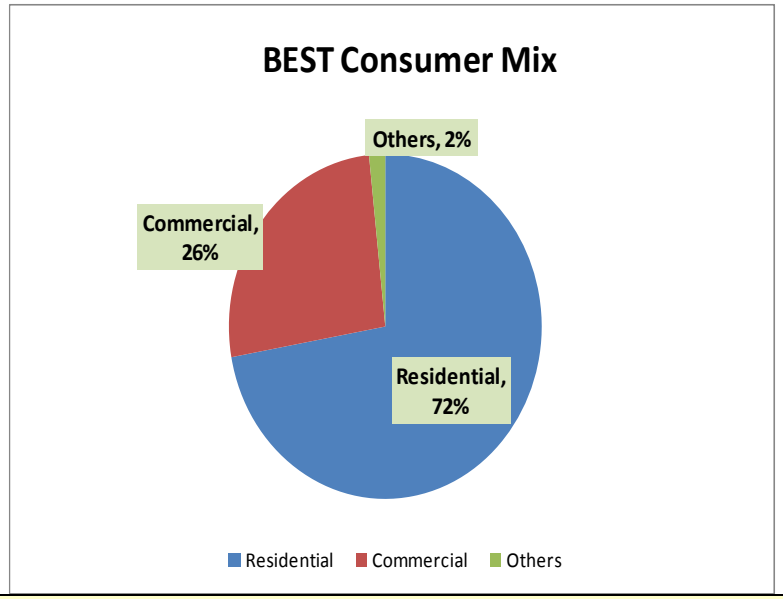
Uniform Vs Differential Tariff…(2/5)

- In determining the category-wise tariffs, MERC has been guided by the following principles:
- Reflection of Cost of Supply
- Prudency of Costs
- Introduction of two-part tariff for all consumer categories
- Increase in recovery of fixed costs through fixed charges
- Reduction of cross-subsidy
- Rationalization of tariff categories, guided by principles of -
  - Simplicity
  - Targeting of subsidy
  - Time of Use Tariff

Uniform Vs Differential Tariff…(3/5)

- **Consumer Mix of RInfra-D & BEST**

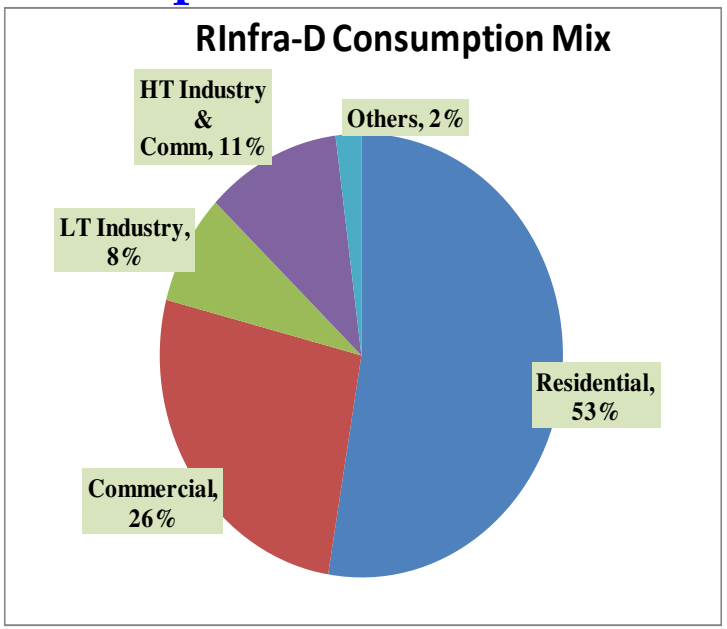


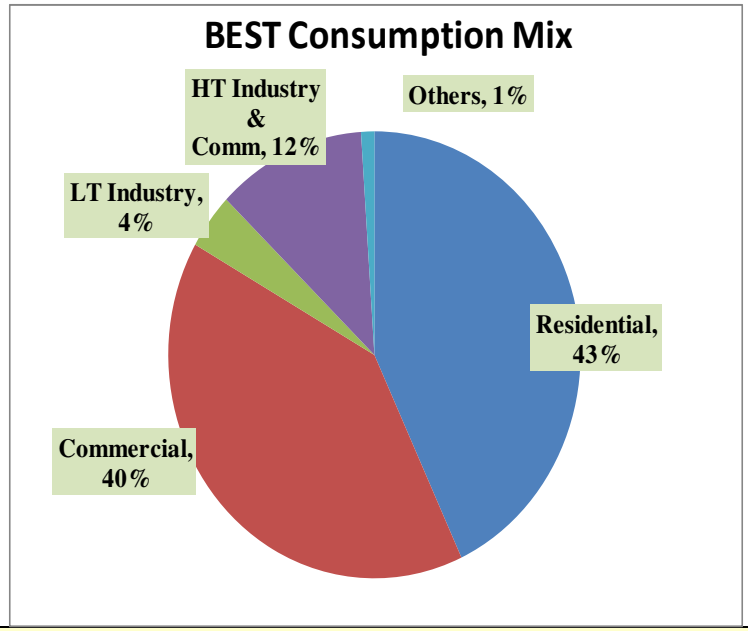


- BEST has a significantly higher proportion of commercial consumers and commercial consumption as compared to that of RInfra-D,
- RInfra-D has a higher proportion of residential consumers, which enables BEST to cross-subsidise its domestic consumers at the expense of the commercial consumers to a larger extent, which is not possible to the same extent in RInfra-D area.

Uniform Vs Differential Tariff…(4/5)

- **Consumption Mix of RInfra-D & BEST**





- **Consumption mix of BEST is more favourable than that of RInfra-D, as it has a higher proportion of subsidising consumers, primarily commercial consumption, where the tariffs are higher**

Uniform Vs Differential Tariff…(5/5)

- **If Uniform tariff has to be introduced and cross-subsidy has to be retained at the existing levels or increased further,**
  - **EA 2003 and the Tariff Policy may have to be amended**
  - **The State Government may have to provide subsidy to the concerned distribution licensees to compensate for the loss of revenue**

FAC Mechanism

- **FAC shall form part of 'Z' factor and would be pass through to the consumers on a quarterly basis,**
- **Prevailing mechanism of FAC computation and cap of 10 percent of the variable component being practiced in Maharashtra is proposed to be continued.**

Norms and Principles for Energy Efficiency and Demand Side Management

Agenda

- Introduction to Demand Side Management
- Purpose & Scope of DSM
- Importance of DSM in the context of Maharashtra
- Existing Initiatives of MERC
- Proposed DSM Initiatives

Introduction to Demand Side Management

What is Demand Side Management?...(1/2)

- Demand side management (DSM) is used to refer to actions which change the demand on electricity system including;
  - Action taken on consumer side of the electricity meter (the 'demand side') such as energy efficiency measures;
  - Fuel Switching, such as changing from electricity to solar/gas for water heating;
  - Distributed Generation, such as standby generators in office buildings or PV modules on rooftop; and
  - Pricing Initiatives, such as time of day tariff;
  - Power Factor Improvement;

What is Demand Side Management?... (2/2)

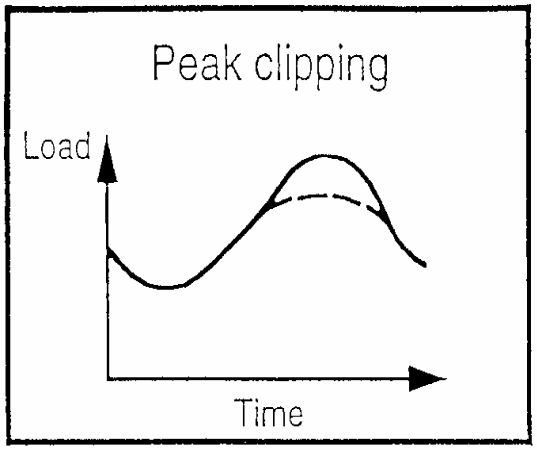
- **Benefits of DSM to various Stakeholders**

Parameter	Stake Holder		
	Customer	Society	Utility
Cost	Lower bills	Reduced debt	Lower cost of service
Quality	Improved service	Improved service	Improved customer service
Capital expenditure	Non-energy business benefits	Lower business costs, capital freed for other projects	Less generation and network capacity required
Environment	Reduced pollution	Reduced pollution	Improved operating efficiency
Corporate Sustainability Reporting		Conservation of indigenous energy resources	

Purpose and Scope of DSM

Peak Clipping

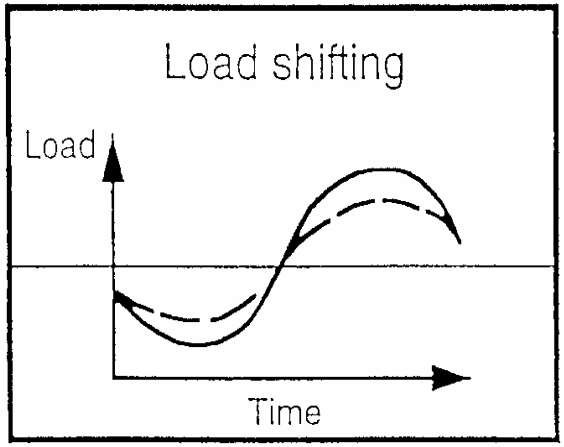
- **Purpose:**
  - Reduce demand during system peak times;
  - Also lead to reduction in electricity consumption;
  - Provide opportunities for avoiding, reducing or postponing the need for G/T/D capacity
  - Reduce the need for costly power purchase during peak times;
- **In Maharashtra, it may help the Utilities in reducing their demand-supply gap;**
- **Typical programs:**
  - **Promotion of CFL Lamps;**
  - **Promotion of T-5 / T-8 FTLs;**
  - **High Efficiency Chillers**



Reduction of peak loads

Load Shifting

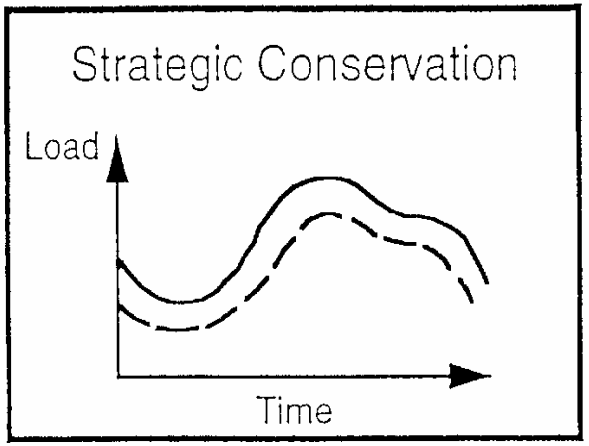
- **Purpose:**
  - Reduce demand during system peak times;
  - Do not necessarily lead to reduction in electricity consumption;
  - Provide opportunities for avoiding, reducing or postponing the need for G/T/D capacity
  - Reduce the need for costly power purchase during peak times;
- **In Maharashtra, it may help the Utilities in reducing their demand-supply gap;**
- **Typical programs:**
  - **Thermal Storage;**
  - **Time of Day Tariff**



Shift from peak to off-peak hours

Strategic Conservation

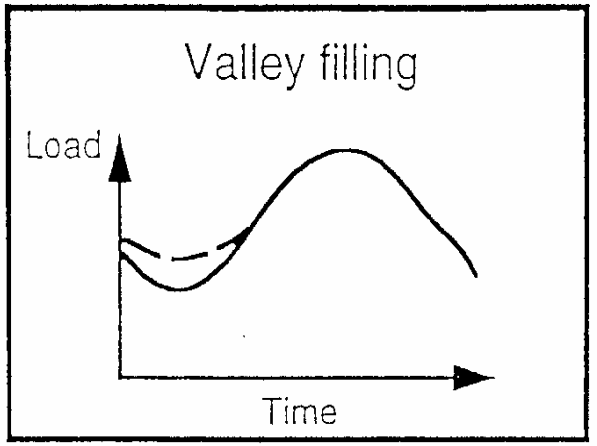
- **Purpose:**
  - Reduction in electricity consumption and demand as a spin-off (may or may not occur during peak hours)
  - May not necessarily provide opportunities for avoiding, reducing or postponing the need for G/T/D capacity;
- **In Maharashtra, it can help Utilities in reducing their energy shortage;**
- **Typical programs:**
  - **Efficient Lighting (CFLs)**
  - **Promotion of Star Label Appliances (Efficient air conditioners, Refrigerators)**



Reduction during peak and off-peak hours

Valley Filling

- **Purpose:**
  - Increase electricity load and consumption during off-peak hours;
  - Enhance utilisation of existing generation, transmission and distribution capacity;
- **Typical Programs:**
  - Thermal storage
  - Time of Day Tariff
  - Pump Storage Generation Plant

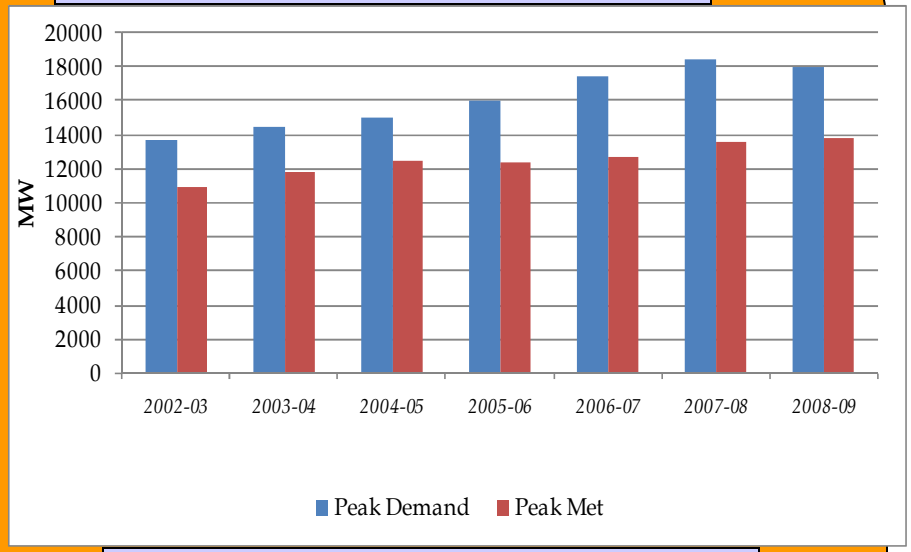


Increase in off-peak loads

Importance of DSM in the context of Maharashtra

Power Supply Position in Maharashtra

PEAK DEMAND



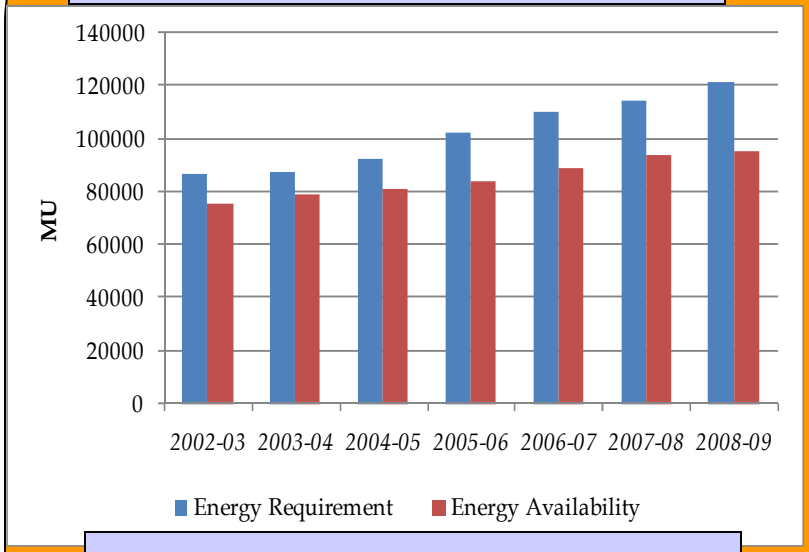
FY 2008-09- 18049 MW

31.77%

FY 2002-03- 13697 MW

Peak Deficit: 4282 MW

ENERGY DEMAND



FY 2008-09- 121890 MU

39.85%

FY 2002-03- 87152 MU

Energy Deficit: 26140 MU

Importance of DSM in Maharashtra

- Capacity Addition not in pace with rise in demand
- DSM Potential in Maharashtra
  - LBNL & IIEC Study under USAID funding in FY 2004-05 – 1300 MW
  - MERC Preliminary Estimate
    - Maharashtra State – 2000-2300 MW (MSEDCL Area)
    - Mumbai City – 400-450 MW
- Inspite of MERC's efforts, implementation of various EE&DSM measures is in the range of 15 to 20 MW only, which is 0.65% of Estimated Potential
- EE & DSM could be possible alternatives to mitigate power shortage

Existing Initiatives by MERC

Existing Initiatives by MERC

- **Some of the initiatives undertaken by MERC are:**
  - Energy Efficiency & DSM in MERC Tariff Regulations;
  - Tariff Related Initiatives
    - Time of Day Tariff;
    - Power Factor Incentive and Penalty;
    - Load Management Charges;
  - Other Regulatory Directives/Initiatives related to EE & DSM
  - Preparation of EE & DSM Guidelines;
  - Development of Methodology for financing DSM & EE initiatives of Utilities;

EE & DSM in MERC Tariff Regulations, 2005

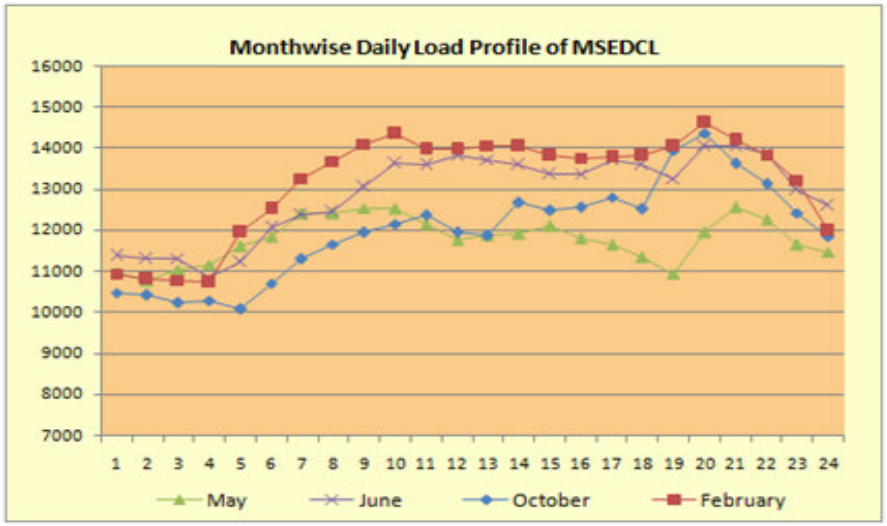
- **Considering the available potential for demand side options; MERC, in Regulation 23.2(d) of MERC Tariff Regulations, 2005 has:**
  - **Included Energy Conservation (EC) and Energy Efficiency (EE) measures as Supply Side Resources; and**
  - **Specified that distribution licensees should consider EE & EC measures while formulating the long term power procurement plan;**

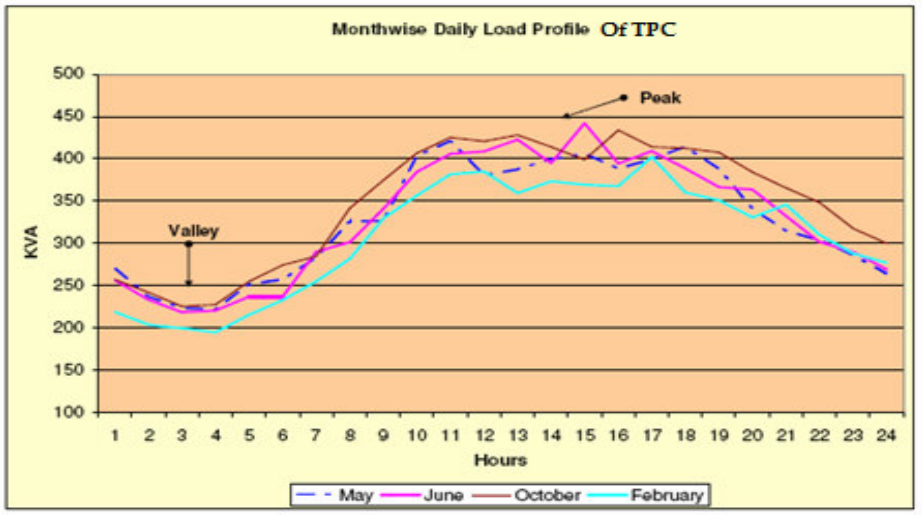
Accordingly, the Commission has issued several directives to the distribution utilities in the State through its various Tariff Orders issued from time to time.

Tariff Related Directives – Time of Day Tariff

- **Time of Day**
  - Typically, the system demand during different hours of the day varies significantly
  - Demand during peak hours is significantly higher than that in off-peak hours;
  - System designed to meet Peak demand would lead to lower capacity utilisation
  - System designed to meet Average demand may result in inability to meet Peak requirements
  - Ideally, Utilities would prefer to have a flat load curve throughout the day;
  - However, this is not practical as the Utility has rarely got any control over the consumption by the consumers;
  - Consumption pattern and the impact of different consumer categories varies significantly;

Time of Day Tariff- Typical Load Curve





- Morning Peak – 0600-1000 hours
- Evening Peak – 1800 - 2200 hours
- Load varies significantly in different months due to variation in climatic condition and significant variation in consumer profile
- Difference between peak demand and off peak demand is also quite significant

- Peak Demand – 0900 – 1700 hours
- Sharp plunge in demand occurs during 0100 hours to 0500 hours;
- Primary reason for occurrence of peak – higher share of industrial and commercial sector in TPC's overall consumer mix
- Marginal Monthly variation due to almost similar climatic condition throughout the year

Rationale of Time of Day Tariff

- To flatten the load curve, Time of Day Tariff was introduced
- ToD initiatives aim to change customer's energy usage behaviour, particularly to alter the time at which electricity is used;
- ToD tariff is typically used to reduce demand on the system during peak period;
- ToD tariff has been quite successful in flattening the load curve in the State of Maharashtra.

MERC Directives for ToD Tariff

- ToD Tariff for MSEB/MSEDCL was introduced through MERC Tariff Order dated May 5, 2000.
- Gradually raised the difference between peak and off-peak tariff
- Presently, differential between "peak" and "off-peak" tariff at Rs. 1.95 kWh (+1.10) and (-0.85))
- Introduced ToD Tariff for Mumbai city since October 2006;
- ToD tariff is applicable to most HT & LT categories where MD metering facility exits
- MERC has adopted same time slots for ToD tariff for all Utilities in the State to optimise the load curve of the State.
- Requirement for designing Effective ToD Regime
  - System load curve and Category wise load curve to identify which category is contributing to Peak load and in what proportion, so that directed incentive/penalty structure could be designed.
  - For development of category wise load curve, Utilities are required to carry out detailed load research

Proposed Mechanism for Designing ToD Tariff for Second Control Period

- All Utilities shall undertake extensive load research to understand contribution of each category to the load curve
- Based on load research, Utilities should propose ToD tariffs
- Utilities should submit data related to seasonal/ weekend/weekday load variation to the Commission;
- Based on above, Commission may consider re-defining both time slots as well as quantum of charges for ToD tariff

Tariff Related Directives - Power Factor Penalty/Incentive… (1/2)

- Power Factor : Ratio of energy consumed (Watts) versus the apparent power (Volts-Amp).
- Power factor correction reduces the difference between the energy consumed and the apparent power so as to reduce energy wastage.
- Power factor correction projects help to reduce overall demand
- Power factor correction can be directed specifically to reduce peak demand also if load contributing to the peak can be identified

Tariff Related Directives - Power Factor Penalty/Incentive …..(2/2)

- Introduced Power Factor Incentive at the rate of 1% of the amount of monthly electricity bill for maintaining PF >0.95 for MSEB/MSEDCL since May 5, 2000
- Did not impose any penalty for not maintaining the PF
- Introduced additional incentives of 2% (total 7%) for maintaining unity PF & also introduced penalty of 1% of monthly electricity bill for fall in PF below 0.9.
- Introduced Power Factor Penalty/Incentive for RInfra-D (REL-D) and TPC –D since June 2004

Load Management Charges (LMC)

- MERC's Load management directives for Mumbai
  - Order of May 2005: BEST, TPC, MSEDCL and REL -
    - Load management charge of Rs. 1 per kWh was imposed if consumption above prescribed limit; and load management rebate of Rs. 0.5 per kWh if consumption below prescribed limit –for two peak months – April & May 2005
    - Load management charge was proposed to be utilised for promotion and implementation of EE, EC, DSM
    - Rs. 70 crore was collected from this initiative, which is being used to run DSM activities to date
    - However, Load Management Charge Order was withdrawn in December 2006, after it was reimposed in the Tariff Orders for TPC and REL

Other Directives/Initiatives related to EE & DSM..(1/2)

- Directed all Utilities to develop necessary infrastructure and create dedicated DSM Cell for implementation, monitoring & verification of DSM programme;
- Order of March 2005
  - Directed MSEB to submit detailed first phase plan of EC within one month;
- April/May 2005
  - Directive to BEST, REL and TPC to undertake DSM programmes;
  - All the cost incurred on implementation of DSM initiatives will be allowed as pass through in ARR;

Other Directives/Initiatives related to EE & DSM…(2/2)

- **Tariff Order of April 2007**
  - **MERC directed that Long Term power procurement plan of Distribution Utilities to have proposals on EE & EC;**
  - **MERC directed Utilities to take up Load Research on a sustained basis and as an integral part of operations**
  - **MERC reiterated that all the costs incurred on implementation of DSM initiatives will be allowed as pass through in ARR**

Preparation of EE & DSM Guidelines for Utilities….(1/2)

- **Barriers to DSM Implementation**
  - **Very Little DSM implementation experience exists;**
  - **Significant uncertainty regarding issue related to design, development & implementation of DSM programme, as well as monitoring and verification;**
  - **No specific criteria exists, which will:**
    - **Guide distribution Utilities in designing programme; and**
    - **Assist the Commission in assessing effectiveness of programme;**
- **In order to overcome these barriers; Commission has prepared following:**
  - **Draft Cost Effectiveness Assessment Guidelines**
  - **Discussion Paper on Regulatory Framework for DSM**

Preparation of EE & DSM Guidelines for Utilities…(2/2)

- It is important that all distribution Utilities in the State follow consistent set of methods and procedures;
- Discussion Paper on Regulatory Framework for DSM
  - Possible Policy objectives of MERC vis-a-vis DSM;
  - Eligibility & Selection Criteria;
  - Institutional Structure & their roles and responsibilities;
  - DSM Targets and Period (Multi Year Tariff period);
  - Funding Arrangements;
  - Evaluation, measurement and verification;
  - Monitoring and reporting;
  - Post programme reporting;
  - Possible content of DSM plan and programme document;
- It is proposed that in next Control Period, Commission shall prepare Maharashtra State specific DSM Regulations in accordance with the Discussion Paper.

Financing of EE & DSM initiatives of Utilities…..(1/2)

- MERC has adopted following two mechanisms:
  - Development of Special Fund (e.g. Load Management Charges)
  - Recovery of Cost through Aggregate Revenue Requirement
- Recovery of Cost through Aggregate Revenue Requirement
  - Direct costs associated with programme administration including design, implementation, monitoring, evaluation and incentives, if not recovered, could impact earnings of the utility.
  - Reasonable certainty of cost recovery is necessary condition for utility program spending, as failure to recover any costs directly impacts utility earnings, and sends a discouraging message regarding further investment.
  - Earlier, the Commission allowed distribution Utilities to recover the costs incurred by them for DSM & EE related activities through ARR on 'case to case' basis.

Financing of EE & DSM initiatives of Utilities…..(2/2)

- **In the next Control Period, following provisions will have to be made in the MYT Regulations:**
  - **Allow recovery of costs associated with DSM through ARR**
  - **Guidelines on recognition of expenditure incurred on DSM activities as either revenue or capital expenditure;**
  - **Recovery mechanism for expenses incurred for the implementation of DSM schemes; e.g. Specifying depreciation rates for capital expenditure related DSM initiatives;**
  - **Designing suitable means for financing of DSM activities (ESCO, Fund Creation etc.)**

Proposed DSM Initiatives

Proposed DSM Initiatives

- **Following DSM initiatives can be taken up by the Commission during second Control Period:**
  - **Inclusion of EE & DSM in Planning Process;**
  - **Rebate/Incentives for Solar Water Heating System;**
  - **Rebate/Incentives for ECBC Compliant Buildings;**
  - **Promotion of programmes initiated by BEE**

Inclusion of EE & DSM in Planning Process…(1/2)

- Consumption pattern of different consumers are quite different;
- To undertake effective DSM programme, following is required:
  - Strong database of consumer profile;
  - Idea of system load curve; and
  - Category wise load curve
- Hence, it is necessary to undertake load research programme on continuous basis in the area of Utility;
- It is also important to identify total potential for EE/DSM in the State;
- This assessment will have to be done by an entity other than the Utilities;

Inclusion of EE & DSM in Planning Process….(2/2)

- BEE is undertaking such activity on behalf of State Designated Agency (SDA) in some of the States
- It is proposed that MEDA undertakes this activity either on its own or with the assistance of BEE in Maharashtra
- MERC may use this estimated potential to set targets for various utilities for implementation of DSM programme
- These targets will be incorporated by the Utilities in their power procurement policies

Rebate/Incentive for Solar Water Heating Systems…(1/4)

- Similar to EE measures, Fuel Switching also leads to reduced load on the electricity network;
- Load curve of Maharashtra shows distinct morning & evening peaks;
- Primary reasons for morning peak is usage of water heating appliances such as electric geysers, storage type heaters, heating coil, etc;
- Replacement of electrical heating appliances with solar heaters would result in reduction in morning peak
- However, it is necessary to promote solar water heaters by way of incentives/ rebates;

Rebate/Incentive for Solar Water Heating Systems….(2/4)

- A Study was carried out by IIT, Mumbai in March 2007 to estimate technical potential of SWH systems for Maharashtra and few of its major cities
- The study included detailed load research and developed load profiles of energy requirement for water heating on a typical day of winter (January) and summer (May) for the city of Pune.
- Technical Potential for State of Maharashtra:
  - Maharashtra 1620 GWh;
  - Mumbai 477 GWh;
  - Pune 242 GWh
  - Nagpur 129 GWh

Regulations should create framework which will encourage utilities to capture this potential.

Rebate/Incentive for Solar Water Heating Systems…(3/4)

- **Following mechanism have been deployed in order to promote SWH system in the country:**
  - **Fiscal Incentives by Government**
  - **Rebate in property tax; and**
  - **Rebate in electricity bills by Utilities upon approval of SERC;**

State	Rebate
Assam	Rs. 40 / month
Rajasthan	Rs 0.15 per kWh
Haryana	Rs. 100 / 100 lpd, Rs. 200 / 200 lpd, 300 / 300 lpd
Karnataka	Rs 0.50 per kWh to a max. of Rs. 50/ month
Uttarakhand	Rs. 75 /month for 100 lpd installation
West Bengal	Rs 0.40 per kWh to max. of Rs. 80

Rebate/Incentive for Solar Water Heating Systems…(4/4)

- Distribution Utilities have direct incentives in promotion of SWH systems as:
  - Reduce morning peak demand;
  - Reduce requirement of generation capacity in the grid;
  - Reduced costly power procurement during morning peak;
- According to MNRE, significant potential exists in Maharashtra for solar water heating system application;
- It is proposed that, Utilities should carry out detailed study to assess benefits through SWH in their area of supply; and
- Based on assessment, Utilities should submit suitable mechanism including commercial incentives for promotion of SWH system to Commission for approval.

Rebate/Incentive for ECBC Compliant Buildings…(1/2)

- Huge potential for energy savings exists in buildings;
- Several EA studies estimated potential in the range of 23-46%;
- To capture this potential, BEE has published the Energy Conservation Building Code on May 27, 2007;
- ECBC sets minimum energy performance standards for commercial buildings;
- ECBC compliant buildings consume 40 to 60 % less energy than conventional buildings;
- Presently, ECBC is introduced on voluntary basis;
- Expected to be made mandatory in future for commercial buildings, having connected load of 500 kW or greater or a contract demand of 600 kVA or greater

Rebate/Incentive for ECBC Compliant Buildings….(2/2)

- Commercial buildings provide great opportunities to distribution utilities to take EE & DSM programmes;
- Various end uses such as HVAC, lighting and Hot Water Systems are contributing to the system peak demand;
- Provides opportunities to Utilities to take up Peak Clipping & Load Shifting programmes (thermal storage, SWH system);
- It is proposed that based on the analysis of load research, the distribution utilities shall submit proposal for measures such as solar water heating system & thermal storage etc to the Commission for approval.

Utilities to undertake the programmes initiated by BEE

- Section 5.9 of National Electricity Policy – Para 5.9.2
  - BEE has been mandated to initiate Action Plan to implement DSM & EC measures;
- Section 5.9 of National Electricity Policy – Para 5.9.6,
  - Regulatory Commission should ensure adherence to energy efficiency standards by Utilities;
- BEE has identified number of thrust areas such as Agricultural, Municipal & Residential for promoting EE & DSM at national level;
- BEE has also initiated Ag. DSM, Municipal DSM and Bachat Lamp Yojna programme targeting above mentioned areas;
- It is proposed that distribution Utilities should carry out detailed analysis of these national level programmes of BEE and submit the same to MERC for Approval

Way Forward

Activity	Week												Scheduled Completion Date
	1	2	3	4	5	6	7	8	9	10	11	12	
Presentation to MERC on Draft Approach Paper													23-Sep-09
Identification of Experts													24-Sep-09
Letter to Utilities for Submission of Business Plan													25-Sep-09
Submission of Draft Approach Paper after incorporating comments from MERC													1-Oct-09
Circulation of Draft Approach Paper to the Experts													1-Oct-09
First Meeting with Experts													8-Oct-09
Preparation of Draft MYT Regulation after incorporating MERC Comments													8-Oct-09
Circulation of Draft MYT Regulations													8-Oct-09
Second Meeting with Experts													15-Oct-09
Finalisation of Approach Paper and Draft MYT Regulations after incorporating comments from MERC and Experts													22-Oct-09
Publication of Public Notice													23-Oct-09
Submission of comments by Stakeholders													13-Nov-09
Analysis of Responses													20-Nov-09
Finalisation of MYT Regulations													20-Nov-09
Filing of Business Plan and MYT Petition by the Utilities													15-Dec-09

Thank You

Back Up Slides

Statewise O&M Norms for Transmission Utilities

GERC Terms and condiditions of Regulations, 2005 (dated 1.4.2005)

GERC Norms for O&M expenses per ckt-km and per bay	Year				
	2004-05	2005-06	2006-07	2007-08	2008-09
O&M expenses (Rs. in lakh per ckt-km)	0.227	0.236	0.246	0.255	0.266
O&M expenses (Rs. in lakh per bay)	28.12	29.25	30.42	31.63	32.9

KERC Terms and condiditions of Regulations, 2006 (dated 31.5.2006)

KERC Norms for O&M expenses per ckt-km and per bay	Years		
	2007-08	2008-09	2009-10
O&M expenses (Rs. in lakh per ckt-km)	0.255	0.266	0.277
O&M expenses (Rs. in lakh per bay)	31.63	32.9	34.22

APERC Norms for O&M expenses per ckt-km and per bay	Year			
	2005-06	2006-07	2007-08	2008-09
O&M expenses (Rs. in lakh per ckt-km)	0.1624	0.1705	0.1790	0.1880
O&M expenses (Rs. in lakh per bay)	7.5000	7.8750	8.2688	8.6822

Statistics of previous control period

- The details of the capital expenditure, capitalisation and growth of Physical network during the previous control period is as shown here

	Year	Projected at beginning of control period			Approved for control period			Actual (as latest approved)		
		MSETCL	TPC-T	RInfra	MSETCL	TPC-T	Rinfra*	MSETCL	TPC-T	RInfra
Capital Expenditure	2007-08	3994	261	380	624	83	11.39			
	2008-09	4258	213	651	586	70	1.9			
	2009-10	4997	366	320	262	107	0.47			
Sub Total		**13249**	**840**	**1351**	**1472**	**260**	**13.76**			
Capitalisation	2007-08	1577	180	36	640	97	8.8	245	51	6
	2008-09	2884	261	715	562	74	9.22	491	74	47
	2009-10	3854	400	433	809	118	0.5	618	118	29
Sub Total		**8315**	**841**	**1184**	**2011**	**289**	**18.52**	**1354**	**243**	**82**

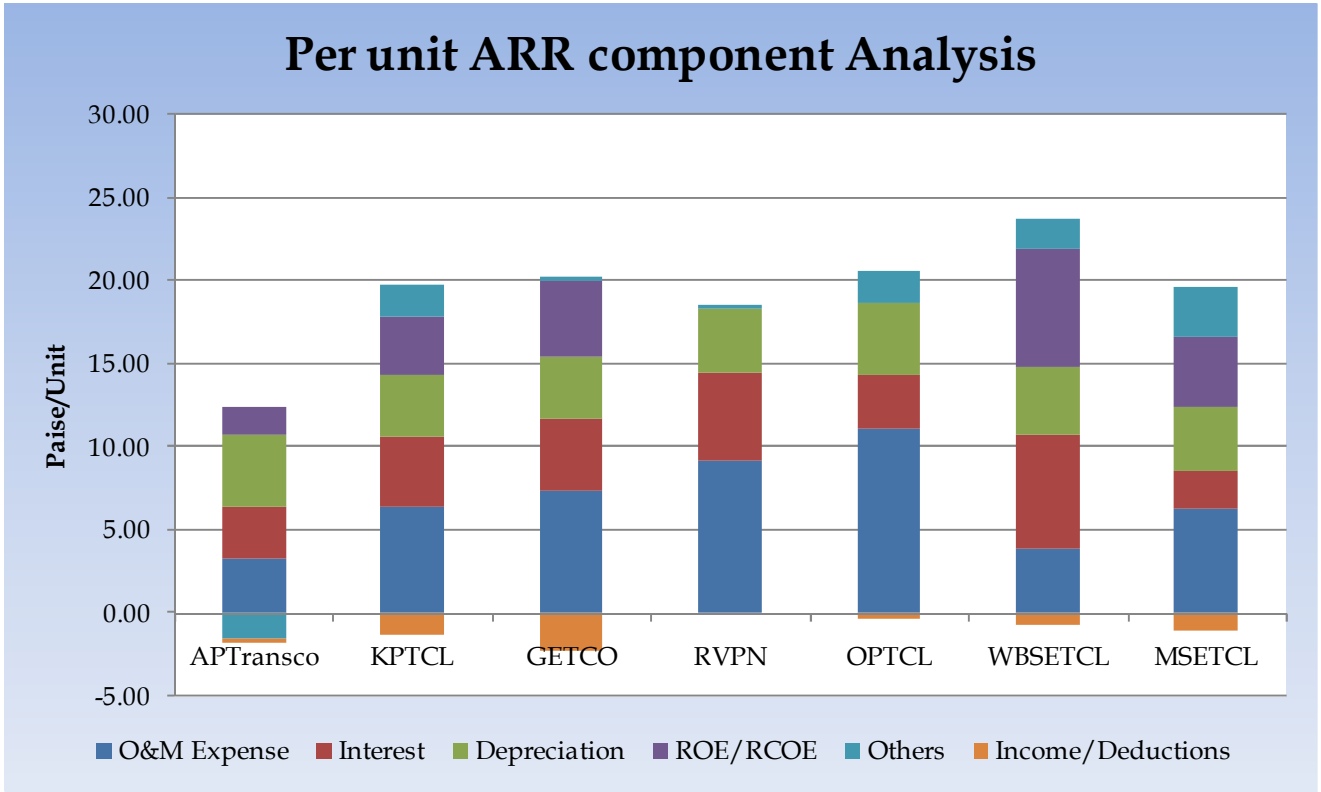
*The Commission has considered only non- DPR schemes for approval towards capital expenditure for the control period in the ARR, as no DPR schemes have been approved in principle for the control period due to lack of submission of DPRs by the licensee and lack of data.

Acheivement during the control period	MSETCL		TPC-T		Rinfra-T	
	2007-08	2008-09	2007-08	2008-09	2007-08	2008-09
X-mission line length (ckt Km)	36287	36409	9719	10075	481	481
MVA capacity	61530	62459	7050	7430	1100	1100

Back

Per unit ARR analysis

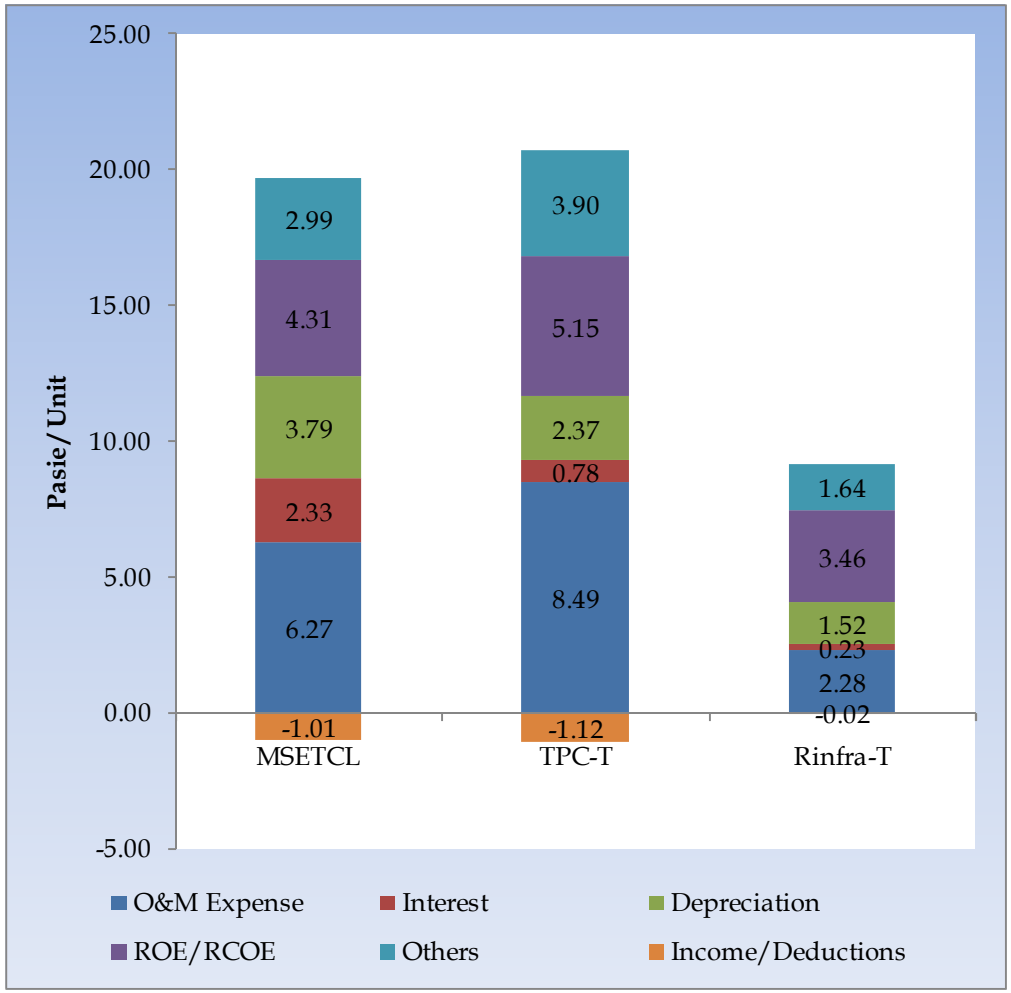
- The following table shows the per unit ARR components of various utlities



Back

Per unit ARR analysis

- The following table shows the per unit ARR components of Transmission Utlities in Maharashtra

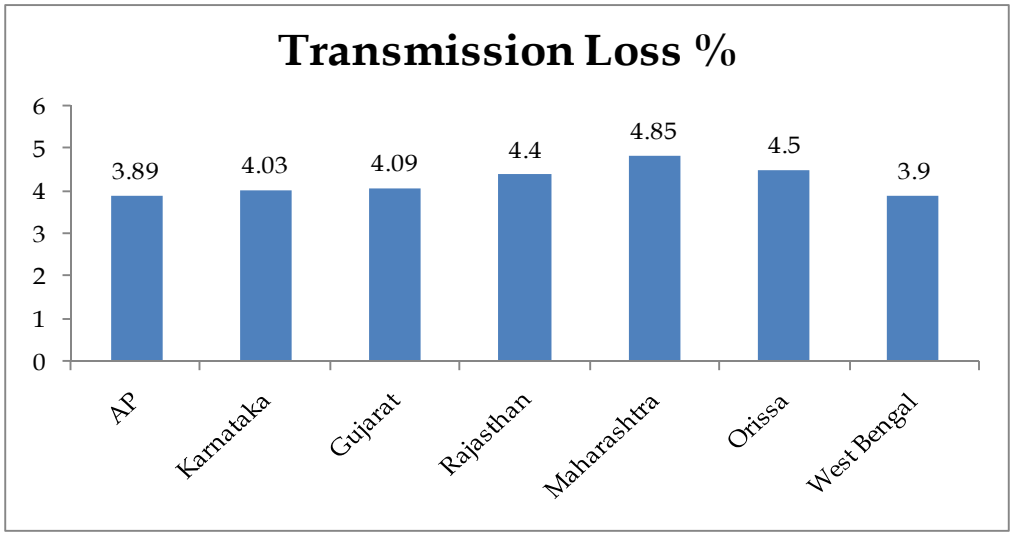


Back

State-wise Statistics on power Transmission

- Comparison of transmission tariff & transmission loss across States

States	Category	Transmission Charges	Units
AP		47.79	Rs/kW/Month
Karnataka		70391	Rs/MW/Month
Gujarat		12.39	Paise/Unit
Rajashtan		115.16	Rs/kW/Month
		3.786	Rs/kW/Day
Maharashtra	long term	111.73	Rs/kW/Month
	long term	3673	Rs/MW/Month
	short term	918.25	Rs/MW/Day
Orissa		33.05	Paise/Unit
West Bengal	long term	150847	Rs/MW/Month
	short term	1257.06	Rs/MW/day



Back-up Slides

Promoting Competition in Distribution …(1/5)

EA 2003 provides an enabling framework to create a competitive and efficient electricity market, as highlighted below:

- Section 7 provides for establishment, operation and maintenance of a generating company without obtaining a licence subject to complying with Technical Standards.
- Section 9 provides for Open Access to captive generators subject to availability of network.
- Section 12 recognises transmission, distribution and trading of electricity as distinct licenced activities.
- Sixth Proviso to Section 14 provides for issue of parallel distribution licences to two or more persons through their own distribution network within the same area.
- Ninth Proviso to Section 14 stipulates that a distribution licensee shall not require a licence to undertake trading in electricity.

Promoting Competition in Distribution …(2/5)

- **Electricity Act 2003 provides an enabling framework to create a competitive and efficient electricity market, as highlighted below:**

- Section 39 (2) (d) in respect of STU and Section 40 (c) in respect of transmission licensee, specifies that non- discriminatory open access has to be provided to their respective transmission system for use by any licensee or generating company and to any consumer as and when open access is provided by the State Commission.
- Section 42 (2) mandates the State Commission to introduce Open Access in such phases and subject to such conditions and other operational constraints as may be specified within one year of the appointed date.
- Section 42 (3) allows any person to obtain supply from a generating company or any licensee other than the distribution licensee of his area subject to payment of surcharge, wheeling charge and additional surcharge.

Promoting Competition in Distribution …(3/5)

- **Electricity Act 2003 provides an enabling framework to create a competitive and efficient electricity market, as highlighted below:**

- Section 49 provides for open access consumers to enter into agreement with any person for supply or purchase of electricity on such terms & conditions (including tariff) as may be agreed upon by them.
- Section 60 provides the appropriate Commission to issue such directions to a licensee or generating company if they enter into any agreement or abuse their dominant position or enter into a combination, which is likely to cause an adverse effect on competition in electricity industry.
- Proviso to Section 62 (1) provides that the appropriate Commission may fix a maximum ceiling of tariff for retail sale of electricity in case where there is more than one distribution licensee in the same area of supply.
- Section 63 stipulates that the appropriate Commission shall adopt the tariff if such tariff is determined through bidding.

Promoting Competition in Distribution …(4/5)

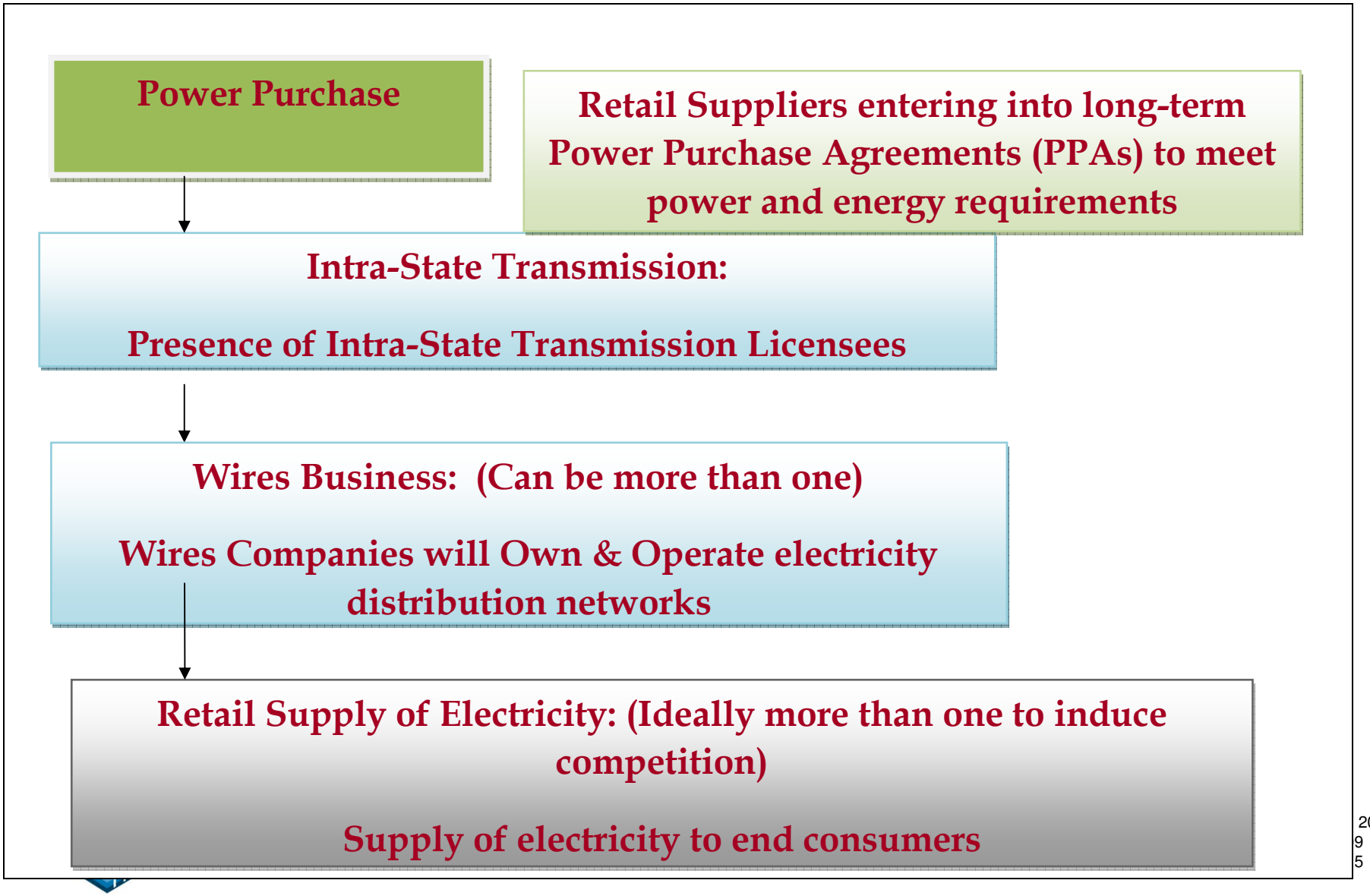
- **Electricity Act 2003 provides an enabling framework to create a competitive and efficient electricity market, as highlighted below:**

- Section 65 provides for payment of advance subsidy by the State Government to compensate the person affected by grant of such subsidy.
- Section 66 mandates the appropriate Commission to endeavour to promote development of a market (including trading) in power.
- In India, the parallel distribution companies with common carrier/independent distribution network as envisaged in the EA 2003 are yet to come up in spite of the enabling legal framework provided in the EA 2003.
- The consumers continue to buy power from monopoly distribution licensees without any choice of supplier.
- In Mumbai, TPC has a distribution licence which spans the distribution licence areas of both, RInfra-D as well as BEST.

Promoting Competition in Distribution …(5/5)

- **Electricity Act 2003 provides an enabling framework to create a competitive and efficient electricity market, as highlighted below:**
- Thus, in both these licence area, there are two suppliers of electricity.
- However, competition in the retail supply of electricity without insisting on creation of a parallel distribution network will go a long way in introduction of competition in retail supply of power.
- International experience: Competition in retail supply is induced through common- carrier model instead of parallel networks
- It is not economically viable to duplicate the existing distribution network due to the sunk-cost associated with it
- Separation of the supply from wire business is essential to make retail supply competitive.

Multi Supplier Model…(1/3)



Multi Supplier Model…(2/3)

- With a view to introduce competition, it is proposed that in the long-term, the Wires Business (covering the distribution network) should be separated from Retail Supply Business.
- The retail supply licensees should be able to supply power to any consumer (irrespective of the load and supply voltage) through the existing distribution lines/network subject to payment of wheeling charges to the owner of the wire network. Requirement of meeting Universal Service Obligation (USO) would form an essential part of retail supply licence conditions, to prevent cherry picking of consumers.

Multi Supplier Model…(3/3)

- It is proposed that Wires Business Duties
  - Will own and maintain the distribution network.
  - Would be responsible for up-gradation to network to meet the standards of performance.
  - The Power Purchase Agreements would have to be transferred to the Retail Supply Business.
- Retail Supply Business Duties
  - Would be responsible for retail supply of electricity.
  - All the activities related to consumer interface which would include billing, collection and other value added services, viz., reactive power compensation, etc.

Proposed Wires & Supply Business

- In the interim, the Revenue Requirement and tariff of the Wires and Retail Supply Business would have to be determined separately. The representative components of revenue requirement of Wires and Retail Supply business are shown in the Block Diagram below: