

SECTION 5: ASSAM ELECTRICITY GRID CORPORATION LIMITED**Performance Efficiency Norms and Future Improvements**

5.1 Under the AERC (Terms and Conditions for Tariff) Regulations, 2005 the Commission is to set performance efficiency norms for the AEGCL and take them into account when setting the ARR. Performance efficiency norms will benefit the consumer because the licensee will be expected to achieve these performance levels in order to fully recover their costs. Where the performance is below target level, the licensee will not be permitted by the Commission to pass these additional costs on to the consumers.

5.2 The performance efficiency measures are:

- (a) Auxiliary power consumption in the sub-stations – the cost of power consumption for air-conditioning, lighting, technical consumption shall be taken into account in the review of operation and maintenance expenditures.
- (b) Operations and Maintenance expenditure (e.g. the sum of employee cost, repairs and maintenance, and administration and general expenses) shall be fixed on the basis of norms based on the circuit kilometre of transmission lines, transformation capacity, and number of bays in substations.
- (c) Working capital – norms are set for the levels of expenses and receivables to determine an appropriate level of working capital.
- (d) Transmission losses – transmission losses will be calculated as the difference between the sum of all energy initially injected into the transmission system from different interface points and the sum of energy transmitted to distribution licensees and consumers connected to the transmission system. The Commission will not approve transmission losses above the norm fixed by it.
- (e) Availability of the transmission system – A target availability of 98% shall be the minimum level for 100% recovery of the fixed costs of the transmission system. The recovery of fixed costs shall be on a pro-rata basis for availability below 98%. The AEGCL may also receive a revenue incentive for availability above 98% subject to a cap of 99.75%. The revenue incentive will be calculated as follows:

$$\text{Incentive} = \text{Annual transmission charge} \times (\text{Annual availability achieved} - \text{Target Availability}) / \text{Target availability}$$

5.3 The Commission recognises that this is the first year a normative approach has been included in the tariff regulations. In most cases, the data is not available to support this approach in the FY 2005-06 Tariff Order because the AEGCL has only just been established. Nevertheless the Commission fully intends to phase in a normative approach for setting many of the costs components of the ARR in future tariff orders.

Where the data makes it possible, the Commission has adopted some of the norms in the FY 2005-06 Tariff Order as discussed in the paragraphs below.

- 5.4 There is no data available to set norms for auxiliary power consumption in assessing the level of operation and maintenance expenditure nor is the data available yet to set norms for O&M expenses based on length of transmission lines etc. Until this data is available, the amount of O&M expenditure is based on the Commission's assessment of the reasonableness of the estimates submitted by the licensee.
- 5.5 The Commission has assessed the estimated loss level in the transmission network of 8.55% proposed by the licensee. The Commission notes that:
- (a) The AEGCL does not currently have the required metering at bulk supply points of each distribution licensee to accurately measure the transmission losses in the transmission network.
 - (b) The AEGCL is committed to install 0.2 S (accuracy) class ABT compliant meters as required under the Transmission Metering Code and it will migrate from the current process of measuring all energy exchanges simultaneously to a MRI based system for an accurate assessment of transmission losses.
- 5.6 The Commission is not happy with the details on transmission losses that have been provided by the AEGCL but understands that until the required metering is in place there is insufficient data for the measurement of transmission losses. The Commission is only using this estimate for the purpose of power purchase calculations and the same should not be considered as an approved transmission loss.
- 5.7 The Commission has also reviewed the objectives and expected benefits of the Transmission System Improvement project being funded by the Asian Development Bank (ADB) as well as by Non Lapsable Central Pool of Resources (NLCPR). The Transmission system reinforcement sub-project will strengthen the existing transmission system at 66,132 and, 220 kV throughout the state of Assam to meet the estimated transmission system requirements up to the year 2007. The project objectives are:
- (a) Evacuation of 925 MW (projected peak demand by the year 2007) of power on the transmission network;
 - (b) No load-shedding (system frequency excursion within stipulated limits - $50 \pm 10\%$);
 - (c) End voltage at 33 kV bus at the 132/33 kV grid sub-stations to be within $\pm 5\%$;
 - (d) Reduce transmission system losses to $\leq 5\%$;
 - (e) Meet (n-1) reliability criteria to ensure delivery of power when one of the n number of circuits / elements fail;

- (f) No grid transformer and lines shall be loaded continuously for > 70% of its rated capacity;
 - (g) Achieve correct discrimination and quick isolation of faulty elements by modernizing protection and communication systems.
- 5.8 The transmission system sub-project also includes the SCADA (Supervisory Control And Data Acquisition) system extension on 33 kV side of all 39 existing 132/33 kV grid sub-stations and a SCADA system for the proposed new substations. The proposed SCADA system is consistent with the ongoing SCADA system implementation being carried out by Power Grid and AEGCL.
- 5.9 The Commission notes that consumers will benefit from the reduction in transmission technical losses by 3%, the improved voltage profile in the transmission grid (end voltages at 33 kV are within 5% deviations from the rated voltages), improved system operations and from the long term manpower reductions that can be achieved because new substations being built could be unmanned as remote control and monitoring would be done from the SCADA system. The Commission also notes that there should be an improvement in the reliability of supply to consumers above current levels with increase in transmission capacity to 925 MW.
- 5.10 In the absence of required metering, the Commission is working on the basis of the transmission loss as in the submission of AEGCL and set no target of transmission loss for 2005-06. However, the Commission sets a transmission loss target of 6.25% for 2006-07 and will use this target in setting the distribution parameters for each distribution licensee as well as for ARR of the licensees including AEGCL.
- 5.11 In the AERC (Terms and Conditions of Tariff) Regulations, 2005 the Commission has set a target availability of the transmission system at 98% for 100% recovery of the fixed costs of the AEGCL. The Commission recognises achievement of this target in FY 2005-06 is unrealistic given the long history of past neglect in providing sufficient funds to the Board for repairs and maintenance.
- 5.12 Nevertheless, once the ADB funded Transmission System Improvement project is completed by the middle of calendar year 2006 this target availability rate should be achievable. Accordingly, the Commission in the FY 2006-07 Tariff Order will apply the target availability of 98% in setting the ARR of the AEGCL.

Directions

- 5.13 In accordance with the move to a normative approach to tariff regulation, the Commission issues the following directions to the AEGCL:
- (a) Transmission Losses –The AEGCL is to submit data regarding the current and future level of transmission losses three months before the next tariff petition for FY 2006-07.
 - (b) Transmission Performance Standards – The AEGCL is to put into a place a process to measure the availability of the transmission system along with the

other performance measures set out Schedule II of the (Transmission Licensee Standards of Performance), Regulations, 2004. The AEGCL is to submit a report within the next three months describing the current achievements of the performance standards and how they will be improved once the Transmission System Projects are completed.

- (c) Operations and Maintenance expenditures – The AEGCL is to submit a report within the next three months that provides data on regarding length of transmission lines, transformation capacity, and number of bays in substations, auxiliary power consumption by substation, and number of staff by organisation unit. The report should also explain how manpower reductions will be achieved given that the new substations do not need to be managed by personal in site but with the use of remote control and monitoring from the new SCADA system.

Annual Revenue Requirement for FY 2005-06

5.14 The Commission has reviewed the estimates of each ARR cost element submitted by the AEGCL and made its own assessment of the level of expenditures required. In most cases the Commission has accepted the estimates submitted. The table below presents the cost elements of ARR as filed and as approved.

ARR Element	Filed Rs. Cr	Approved Rs. Cr	Commission's Decision
Employees Cost	37.05	37.04	Other allowances payable to employees is reduced. The petitioner has claimed an increase of 12.35% over and above the approved amount in the last Tariff Order in respect of other allowances. The Commission has restricted it to 8%. While allowing 8% increase, the Commission has considered normal inflation adjustment of 5% and an extra cushion of 3% to cover any contingency
Repairs & Maintenance	5.91	5.91	R&M expenses are important to maintain and improve the transmission system reliability. Overall the Commission is increasing repairs and maintenance across all companies by 24% as compared to the level approved in the last tariff order in line with the submitted petitions to ensure that more resources are allocated to improving the reliability and quality of power supply. The Commission accepts the estimate of the licensee but will in future benchmark expenditures against the length of lines, transformation capacity, and number of substation bays. The Commission hopes that by allowing the full amount claimed by the petitioners for Repairs

ARR Element	Filed Rs. Cr	Approved Rs. Cr	Commission's Decision
			<p>and Maintenance Expenses coupled with investment funded by ADB and others the quality of supply will improve in the near future.</p> <p>The petitioners stated in their petition about gradually moving towards norm based allowance of Repairs and Maintenance Expenses. Before fixing any norm for approving R&M expenses, the Commission needs reliable comparative data from other states with similar working conditions as in Assam which is not available now. For this reason, any bench marking is not possible now for R&M expenses.</p>
Administrative & General Expenses	2.89	1.79	<p>The Commission has estimated the Administrative and General expenses from the base level expenditure in 2003-04 by adding 6% each year for 2004-05 and 2005-06. The Commission has relied on 2003-04 figures because this is the latest available audited figure. While allowing 6% increase, the Commission has taken into account normal inflation @ 5% and 1% cushion to take care of any additional expenditure. This new total has been allocated to each licensee and the ASEB in proportion to the FY 2005-06 figures mentioned in the petitions.</p> <p>The Rs. 1 Crore one time capital expenditure request for setting up infrastructure and services for the new company is denied in the absence of any detailed justification</p>
Interest on term loans	8.45	8.45	<p>Interest on term loans is accepted without capitalisation of interest charges for loan funded capital projects. Most of Transmission projects are funded either under ADB or NLCPR. The gestation period of such projects varies from six months to one and half year. So the Commission has allowed the full interest cost as a pass through. This is consistent with linking depreciation to loan repayments.</p>
Interest on working capital		1.18	<p>Although the petitioner has not asked for any interest on working capital, charges on this account are taken into consideration Interest on working capital has been estimated based on the AERC (Terms and Conditions for Determination of Tariff) Regulations, 2005.</p> <p>O&M expenses (1 month) Rs. 3.73 Crores</p>

ARR Element	Filed Rs. Cr	Approved Rs. Cr	Commission's Decision
			Maintenance spares Rs. 5.32 Crores ¹ Receivables (1 month) Rs. 4.08 Crores Total Rs. 13.13 Crores Apply interest rate of 9% Rs. 1.18 (A commercial bank rate of 9% has been applied which appears reasonable to the Commission.)
Depreciation	31.4	3.54	<p>AEGCL could not produce the following records/information necessary for assessing the level of depreciation in respect of different categories of transmission assets:-</p> <ol style="list-style-type: none"> 1. Assets Register 2. Value of assets which have been fully depreciated (up to 90% of original cost) 3. Rate of depreciation vis-à-vis value of each categories of assets for the purpose of computing the depreciation <p>In the absence of above information, the Commission could not verify the calculation of depreciation claimed in the petition. Nor is the Commission able to apply the depreciation rates by asset category as specified in the tariff regulations. In the absence of such a register, the Commission maybe forced to stop considering any charges on account of depreciation as such ad-hoc measures cannot continue</p> <p>The charging of depreciation every year and adding to depreciation reserve a sum so set aside is a normal practice for funding the replacement of Fixed Assets. However, in the case of Electricity industry, the nature of funding is different from other industries. Here, the asset replacement is funded by loan taken from financial institutions based on a predetermined capital investment plan. The period of loan normally varies from eight to fifteen years. By linking depreciation to loan repayment it is ensured that cash requirements of a utility towards loan repayment is met. Moreover, it should be remembered that a substantial portion of the assets of the licensee has been built up</p>

¹ No maintenance spares budget has been submitted by the AEGCL. The Commission has estimated maintenance spares as equal to 1% of the assumed gross fixed assets of the AEGCL (e.g. Rs. 531.8 Crores) or Rs. 5.32 Crores.

ARR Element	Filed Rs. Cr	Approved Rs. Cr	Commission's Decision
			<p>through grants in which case no cost has actually been incurred in creating those assets. This a special feature of the north-eastern states. So, the Commission has thought it prudent to limit the depreciation to the extent of loan repayment every year.</p> <p>Accordingly the Commission has decided to link depreciation to loan repayments. The same approach was adopted in the FY 2004-05 tariff order.</p> <p>To avoid a situation where the existing assets cannot be replaced the Commission is providing for establishment of a Development Fund for taking up quick maturity schemes which may also include high priority expenditure on replacement/renovation etc. for the APGCL, AEGCL, and Discoms as discussed in section 8 of the tariff order.</p>
Total Expenditure	85.70	57.91	
Less Miscellaneous Receipts	8.94	8.94	Miscellaneous receipts consist of Rs. 8.0 Crores for depooling of PGCIL transmission charges, Rs 0.9 Crores interest on investments and 0.04 of other minor receipts. The Commission accepts the licensee's estimates.
Return on equity	8.66	0.00	<p>Because of the poor performance of the ASEB in FY 2004-05, the Commission is not allowing any return on equity in FY 2005-06 by applying a zero return on equity rate.</p> <p>As discussed in section 8, the Commission is providing for a Development Fund for taking up quick maturity schemes which may also include high priority expenditure on replacement/renovation etc. for the APGCL, AEGCL, and three distributors.</p>
ARR	84.42	48.97	

- 5.15 The Commission notes that a separate ARR should be determined for the State Load Dispatch Centre in accordance with the (Terms and Conditions for Tariff) Regulations, 2005. However the accounting records of the AEGCL do not provide sufficient data for this unbundling to occur.
- 5.16 In the Commission's view, the unbundling of the SLDC costs from the transmission network are a high priority and as it will enable the SLDC to assume

a role which will become more important in view of the formation of distinct companies having separate jurisdictions. SLDC has to play a very significant allocative role in ensuring optimum utilisation of available power, avoiding congestion and ensuring reliability, a role which will become more important as the distribution activity will be open to players other than the present entities also. In keeping with such a role, the functioning of SLDC may have to be considered at arms length from the STU, for which purpose, the accounting of SLDC has to be bifurcated from that of AEGCL. This has to be ensured while considering ARR and tariff revision for FY 2006-07.

Approved Transmission Charges

- 5.17 Intra-state transmission charges are to be paid by a distribution licensee for the transmission of power purchased from the ASEB Trader as measured at the metering points at the boundary of each distribution licensee. The table below shows that the total purchase volumes are 3096 MUs and the purchases made by the Distribution Licensees after transmission loss of 8.55% (Note: Section 7 of this tariff order describes how the purchase volumes for each Discom have been estimated.)

Distribution Licensee	MU Purchases
Lower Assam Electricity Distribution Company Limited (LAEDCL)	1219.64
Central Assam Electricity Distribution Company Limited (CAEDCL)	877.22
Upper Assam Electricity Distribution Company Limited (UAEDCL)	999.09
Total	3095.95

- 5.18 One important issue concerned with transmission charges is the structure of transmission charges there are several options which may be considered:
- An energy charge only;
 - A demand charge based on the maximum contracted demand (KVA);
 - A fixed charge per month;
 - A mixture of demand and energy charges;
 - A mixture of fixed, demand and energy charges.
- 5.19 The option of adoption of a demand charge applied to the maximum contracted demand for distribution licensees mean that at each transmission connection point for a distribution licensee, a uniform demand charge should be applied to the peak demand for each connection point. The detailed implications of this need to be examined.

5.20 The Commission notes that at present the metering for recording demand of licensees does not exist to support the introduction of demand charges for the distribution licensees. For the present, the Commission will adopt energy charge only for the recovery of transmission costs.

5.21 The transmission charge will be set as an uniform energy only charge as set out below:

ARR AEGCL (Rs. in Crores)	48.97
Distribution Licensees Purchases MU	3,096
Transmission Charge paisa per kWh	16

5.22 The Commission also notes that connectivity charges for generators and distribution licensees have not been proposed by the AEGCL. A connectivity charge could be levied to cover the:

- (a) capital cost of providing entry assets which are fully dedicated to providing connection to a single Generator or group connected at a single point within the intra-state transmission network;
- (b) capital cost of providing exit assets which are fully dedicated to the supply of a single Transmission Customer or a distribution network which supplies electricity to a group of customers. This is charged to Transmission Customer or a Distribution Company.

5.23 The Commission notes that the asset records of the AEGCL do not provide sufficient data for the cost of these connection assets to be separated from the rest of the transmission network costs.

5.24 Nevertheless, any new customer or generator connecting to the transmission network should have a separate connectivity charge levied to meet the cost of providing the respective entry or exit assets. The Commission directs that all such charges will be subject to Commission review and approval by the Commission before they are imposed by the AEGCL.