FORUM OF REGULATORS

OPEN ACCESS – THEORY AND PRACTICE

NOVEMBER 2008

FORUM OF REGULATORS
Secretariat: c/o Central Electricity Regulatory Commission
3rd & 4th Floor, Chanderlok Building, 36 Janpath, New Delhi-110001
Phone: 23353503; Fax: 23753923
www.forumofregulators.org

EXECUTIVE SUMMAARY

Open access has been envisaged in the Electricity Act, 2003 (EA 2003) as a framework for encouraging competition in the electricity sector and for enabling consumers to choose their suppliers. The Act provides for non-discriminatory open access in transmission from the outset. In distribution, open access is to be introduced in phases by the State Commissions with due consideration of constraints like cross-subsidy etc.

The National Electricity Policy and Tariff Policy framed under the Act lay emphasis on proper implementation of this competitive framework which has the potential of: (i) desired market signal for investment; (ii) inducing improved service from the existing utilities; and (iii) enabling consumers to get power from any source of their choice.

The Central Electricity Regulatory Commission (CERC) has framed regulations on inter-State open access. There have been large numbers of transactions involving the generating companies, traders and distribution companies through open access in inter-State transmission. At the State level, regulations have been framed by the State Commissions, phasing out open access for consumers. Transmission charges, wheeling charges and surcharge have also been determined by most SERCs. However, implementation of open access at the distribution level has not been encouraging.

The Forum of Regulators (FOR) has been deliberating on the issues concerning implementation of open access for quite some time. At its meeting in June 2008, the Forum felt the need for a detailed examination of operational constraints in implementation of open access. The Forum thus constituted a Working Group consisting of the **Chairpersons** of some State Commissions with the mandate to examine all such issues and suggest measures for overcoming the constraints for the framework of open access to be implemented in its true spirit. The Group submitted its report which was considered by the FOR in its meeting at Chennai on January 30, 2009.

The report, as adopted by the Forum, makes a detailed examination with recommendations concerning the following issues: (i) legal and policy provisions and the status of their implementation; (ii) identification of problem areas with the conclusion , inter alia, that the weakest link is the State Load Dispatch Centre (SLDC) which, unless made truly independent, will frustrate all effort at open access; (iii) measures for ring-fencing of SLDC; (iv) structural and financial re-modelling, including technological upgradation; (v) staffing pattern; (vi) incentive and disincentive scheme; and (vii) fees and charges for the SLDCs.

The report also emphasises the need for: (i) rationalization of various open access charges including surcharge; (ii) uniform standby arrangement for back-up supply to make open access a reality; (iii) monitoring of open access transactions by the State Commission; and (iv) display of illustrative examples of charges for open access to help the potential consumer take an informed decision on the open access option.

*****

Table of Contents

1 Introduction

1.1 Constitution of the Working Group

1.1.1 The FOR was constituted by Notification of February 16, 2005 in accordance with section 166(2) of EA 2003 and comprises the Chairperson of CERC and the Chairpersons of the State Electricity Regulatory Commissions (SERCs). The Chairperson of CERC is the Chairperson of the FOR.

1.1.2 In order to meet the objectives of smooth and coordinated development of the power system in the country and to evaluate and address various issues in operationalising open access, the FOR decided to constitute a Working Group on "Open Access: Theory and Practice" during its meeting on June 13, 2008.

1.1.3 The scope of work of the Working Group was, inter-alia, to consider the relevant provisions of the National Electricity Policy, Tariff Policy, experience in operationalising open access over the State networks, and to give its recommendation on the following:

a. Strengthening the SLDCs in terms of equipment and skill sets;

b. Ring-fencing of the SLDCs with the objective of ensuring their functional independence;

c. Creating a system of monitoring the grant of open access by SLDCs in an expeditious and non-discriminatory manner;

d. Rationalising open access charges, including the envisaged reduction in cross-subsidy surcharge;

e. Facilitating standby power supply arrangement for open access consumers; and

f. Any other relevant issue.

1.1.4 The Chairperson of the FOR was authorised to nominate various SERCs on the Working Group, and accordingly the Working Group on "Open Access: Theory and Practice" was constituted as follows:

(i)	Chairperson, CERC	...	Chairperson
(ii)	Chairperson, CSERC	…	Member
(iii)	Chairperson, JSERC	…	Member

(iii) Chairperson, MERC … Member

(iv) Chairperson, RERC … Member

(v) Secretary, CERC … Member

(vi) Deputy Chief **(Regulatory Affairs**), CERC … Coordinator.

1.1.5 The Secretariat of the FOR acted as the secretariat of the Working Group. MERC offered to support the FOR Secretariat for this Working Group, through its representative Regulatory Experts.

1.2 Deliberations of the Working Group

1.2.1 The first meeting of the Working Group was convened at Lonavala on July 20, 2008, with the following participants:

1. Dr. Pramod Deo, CERC
2. Shri. J.L. Barkakati, Assam Electricity Regulatory Commission (AERC)
3. Dr. J.L. Bose, Madhya Pradesh Electricity Regulatory Commission (MPERC)
4. Shri. A. Velayutham, Maharashtra Electricity Regulatory Commission (MERC)
5. Shri. V.J. Talwar, Uttarkhand Electricity Regulatory Commission (UERC)
6. Shri. K.L. Vyas , Rajasthan Electricity Regulatory Commission (RERC)
7. Shri. Rajupandi , Tamil Nadu Electricity Regulatory Commission (TNERC)
8. Shri. Alok Kumar, CERC
9. Shri. S. K. Chatterjee, CERC
10. Shri S.K. Soonee, Executive Director (SO), **POWERGRID**, New Delhi (special invitee)

1.2.2 To facilitate a focussed discussion on the issues related to implementation of open access, the Regulatory Experts of MERC, which acted as the Secretariat of this Working Group, was requested to make a presentation on the issues.

1.2.3 A Draft Report summarising the deliberations of the Working Group and issues finalised during the first meeting was circulated for further consideration. The Discussion Summary has been classified under the following three categories:

- Issues and action plan finalised during the meeting
- Issues to be finalised in the next meeting

- Issues to be considered after detailed study

1.2.4 The second Meeting of the Working Group was convened at Bhubaneshwar on November 14, 2008 to finalise the recommendations and to deliberate further on the outstanding issues with the following participants:

1. Dr. Pramod Deo, CERC
2. Shri S.K. Misra, CSERC
3. Shri Mukhtiar Singh, JSERC
4. Shri B.K. Das, Orissa Electricity Regulatory Commission (OERC)
5. Shri A. Velayutham, MERC
6. Shri K.L. Vyas , RERC
7. Shri R. Rajupandi , TNERC
8. Shri Alok Kumar, CERC
9. Shri. Kulamani Biswal, CERC
10. Shri. S. K. Chatterjee, CERC
11. Shri S.K. Soonee, Executive Director (SO), **POWERGRID**, New Delhi (special invitee)

1.2.5 During the deliberations at Bhubaneswar on November 14, 2008, Shri S.K. Soonee, Executive Director (SO), **POWERGRID** made three presentations, appended as follows:

- Appendix-I : Presentation on inter-State short-term Open Access (OA)
- Appendix-II : Presentation on ULDC Upgradation Summary
- Appendix-III : Presentation on Software Development for Short-Term OA

1.2.6 The Working Group listed the following key factors in successful implementation of OA in inter-State transmission:

1.2.6.1 **Clear control area demarcation and adequate boundary metering**: The foremost reason for successful implementation of OA in inter-State transmission is clear demarcation of the control areas and scheduling and dispatch

responsibility. Boundary Metering (SEM) has been provided at all seams and interfaces of control areas.

1.2.6.2 **Robust transmission system**: In India, the transmission system is planned in a coordinated manner in accordance with the Central Electricity Authority's (CEA's) planning criteria and provisions of the grid code. The margins that are inherent in design, or due to variations in power flows and also due to in-built spare transmission capacity, created to cater to the future load growth or generation addition are being gainfully utilised through OA.

1.2.6.3 **Assessment of transfer capability**: For successful implementation of OA, the assessment of available transfer capability (ATC) is very important. A pessimistic approach in assessing the ATC will lead to under utilisation of the transmission system. Similarly, over assessment of ATC will place the grid security in danger. All RLDCs are fully geared up for assessment of the ATC. When the flows crossed the declared total transfer capability (TTC), there was a violation of security standards.

1.2.6.4 **Balancing mechanism**: The balancing mechanism is one of the four pillars of the design of any power market, without which no market mechanism can exist. The balancing mechanism in the form of Unsheduled Interchange (**UI)** tariff provides an instrument for settlement of the Open Access Market.

1.2.6.5 **Transmission charge sharing mechanism**: Transmission is the basic platform for development of any power market. Transmission is not a product and, therefore, the transmission charge sharing mechanism is also a key issue in the development of any power market. Presently, OA transmission charges are defined in terms of Rs./MWh. The present transmission charge sharing mechanism is easy to understand and implement in a non-discriminatory fashion. According to the provisions of the National Electricity Policy, the tariff mechanism has to be sensitive to distance, direction and related quantum of flow. Further work is required on this.

1.2.6.6 **Treatment of transmission losses**: The treatment of losses is also important for the successful implementation of OA. At present, the average regional transmission losses are applied to all transactions. The present mechanism is also easy to understand and implement in a non-discriminatory fashion. According to the Tariff Policy, transactions may be charged on the basis of average losses, considering distance and direction sensitivity. The CERC is already considering this matter.

1.2.6.7 **Streamlined scheduling and settlement mechanism**: All RLDCs are fully geared up to streamline the entire scheduling process. A number of software programmes have been developed in-house to streamline the scheduling process and a sound settlement mechanism is in place.

1.2.6.8 **Transparency and non-discriminatory implementation**: To ensure transparency and non-discriminatory implementation of the provisions of CERC regulations, complete information is displayed on the RLDC website. This includes the 52-week average transmission losses, ATC/TTC details, approved OA transactions details, schedules of each constituent, etc.

1.2.7 The Working Group has finalised its recommendations in respect of each issue identified under the Terms of Reference which are organised under following chapters:

a. Chapter-2: Capacity building at SLDC
b. Chapter-3: Ring-fencing of SLDC for functional independence
c. Chapter-4: Monitoring mechanism for grant of open access
d. Chapter-5: Rationalisation of open access charges and regulatory framework
e. Chapter-6: Facilitative standby power supply arrangement
f. Chapter-7: Summary of recommendations

2 Capacity Building at SLDC

2.1 Statutory framework

2.1.1 The SLDC has been entrusted with the following functional responsibilities:

a. Optimal scheduling and despatch of electricity within a State, meeting the terms contracted with the licensees or generating companies operating in that State;
b. Monitoring grid operations;
c. Keeping accounts of quantity of electricity transmitted through the State grid;
d. Exercising supervision and control over the intra-State transmission system; and
e. Responsibility for carrying out real time operation for grid control and despatch of electricity within the State through secure and economic operation of the State grid in accordance with Grid Standards.

2.1.2 In order to facilitate this, the SERCs have to ensure that the SLDCs are equipped with state-of-art communication and data acquisition capability on real-time basis. In this context, the relevant extract from para 5.3.3 of the National Electricity Policy is reproduced below:

> *"Regulatory Commissions need to provide facilitative framework for non-discriminatory open access. This requires load despatch facilities with State-of-the art communication and data acquisition capability on real time basis. While this is the case currently at RLDCs, Appropriate State Commissions must ensure that matching facilities with technology upgrades are provided at the State level, where necessary and realized not later than June 2006*"(emphasis added)

2.2 Key issues addressed

2.2.1 In view of this position, the following issues were discussed by the Working Group:

Issue 1: Organisational structure of SLDC

- Is the current SLDC organisational structure capable of addressing

the requirements of OA transactions?

- What are the modifications necessary for the SLDC organisational structure to undertake the responsibilities assigned?

Issue 2: Regulatory intervention

The areas for urgent regulatory intervention were noted as being:

- Manpower related: total manpower, manpower skill-set requirements, deputation and selection process, training requirements and budget approval for this.
- Technology related: energy accounting, software requirement, operational requirement, and visibility of OA transactions.

2.3 Summary of deliberations

2.3.1 SLDCs need to be directed to submit long-term Business Plans for approval of SERCs, and SERCs may be advised to address manpower and organisational structure aspects while approving the Business Plans.

2.3.2 The Central Transmission Utility (CTU) and National Load Despatch Centre (NLDC) may be requested to provide a basic plan for technological upgradation of SLDCs.

2.3.3 Minimum qualification and certification criteria need to be introduced for inducting any personnel in SLDC functions and this need to be enforced through the Indian Electricity Grid Code (IEGC) and State Grid Code Regulations.

2.3.4 Regular training needs to be imparted to SLDC personnel to develop requisite skill sets in System Operations, Energy Accounting and Computer Software skills as deemed necessary.

2.3.5 A communication backbone should be created in advance along with a security system in the SLDC for unlimited sharing of data.

2.4 Future course of action

2.4.1 After considering these comments and suggestions, the Working Group concluded that at present, the capability of the SLDCs in several States is inadequate due to the deployment of persons from State Transmission Utilities (STU) with

inadequate training. The Working Group also recognised the need to provide for an appropriate pay structure for SLDC staff to attract talent with specialised skill sets and, to that extent, a difference in pay structure between STU and SLDC may be necessary.

Recommendations

2.4.2 The minimum qualifications and certification of competence of personnel to be deployed in RLDCs should be incorporated in the Grid Code. This may be done first by the CERC which would serve as a model for SERCs.

2.4.3 A model scheme for technological upgradation of SLDCs, with the objective of providing appropriate connectivity for transmission of data for system operations up to SLDCs has been prepared by ED (SO), PGCIL. For this purpose, the scheme of ULDC Control Centre Upgradation was reviewed, and the Summary is presented in **Annexure-1.1**. The Group also agreed to consider SLDC-Rajasthan as a pilot project. The current status of technologies and upgradation requirements for SLDC-Rajasthan is summarised in **Annexure-1.2**. The upgradation requirement from the communication perspective at the national level is summarised in **Annexure-1.3**. This model scheme could be sent to all SLDCs for implementation for which the CTU would provide technical guidance. By associating the CTU and NLDC with technological upgradation of SLDCs, the objective of compatibility of technologies across the system would also be achieved. Necessary software and skill sets should be identified, along with adequate system security, so that data is protected and safe from viruses.

2.4.4 The recommended staffing pattern, organisation structure and incentives for attracting qualified personnel in Load Despatch Centres (LDCs) are the key issues to be deliberated upon by the Working Group. In this context, the Group notes that these issues were extensively dealt with in the Report of the Committee constituted by the Ministry of Power on Manpower, Certification and Incentives for System Operation and Ring-fencing of LDCs. The Manpower Requirement and Organisation Structure as suggested in the Committee's Report for SLDCs is covered in **Annexure-2.0**. In particular, Recommendation-4 of this Report deals with the issue of compensation and incentive structure, enclosed in **Annexure-**

2.1. This may be considered by SERCs while approving the budgets of the SLDCs.

2.4.5 Training of LDC personnel, addressed by Recommendation-3 of the Report, is summarised in **Annexure-2.2**. A template for periodic training of personnel deployed in LDCs needs to be prepared in line with these recommendations, to include system operation, market operations, logistics and regulatory matters.

3 Ring-fencing of SLDCs for functional independence

3.1 Statutory framework

3.1.1 Section 31 of EA 2003 outlines the statutory framework for constitution of SLDCs. It stipulates that State governments shall establish SLDCs for exercising powers and discharge of statutory functions.

3.1.2 The SLDC shall be operated by a government company or any authority or corporation established or constituted by or under any State Act, as may be notified by the State Government. This is subject to the proviso that until a government company or authority or corporation is notified by the State Government, the State Transmission Utility (STU) shall operate the SLDC.

3.1.3 The need for deliberating on ring-fencing of SLDCs has arisen as several instances have come before the CERC where SLDCs have allegedly acted in a partial manner in granting OA, thereby violating the provisions of EA 2003 for non-discriminatory treatment of OA transactions.

3.2 Key issues addressed

3.2.1 In view of this, the following issues were discussed during the deliberations of the Working Group:

Issue 1: How to ensure functional independence of SLDC operations?

- Accounting segregation from STU operations
- Utilisation of revenues from SLDC fees and charges
- Approval of business plan and SLDC budget
- Financial delegation of powers
- Manpower deputation tenure

Issue 2: What should be the mechanism for monitoring the performance of SLDCs and ensuring compliance of directives by them?

- Parameters for performance monitoring of SLDCs
- Compliance of directives

3.3 Summary of deliberations

3.3.1 In order to ensure the financial and functional independence of SLDCs, an option of creating a separate subsidiary or separate accounting division within the STU for SLDC operations needs to be explored.

3.3.2 In addition, the reporting channel for SLDC personnel should be insulated from the normal reporting channel for **TRANSCO/DISCOMs**. The issue to be addressed is separation of functional reporting requirement vis-à-vis administrative reporting requirements on the lines of reporting practices followed in RLDCs. While the RLDC staff reports to Director (Operations) of PGCIL, its functional reporting is independent from its administrative reporting requirements. Functionally, RLDCs are to operate within the ambit of the Indian Electricity Grid Code (IEGC) and CERC Orders. The stability and smooth operation of the power system in that region are discussed in the Regional Power Committees (RPCs). Accordingly, SLDCs can be made functionally independent and should function in accordance with the State Grid Code and directions and orders of the SERCs. Matters concerning the smooth operation of the State Grid should be discussed in the State Power Committees (SPCs) or Grid Co-ordination Committees (GCCs), as required.

3.3.3 For regulatory reporting and regulatory compliance requirements, SERCs should address the SLDCs directly and seek their direct participation in the regulatory process instead of routing such requirements through STUs.

3.3.4 In order to ensure effective functional independence of SLDCs, the SERCs should provide statutory advice to the State Government to be proactive in devising the organisational structure of SLDCs and ensuring its financial independence. For this, the Working Group has considered Recommendation-1 in the Report of the Committee constituted by Ministry of Power for Ring-fencing of LDCs, summarised in **Annexure-2.3**. To ensure financial independence, the Working Group has considered Recommendation-2 which is enclosed in **Annexure-2.4**.

3.3.5 The suggested draft guiding principles for determination of SLDC Fees and Charges and their recovery have been discussed in **Annexure-2.5**.

3.4 Future course of action

3.4.1 After considering these comments and suggestions, the Working Group concluded as follows:

Recommendations:

3.4.2 For effective ring-fencing of SLDCs, there is an urgent need to delegate financial powers to SLDCs and to put in place an appropriate reporting system for administrative control and recording of confidential remarks. Currently, there is a serious conflict of interest as the SLDCs report to the STU and often cannot take any action against the **DISCOM**, as top management personnel are sometimes common for **Discoms** and STUs. The SLDCs may remain under the administrative control of STUs until a separate government company is established for SLDC operations. Creation of a subsidiary of the transmission utility can be a stop-gap arrangement during the transition phase but, in the long run, a separate entity for system operation and load despatch has to be created at the Central and State level. Further, during the transition phase for proper ring-fencing of SLDCs, the practice of their reporting to STUs along with DISCOMs or state trading companies should be discontinued. Irrespective of whether the SEB has been reorganised, the reporting channels going to the top for SLDCs and **Discoms** have to be separate and distinct, not only in terms of position but also in terms of top management personnel. This should also be formally communicated to the respective governments by the ERCs under sections 79 and 86 for promoting competition through open access.

3.4.3 Additionally, to ensure functional independence, the State Government needs to ensure that SLDCs do not directly or indirectly report to any other power sector entity such as distribution or trading licensee. The reporting requirements should be similar to that of the State Electoral Officer under the Election Commission.

3.4.4 The State Governments should also be advised to phase out the single buyer model with a definite time frame and change over to a multi-buyer and multi-seller market model in the State as the single buyer model creates a conflict of interest and brings pressure upon SLDCs to favour incumbent distribution licensees.

3.4.5 The CERC may formulate regulations for fees and charges to be levied by RLDCs to ensure that they not only recover operating and capital servicing costs but also generate adequate surpluses to provide equity for future investments. The State Governments should establish a separate investment fund for SLDCs apart from transfer of existing assets. The revenues for SLDCs, excluding operational expenses, should be escrowed to such a fund. Lenders would be willing to fund capex expansion plans of SLDCs, as approved by ERC, on the basis of such funds. Depreciation should be allowed in view of the pace of obsolescence of IT equipment. The SLDCs should also have full autonomy in expenditure for their operational expenses.

3.4.6 The SERCs may thereafter frame regulations for SLDCs as these are essential for ensuring financial autonomy.

4 Monitoring Mechanism for grant of Open Access

4.1 Key issues addressed

4.1.1 A monitoring mechanism for grant of OA is essential for ensuring that OA for Transmission Open Access Users (TOAU) and Distribution Open Access Users (DOAU) is granted in a non-discriminatory manner. In this context, the following issues were discussed by the Working Group:

Issue-1: Devising monitoring mechanism

- Should this be restricted to 'Short Term OA' alone to begin with? (STU is the nodal agency for long-term OA transactions).
- Should a distinction be made in terms of TOA and DOA transactions? How?

Issue-2: Addressing information asymmetry

- Is there any information asymmetry while processing OA applications?
- Have the timelines for grant of OA been adhered to?

4.2 Summary of deliberations

4.2.1 SERCs may need to monitor, on a monthly basis, the manner in which OA cases are handled by nodal agencies.

4.2.2 For visibility of OA transactions, the SLDCs are the best placed to monitor them at the transmission level, whereas for OA transactions at the distribution or sub-transmission level, it is the concerned distribution licensees who are best placed to monitor and facilitate such transactions. Accordingly, many SERCs have ruled that distribution licensees should act as the nodal agencies for DOA transactions whereas STUs and SLDCs should be the nodal agencies for long-term and short-term **TOA** transactions, respectively. In view of this, the Working Group concluded that monitoring of OA transactions should be ensured, and that ensuring transmission open access (TOA) should be prioritised at the start, followed by Distribution Open Access transactions.

4.2.3 Information regarding OA data should be regularly updated on the SLDC websites and reasoning given for rejection of any OA application.

4.2.4 Long-term and short-term OA should not be treated differently as the Act does not discriminate between them. However, the issue of long-term transmission

capacity build-up and recovery of transmission charges for varying utilisation patterns under changing electricity market structures needs to be addressed.

4.2.5 The STUs are responsible for planning adequate evacuation facilities and this may be taken up either by the STU or other transmission licensees through private sector participation, both for conventional as well as renewable energy projects.

4.2.6 The SERCs should ensure that SLDCs display information on their websites about available transfer capability on different transmission corridors and flow-gates, particularly for congested lines of transmission licensees, and this information should be updated every month. In addition, SLDCs should also publish information about the rejected OA cases on account of congestion, highlighting the congested elements of transmission system.

4.3 Future course of action

4.3.1 After considering these comments and suggestions, the Working Group concluded as follows:

Recommendations:

4.3.2 It is necessary to first resolve the hurdles being faced in short-term OA on State transmission networks. Accordingly, the SERC should separately monitor the cases for short-term OA in transmission on a monthly basis. The cases for short-term OA in distribution may be monitored in a separate format to also include OA on STU networks. Compilation by the FOR should similarly be done.

4.3.3 Open Access is basically intended to utilise the surplus capacity available by virtue of inherent design margins, margins available due to variation in power flows and margins available due to in-built spare transmission capacity created to cater to future load growth or generation addition. Open Access obviously also requires grid connectivity to be in place. Moreover, long–term access to the transmission system requires grid connectivity, based on long-term commitment to pay transmission charges and sufficient evacuation capacity, and does not require case by case grant of OA.

4.3.4 The software being used by RLDCs for receiving and processing OA applications electronically should also be adopted by SLDCs.

5 Rationalisation of OA charges and regulatory framework

5.1 Background

5.1.1 The FOR held a meeting on the issue of rationalisation of OA charges on November 16 and 17, 2005 when the following recommendations were made:

- State Commissions to endeavour to rationalise various charges and as far as practicable club them into a single charge;
- Till intra-State ABT is implemented, grid support charges, parallel operation charges, and other charges to be clubbed into one charge;
- Once intra-State ABT is introduced, there would be no rationale for levy of such charges;
- For emergency drawal from the grid, charges should relate to period and quantum of energy drawal;
- Wheeling charges and transmission charges to be applied at relevant voltage level. Only technical losses should be applied on the basis of relevant voltage level;
- Losses should be applied in kind; and
- Reactive energy charges for OA users should be on par with other users.

5.2 Key issues addressed

5.2.1 To take this forward, a discussion was initiated on similar lines and the following issues were examined:

Issue-1: Transmission charges and wheeling charges

- Applicability of transmission and wheeling charges
- Principles for determination of transmission and wheeling charges (voltage-wise)

Issue-2: Transmission loss and wheeling loss

- Applicability of transmission and wheeling losses for OA transactions
- Principles for determination of transmission and wheeling losses (voltage-wise)

Issue-3: Cross-subsidy surcharge

- Applicability of surcharge in some cases
- Principles for setting trajectory for reduction in surcharge

Issue-4: Treatment for renewable energy (RE) based OA transactions

- Should any distinction be made for OA charges on RE transactions?
  - For OA charges?
  - For loss compensation?
- Will the distinction lead to discrimination between renewables and conventional OA transactions?

Issue-5: Technical requirements for availing of OA and handling of disputes

5.3 Summary of deliberations

5.3.1 A matrix of OA charges applicable under different circumstances should be specified by SERCs and uploaded on the SERC websites. The computation of total OA charges should be clarified, illustrated with examples. In this context of determination and applicability of wheeling charges, the observations of the Appellate Tribunal for Electricity (ATE) under its Judgement dated October 31, 2007 (Appeal no. 3 of 2007 and IA no. 5 of 2007) on the Appeal filed by Hindalco against WBERC Order, are relevant. The ATE observed that the wheeling charges should be applicable only to the extent of utilisation of network and the OA user should not be asked to bear the cost of the entire distribution network. The relevant extract of the Judgement is as follows:

"11. CESC has various systems for supply of electricity. It has EHT system, 33 KV Distribution System, 20KV, 11KV, 6 KV & 33 KV distribution system and LT system. There is no reason for the Commission to ask the appellant to pay wheeling charges for the entire distribution system when electricity is transmitted through its 33 KV distribution system. It does not stand to reason why 33 KVA consumers should pay for the LT lines which are not being used for transmission of electricity to it. The WBERC has fixed 83.54 paise/KWH as the wheeling charges. The relevant provisions that govern the wheeling charges are Regulations 14.3(b) of the West Bengal Electricity Regulatory Commission

(Terms and Conditions) Regulations, 2005 and clause 4.2 of the West Bengal Electricity Regulatory Commission (Terms and Conditions for Open Access – Schedule of Charges, Fees and Format for Open Access) Regulations, 2005.

……

14. The aforesaid Regulations do not state that the wheeling charges are to be based on total or entire network cost. The Judgment rendered by the Tribunal dated July 11, 2006, clearly lays down that cost shall be calculated on the basis of 'applicable network.' Simple question to be asked is, which is the 'applicable network' for transmitting electricity to the appellant. The answer obviously is that applicable network is the 33 KV distribution system on which the electricity is being rolled to the appellant. No further elaboration is required."

5.3.2 Losses for transmission and wheeling should be applied on the basis of applicable voltage for delivery of power at 11 kV and above. However, for OA at LT voltage, the losses at 11 kV may only be considered. Open Access transactions should not be subjected to commercial losses prevalent in the system. Accordingly, only technical losses based on estimate or voltage-wise technical studies should be applied for OA transactions. For OA outside DISCOM, additional inter-State and intra-State transmission losses shall be applicable.

5.3.3 The 'FOR' secretariat has analysed the surcharge applicable in different States. A comparison of cross-subsidy surcharge across States has been summarised in **Annexure-4**.

5.3.4 A summary of all OA charges for sample illustration of 11 kV OA consumer in three States has been compiled by the FOR secretariat in **Annexure-3(A)**. It is evident that despite a reasonable quantum of OA charges, OA transactions are limited mainly due to non-availability of surplus power in the system.

5.3.5 In order to promote renewable energy sources in the State, preferential OA charges may be considered. However, the loss compensation should be uniform across all types of OA transactions depending on the loss at each voltage level.

5.4 Future course of action

5.4.1 After considering these comments and suggestions, the Working Group concluded as follows:

Recommendations:

5.4.2 The applicability of transmission and wheeling charges in different cases of OA should be clarified in the Orders of the SERCs with the help of illustrations. Such a matrix has been provided by MERC and TNERC in their Orders, which are in Annexure-3(B). All SERCs should display illustrative cases of applicable OA charges on their websites for sample consumer categories.

5.4.3 Losses for transmission and wheeling should be applied on the basis of voltage for delivery of power at 11 kV and above. However, for OA at LT voltage, the losses at 11 kV may only be considered as most losses below this voltage level are commercial losses and OA consumers should not be asked to bear these. Only technical losses, based on estimate or voltage-wise technical studies, should be applied for OA transactions.

5.4.4 To promote RE sources, the transmission and wheeling charges may be partly waived for OA transactions based 1on non-firm, that is, non- schedulable RE sources with lower capacity utilisation factors for wheeling of power within the State. However, transmission and wheeling losses may be applied uniformly based on voltage level. Further, in case RE is being sold to other States, no concession in transmission and wheeling charges need be given to RE projects, since the State utilities may have spent significantly to evacuate the power generated by the RE project.

5.4.5 The cross-subsidy surcharge needs to be calculated in accordance with the formula in the Tariff Policy, unless there are valid reasons for deviation. In case there is shortage of electricity, there is no rationale for imposition of any surcharge since the licensee is unable to serve the entire needs of the consumer who is forced to source the remaining quantum from other sources.

5.4.6 The cross-subsidy surcharge should reduce progressively as stipulated in section 42 of the EA 2003 and also the Tariff Policy. The surcharge rates should be

notified in advance for the next few years to provide confidence to OA consumers. Some SERCs as in Rajasthan have already done this.

5.4.7 There is urgent need to ensure uniformity of technical requirements of metering, data communication etc. for OA applicants across the country. Therefore, SERCs may review their Grid Codes and OA Regulations to make them consistent with the Grid Code specified by CERC as provided in section 86(1)(h) of the EA 2003 and the Metering Regulations specified by CEA.

5.4.8 All disputes concerning intra-State OA would come before the concerned SERC under its relevant regulation. Similarly, all disputes in inter-State OA should come before CERC, including the role of SLDC, in such cases.

6 Facilitative standby power supply arrangement

6.1 Background

6.1.1 In the absence of a stipulation of Standby Power Supply arrangement and charges, incumbent licensees may levy high standby charges in the event of failure of OA supply, so as to discourage OA. Hence, the need for Facilitative Standby Power Supply was felt.

6.1.2 Besides, para 8.5.6 of the Tariff Policy stipulates that:

> "*In case of outage of Generator supply to a consumer on open access, standby arrangements should be provided by the licensees on the payment of tariff for temporary connection to that consumer category as specified by the Appropriate Commission"*.

6.2 Key issues addressed

6.2.1 In view of this, the following issues were discussed by the Working Group:

Issue -1: Clarity on various aspects of standby power

- Purpose of standby power – capacity or energy or both?
- Extent of standby power and reduction in contract demand
- Maximum and minimum period for standby power supply

Issue -2: Requirement of standby power

- Distinction between TOAU and DOAU

Issue -3: Operationalising standby power supply arrangement

- Operationalising standby power supply arrangement under multi-discom scenario
- Who provides standby support?
- Compensation requirements of host distribution licensee
- Banking vs. standby in case of RE sources
- Alternatives for pricing of standby power supply arrangements

6.3 Summary of deliberations

6.3.1 SERCs may evaluate Temporary Connection charges vis-à-vis marginal cost of power procurement for standby power supply arrangements for OA transactions.

6.3.2 Standby capacity should be equated to captive capacity or OA capacity contracted by the OA consumer.

6.3.3 Temporary tariff in many States is too high whereas the spirit of the Tariff Policy is to ensure that excessive OA charges should not render OA a non-starter. Thus standby power should be charged at marginal tariff and there should be no fixed burden for availing of standby support. A detailed description of the methodology for standby support as prescribed by TNERC is enclosed in Annexure-5.

6.3.4 The duration of standby support should also be fixed while ensuring that such energy drawal takes place only under forced or planned outage period.

6.4 Future course of action

6.4.1 After considering these comments and suggestions, the Working Group concluded as follows:

Recommendations:

6.4.2 The Tariff Policy seeks to ensure that excessive OA charges should not render OA a non-starter. Hence, the standby arrangement for OA consumers should be provided by the incumbent licensee to the extent of OA load sanctioned at day ahead notice, by levying the retail tariff applicable for consumer categories only for the period when such standby support is requested. This would harmonise the approach towards temporary connection charges envisaged in the Tariff Policy. To avoid misuse of standby support, it should be provided for a maximum period of six weeks in a year, to be counted on the basis of number of days. Beyond this duration, the OA consumer should have to avail of regular supply from the distribution licensee.

6.4.3 Standby support should also be extended only to OA consumers; OA generators would need start-up power support.

6.4.4 The charges for standby power support should comprise only energy charge for the days when standby support is requested, and the demand charge for the six-week period may be uniformly spread across the year. No fixed demand charges should be levied on OA consumers beyond this period of six weeks.

7 Summary of Recommendations

This section summarises the recommendations of the Working Group:

7.1 Capacity building at SLDC

7.1.1 The minimum qualifications and certification of competence of personnel to be deployed in RLDCs should be incorporated in the Grid Code. This may be done first by the CERC and this would serve as a model for SERCs.

7.1.2 A model scheme has been prepared for technological upgradation of SLDCs to provide appropriate connectivity for transmission of data relating to system operations up to SLDCs. This scheme could be sent to all SLDCs for implementation for which CTU would provide technical guidance.

7.1.3 The recommendations of the Committee constituted by the Ministry of Power on Manpower, Certification and Incentives for System Operation and Ring-fencing of LDCs, for staffing pattern, organisation structure and incentives to attract qualified personnel in LDCs may be considered by the SERCs while approving the budgets of SLDCs. A template for periodical training of personnel deployed in LDCs needs to be prepared in line with the recommendations of this Committee, to include system operation, market operations, logistics and regulatory matters.

7.2 Ring-fencing of SLDC for functional independence

7.2.1 For effective ring-fencing of SLDCs, there is an urgent need to delegate financial powers to SLDCs and also an appropriate reporting system for administrative control and recording of confidential remarks. The SLDCs may remain under the administrative control of STUs until a separate government company is established for their operation. The creation of a subsidiary of the transmission utility can work as a stop-gap arrangement during the transition phase. However, in the long run, a separate entity for system operation and load despatch will have to be created at the Central and State levels.

7.2.2 During the transition phase, for proper ring-fencing of SLDCs, the practice of their reporting to STUs along with Discoms or state trading companies should be discontinued. Irrespective of whether the SEB has been reorganised or not, the reporting channels right up to the top for SLDCs and Discoms have to be separate

and distinct, in terms of both position and top management personnel. This may be formally communicated to the State governments by the ERCs as advice under section 79 and 86 for promoting competition through OA.

7.2.3 State governments need to ensure that SLDCs do not report directly or indirectly to any other power sector entity such as distribution or trading licensee. The reporting requirements ought to be kept similar to the reporting pattern for State Electoral Officers under the Election Commission.

7.2.4 State governments should phase out the single buyer model with definite timeframe, to pave the way for multi-buyer and multi-seller market models within the State, as the single buyer model creates a conflict of interest and brings pressure upon SLDCs to favour incumbent distribution licensees.

7.2.5 CERC may formulate regulations for fees and charges levied by RLDCs to ensure that they not only recover operating and capital servicing costs but also generate surpluses to provide equity for future investments. The State governments should also establish separate investment funds for SLDCs apart from transfer of existing assets. The revenues for SLDCs, excluding operational expenses, should be escrowed to such a fund. Lenders would be willing to fund capex expansion plans of SLDCs, as approved by ERC, on the basis of such funds. Depreciation should be allowed in view of the pace of obsolescence of IT equipment. The SLDCs should also have full autonomy in expenditure for their operational expenses.

7.2.6 The SERCs may thereafter frame regulations for SLDCs as these are essential for ensuring financial autonomy.

7.3 Monitoring mechanism for grant of open access

7.3.1 The SERCs should monitor cases for short-term OA in transmission separately, on a monthly basis. Cases for short-term OA in distribution may be monitored in a separate format which may also include OA on STU networks. Compilation by the FOR may similarly be done.

7.3.2 Open Access is intended to utilise the surplus capacity available by virtue of inherent design margins, margins available due to variation in power flows, and margins available due to in-built spare transmission capacity created to cater to

future load growth or generation addition. Hence, OA will also require grid connectivity. Long–term access to the transmission system requires connectivity to the grid based on long-term commitment to pay transmission charges and sufficient evacuation capacity, and does not require case by case grant of OA.

7.3.3 The software being used by RLDCs for receiving OA applications electronically and for processing them should be adopted by the SLDCs.

7.4 Rationalisation of OA charges

7.4.1 The applicability of transmission and wheeling charges in different cases of OA should be clarified in the Orders of the SERCs with the help of illustrations. All SERCs should display illustrative cases of OA charges on their websites for sample consumer categories.

7.4.2 Losses for transmission and wheeling should be applied on the basis of applicable voltage for delivery of power at 11 kV and above. However, for OA at LT voltage, the losses at 11 kV may only be considered as most losses below this voltage level are commercial losses and OA consumers should not be asked to bear them. Only technical losses, based on estimate or voltage-wise technical studies, should be applied for OA transactions.

7.4.3 To promote RE sources, the transmission and wheeling charges may be partly waived for OA transactions based on non-firm, that is, non- schedulable RE sources with lower capacity utilisation factors for wheeling of power within the State. However, transmission and wheeling losses may be applied uniformly based on applicable voltage level. Further, in case RE is being sold to other States, no concession in transmission and wheeling charges need be given to RE projects.

7.4.4 The cross-subsidy surcharge needs to be calculated in accordance with the formula in the Tariff Policy, unless there are valid reasons for deviation. In case there is shortage of electricity, there is no rationale for imposition of any surcharge as the licensee is unable to serve the entire needs of the consumer, and the consumer is forced to source remaining quantum from other sources.

7.4.5 Cross-subsidy surcharge should reduce progressively as stipulated in section 42 of

EA 2003 and the Tariff Policy. The surcharge rates should be notified in advance for the next few years to provide confidence to OA consumers.

7.4.6 There is urgent need to ensure uniformity of technical requirements of metering, data communication etc. for OA applicants across the country. The SERCs may review their Grid Codes and OA regulations to make them consistent with the Grid Code specified by CERC as provided in section 86(1)(h) of EA 2003 and the Metering Regulations specified by CEA.

7.4.7 All disputes of intra-State OA would come before the SERC under its regulations. Similarly, all the disputes in inter-State OA should come before the CERC, including the role of SLDCs in such cases.

7.5 Facilitative standby power supply arrangement

7.5.1 Standby arrangements for OA consumers should be provided by the incumbent licensee to the extent of OA load sanctioned at day ahead notice, by levying the retail tariff as applicable to respective consumer categories only for the period during which such standby support is requested. This would harmonise the approach towards temporary connection charges envisaged in the Tariff Policy. To avoid misuse of standby support, it should be provided for a maximum period of six weeks in a year, to be counted on the basis of number of days. Beyond this duration of six weeks, the OA consumer should avail of regular supply from the distribution licensee.

7.5.2 Standby support should be extended only to OA consumers; besides, OA generators would need start-up power support.

7.5.3 The charges for standby power support should comprise only energy charges for the days when standby support is requested, and the demand charge for the six-week period may be uniformly spread across the year. No fixed demand charges should be levied on OA consumers beyond this period of six weeks.

ANNEXURES

ANNEXURE-1: Technological Upgradation requirements

Annexure-1.1: ULDC Control Centre Upgrade -Summary

1. **BACKGROUND**:

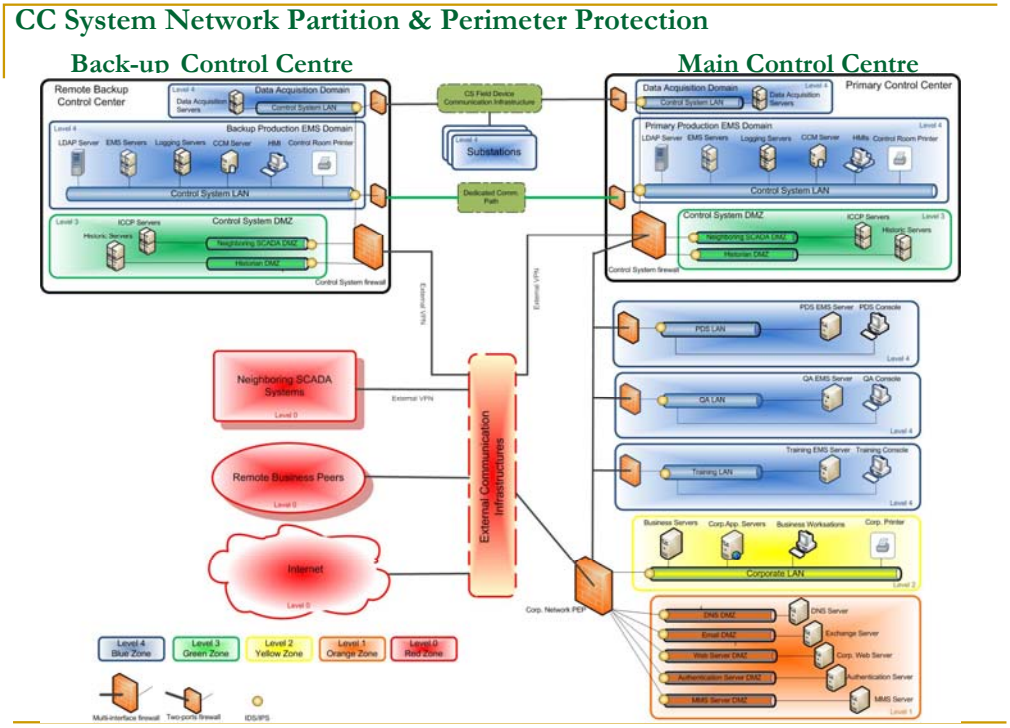
- POWERGRID established ULDC schemes in all five (5) regions in close association with State Power utilities.
- The control centers were in a hierarchical manner - Regional Load Despatch Center (RLDC), State LDC, Sub LDC – a three (3) level hierarchy.
- The scheme established Control Centers, Remote Terminal Units, PLCC, Optic Fiber cable and Microwave Communication network.
    - The RTUs acquire and forward (analog & digital data) voltage, frequency, MW, MVAR, breaker & isolator etc. to nearest control centre (Sub-LDC/ SLDC/RLDC) over PLCC and or digital communication channels in real time.
    - The Dual Redundant control centre hardware (SCADA/EMS ISR, NMS, ICCP servers with peripheral and VPS) are interconnected on LAN.
    - The control centers are connected through digital communication links over OFC and Microwave.
    - All the existing substations and generating stations of the central sector were covered under ULDC scheme. Substations/generating stations of central sector commissioned subsequent to commissioning of ULDC projects have also been integrated with the SCADA system of ULDC.
    - In the state sector the only selected substations were included in the ULDC project and many of the substations commissioned after commissioning of ULDC project have not been integrated with the SCADA system.

2. Issues:

The existing control centres were designed during 1996-2002 period, prior to ABT introduction. These control centres have the provision for expansion. The wide band communication facilities created under ULDC covers only around 30-40% of the RTU locations. The following environmental changes impact functionality for a LDC:

- **Structural Changes** in the Power Sector and phenomenal growth in system (load, stations, lines)
- **Decentralized Scheduling** & Frequency Band Regime- ABT
- **Electricity Act 2003 –**
  - Traders introduced
  - Open access in transmission introduced.
  - Granting of Short Term Open Access is responsibility of LDC.
  - Available Transfer Capacity calculation vital and declaration required
  - Power Exchange information need integration
- **Information Availability** to several users is required necessitating Web Interface to SCADA system and associated security tools.

These issues can be addressed with changes in the LDC by introducing new architecture with network partition for SCADA/EMS, Web and control centre interface; applications for security, logging, authentication etc. (The suggested structure **is meant for Transmission System Operation** and need to be reviewed if Distribution Company's requirement is also to be addressed)



Source – VLPGO/CIGRE D2.24

3. Approach

The approach to handle control centre communication and stations (RTU) need to be different as elaborate below:

- **Power System Interface (Station):** Power System is Dynamic and control centre can not wait for en block addition/replacement of existing SCADA/RTU system.

The present scheme was designed with feature of expandability and interoperability. By defining interoperability parameters, control center and RTUs can be integrated with the existing system. This approach shall continue for monitoring new stations and utilities. However, the existing substations which have yet not been integrated with control centres would require integration immediately.

- **Control Centre**: An introduction of backup SLDC to address business continuity aspect and security issues. The backup SLDC, for SLDCs with immediate need of upgrade, can add functional flexibility and in future the same can take over as main SLDC with all features. An existing Sub-LDC can also be replaced through redundancy in communication. Further all the New control centre upgrade need to target:
    - Main and Back-up control centre
    - Structure with security feature
    - Full SCADA functionality with ABT & UI
    - Network and Reliability Application
    - PMU integration

  The database handling can be harmonized by standardizing the data model using CIM in Indian Context and centralized server for data modeling as service at all RLDCs.

- **Communication Infrastructure:** This shall be continuously upgraded on need basis. In case of multiple new RTUs access communication links have to be augmented with sufficient redundancy. Other issues for improvement in communication infrastructure are:
    - PLCC Congestion- New Wideband Node to be created
    - Microwave- To be replaced by OFC as Frequency band taken back by DOT
    - Network Redundancy is required in most of the cases.

The wide band communication network needs to be expanded on the following basis.

- All important EHV s/s may be connected on OPGW based fibre optic network at least from one direction.
- All critical grid EHV s/s may be connected on OPGW based fibre optic network atleast in two directions.
- All end user equipment shall use/be compatible with IP protocol.
- Future technology based upon WAMS would work only on FO based communication network.

4. **Cost:**

   Control Center Cost Projection: Cost for Control Center up gradation needs to be based on the following issues:
    - Vendor inputs as required for realistic cost calculation.
    - Cost should have consideration for product Life cycle.
    - Parallel creation of Control Centers.
    - Communication
    - No of substations where RTUs are to be installed.

There is a need of adjustment for Annual Maintenance cost, escalation and addition for new application software e.g. Markets, power tracing. The Communication cost varies greatly with choice of network. However, it would be advisable that all the new substations are provided with either substation automation system or RTU for data communication with the control centres along with the substation equipment and the new transmission lines are provided with OPGW in place of earth wire so as to avoid enblock requirement of RTUs and communication infrastructure.

5. Future Technology:

Transmission Grids require sufficient and reliable capacity to support vital energy markets, and maintain high system reliability. In pursuit of better utilization of existing transmission system, grid needs to be operated closer to its **technical limit** while maintaining system security. Hence:

- Steady state view of SCADA systems needs to be replaced by faster, additional and more precise information through uses of Wide Area Monitoring Systems (WAMS) using Phasor Measurement Units - PMUs.
- POWERGRID has undertaken initiative to infuse PMUs for better monitoring and control of Indian Grid.
- The wide area control system (WACS) supported by a developed IT & Communication resource, have potential to replace present day Grid SCADA solutions.
- The control Centre Needs to be ready for future infusion of above technology.

Annexure-1.2: SLDC Upgradation requirements

State Load Dispatch Centre

Meeting Future Expectations

Tools existing in Rajasthan SLDC (Heerapura)

SCADA FUNCTIONS

- DATA ACQUISITION
- SUPERVISORY CONTROL
- DATA EXCHANGE WITH CC
- HISTORICAL INFORMATION STORAGE & RETRIEVAL (ISR)

EMS FUNCTIONS

1. OPERATION SCHEDULING
2. LOAD GENERATION BALANCE
3. POWER SYSTEM ANALYSIS

NMS

Sub LDC :

1. SCADA ONLY

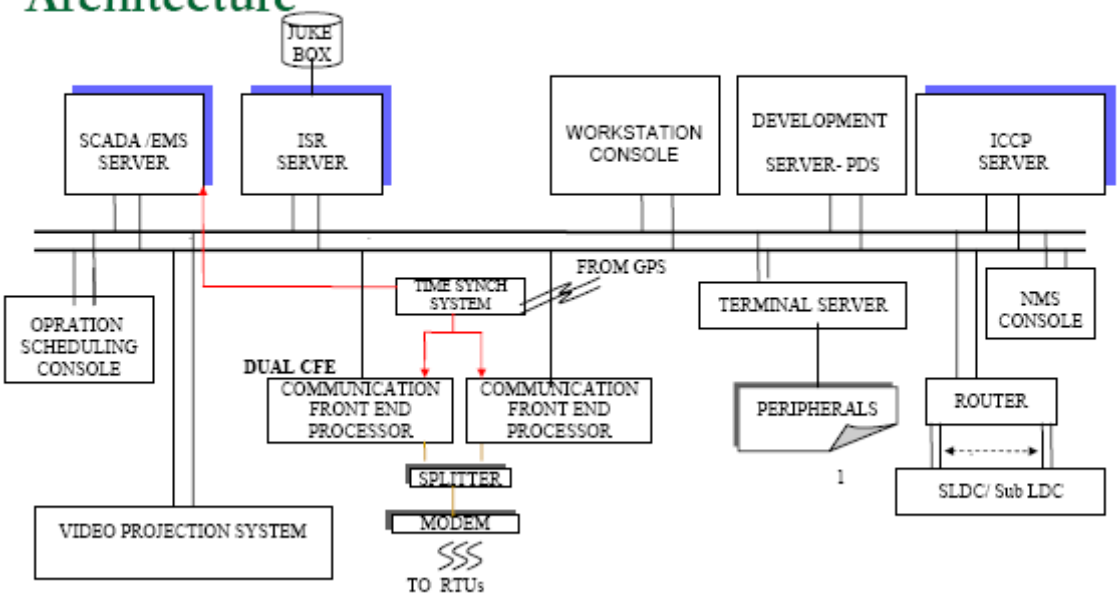
Control Centre need to be upgraded for:

- **Power Sector Growth**:
  - Existing RTU (400/220/132kV) : 75 no
  - Stations (400kV/220kV/generating station):
- **New Requirement**:
  - A new Efficient Whole Sale Electricity Market is expected to operate.
  - Multifold increase in Open Access Requirement need new tools integrated with SCADA/EMS.
- **Technological Challenge**:
  - Emergence of 68510 & IEC-104, Cyber security, Web interface:
  - Power Data Warehouse Needs to be created for various corporate user/ Stakeholders/ web users etc.

Control Centre: Needs to Evolve

- To meet the future demand
- To find & implement the end-state of Future EMS Architecture.
- To provide a high level of interoperability between:
  - RTU to SCADA (Existing)
  - Between control centre
    - Real Data Exchange SCADA to SCADA (ICCP) - existing
    - Data modeling among heterogeneous system - required
    - Within control center application to application - required.
- New technology issues: -
  - RTU-SCADA-only 101 interface
  - IEC-104 & 68510 Required
  - Cyber security required

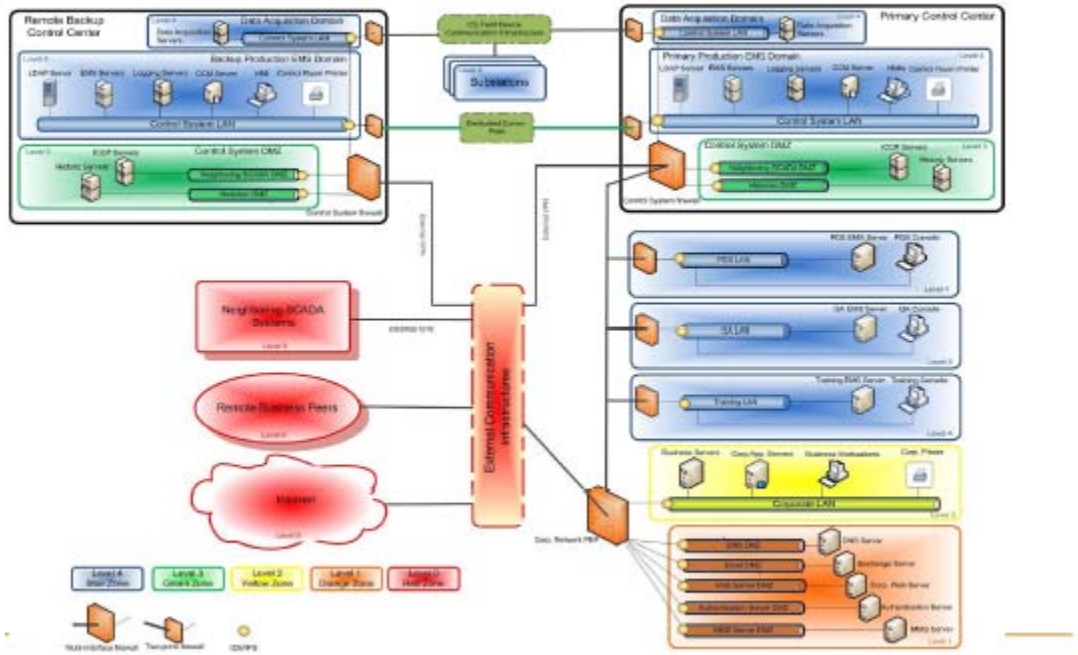
Existing- SLDC CONTROL CENTRE Architecture



Next Generation Control Centre :

- Control Centre Network partition
  - To facilitate security policies
- Control Centre Application Architecture
  - "A Standard integration layer" based solution.

CC System Network Partition & Perimeter Protection

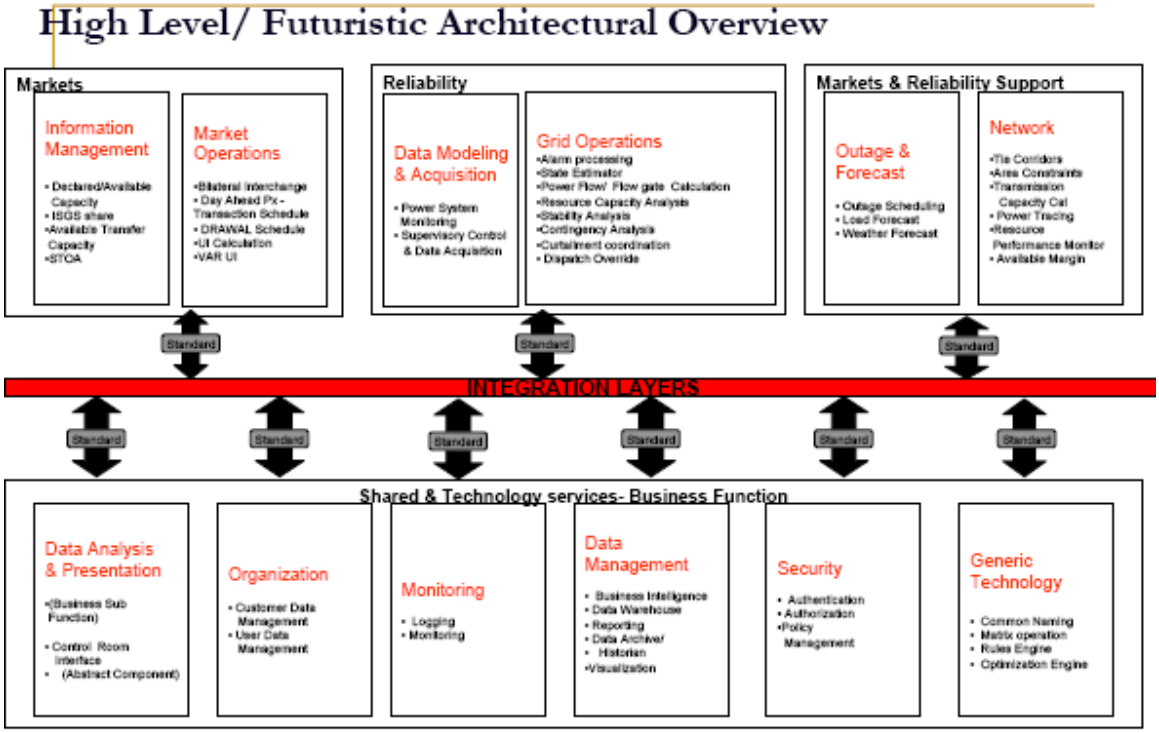


Source: CIGRE Paper WGDD2.24- EMS Architecture

The GAP

Between Present & Future Solution:

- Solution for Market Management –Still evolving.
- Pre internet Architecture design makes existing EMS/SCADA platform vulnerable to cyber attacks.
- Standardised Data models representing electricity network - CIM
- Multiplicity of GUI at present needs to be replaced by similar GUI.
- State estimation to state measurement



Salient Features of Future Control Centre Architecture:

- SOA Adoption - Service Oriented Architecture will be built around highly modularized, reusable components over a standardized messaging bus or "A standard Integration Layer".
- CIM Compatibility – System Vendors & 3rd party providers will adopt the Common Information Model.
- Built-In-Security - System Resistant to cyber attacks
- Platform Independence – It will facilitate the implementation of multi vendor solution & migration of business logic to future tech.
- Unified Graphical Interface: Dispatchers will have an application independent user interface.
- PMU Support: This architect will accommodate the high performance requirement associated with Synchrophasors.

Annexure-1.3: Communication Upgradation Requirements

PRESENT vs FUTURE NATIONAL SCENARIO

DESCRIPTION	PRESENT	FUTURE (by 2012)
S/s connected with data contol centres	1250	2500
Control Centres	29	29
Fibre Optic Transmission System (FOTS) for ULDC	9383 kms	25038
Microwave (MW) for ULDC	165 HOPS	-
Communication Types	Async/ Sync	IP based alongwith Sync/Async.
Bit rate	300bps - STM 1/STM4 (155/625Mbps)	10-20 Gbit/s
Media RTU-CC	PLCC/MW	Analog & Digital PLCC / FO/ unlicensed Radio
CC-CC	MW/FO	FO

CURRENT COMMUNICATION TECHNOLOGIES

- Fiber Optic Transmission Systems based on STM1/STM4 capacity.
- MW in 2.3 -2.5 GHZ with 4 E1 capacity.
- Analog PLCC with 300 -1200 bps
- Standard 2 W/4W phones, Fax machines
- Different interfaces like V.35, V.21, RS232, G.703, Ethernet.
- Presently only 1/3 RTUs are on wide band nodes.
- Digital PLCC equipment with flexible interfaces, embedded Protection Signaling besides the speech over data channels.
- Unlicensed band radio equipment in 2 & 5 GHz limited to short spans & dispersed users.

CONSTRAINTS FORESEEN

• Growth in data for SCADA and other Value-Added Services (VAS) like e-mail, internet, VOIP, on-demand services etc. can only be met with the fiber optics based network.

• Seamless communication required w.r.t existing and upcoming interfaces, technologies & media.

• Limitations of existing wireless networks upto 4 E1 only in the 2.3 -2.5 GHz band. This band is being withdrawn by the regulatory body in the near future.

• PLCC links becoming congested due to frequency crunch & low bandwidth.

• Futuristic technologies such as Wide Area Measurement (WAM), System Integrated Protection (SIP) etc. can work successfully only on Fiber Optic.

• IT based enabling & flexibility of user databases/presentations desired.

CRITERIA FOR FUTURE REQUIREMENTS

• All wideband networks shall be fiber optics based as the regulator has proposed not to use the 2.3 -2.5 Ghz Microwave band in Power Sector and in view of meeting the requirements of the futuristic technologies.

• All Important EHV s/s may be connected through OPGW based fiber optic network at least from one direction.

• All Critical grid EHV s/s may be connected through OPGW based fiber optic network from at least two directions for redundancy.

• Wide-Area Measurement Systems (WAMS) require more bandwidth and least latency. This can only be achieved through fiber optic networks.

• All end user equipment shall use / be compatible with IP protocol.

COST & EXPANSION PROJECTIONS

- Utilities like MSETCL, UPPCL have planned state-wide OPGW based fiber optic n/w for future grid s/s & g/s which are more than two –fold of the present network.

- The average length of OPGW based fiber n/w for such large sized states is approximately 2500 kms per state.

- The average cost of OPGW based fiber optic n/w for such large sized states is Rs 150 crores per state.

- The state-wide growth in the substations to be covered under SCADA is also seen as 100%.

- The communication cost per s/s is approximately Rs 40 lacs based on the above criteria, which is negligible as compared to the cost of the s/s.

Annexure-2: Report of Committee on Ring-fencing of LDCs:

Manpower Requirement at LDC

Top management- Expert level (5)

S. No	Position	Department	Level	No.
1	Head- LDC	–	E8- E10	1
2	Divisional Head- System Operation	System Operation	E7- E8	1
3	Divisional Head- Market Operation	Market Operation	E7- E8	1
4	Divisional Head- System Logistics	Logistics	E7- E8	1
5	Divisional Head- Establishment Services	Services	E7- E8	1

Middle management- Proficient level (15)

S. No	Position	Department	Level	No.
6	Shift Charge Manager- Real-time	System Operation	E6 - E7	5
7	Chief- Reliability Coordinator	System Operation	E6- E7	1
8	Chief- Grid Ancillary Services Coordinator	System Operation	E6- E7	1
9	Chief- Open Access & Scheduling Coordinator	Market Operation	E6- E7	1
10	Chief- Settlement System Coordinator	Market Operation	E6- E7	1
11	Chief- Pool Account Administrator	Market Operation	E6- E7	1
12	Chief- Logistics (SCADA)	Logistics	E6 - E7	1
13	Chief- Logistics (IT & Communication)	Logistics	E6 – E7	1
14	Chief- Establishment Services	Services	E6 - E7	1
15	Chief- Regulatory Affairs	Services	E6- E7	1
16	Chief- Human Resources	Services	E6- E7	1

Executives-Basic level [Real-time]- (15)

S. No	Position	Department	Level	No.
17	Executive- Power System Security	System Operation	E2 - E5	5
18	Executive- Resource Scheduling	Market Operation	E2 – E5	5
19	Executive- Open Access	Market Operation	E2 – E5	5

Executives- Basic level [Off-line] – (33)

S. No	Position	Department	Level	No.
20	Executive- Grid Ancillary Services	System Operation	E2 - E5	1
21	Executive- Analysis & Offline Simulations	System Operation	E2 – E5	1
22	Executive- Energy Management System	System Operation	E2 – E5	1
23	Executive- System Protection Coordination	System Operation	E2 – E5	1
24	Executive- Planned Outage Coordination	System Operation	E2 – E5	1
25	Executive- Dispatcher Training Simulator	System Operation	E2 – E5	1
26	Executive- Documentation	System Operation	E2 – E5	1
27	Executive- Power System Information	System Operation	E2 – E5	1
28	Executive- Coordination Committee	System Operation	E2 – E5	1

S. No	Position	Department	Level	No.
29	Executive- Metering System Design	Market Operation	E2 – E5	1
30	Executive- Metering System Maintenance	Market Operation	E2 – E5	1
31	Executive- Meter data Collection	Market Operation	S1 – E2	1
32	Executive- Meter data Validation & Processing	Market Operation	S1 – E2	1
33	Executive- Energy Accounting	Market Operation	E2 – E5	2
34	Executive- Settlement	Market Operation	E2 – E5	1
35	Executive- Pool Account Administration	Market Operation	E2 – E5	1
36	Executive- SCADA Hardware	Logistics	E2 – E5	1
37	Executive- SCADA Software	Logistics	E2 – E5	1
38	Executive- Telemetry	Logistics	E2 – E5	1
39	Executive- Online Database Development	Logistics	S1 – E2	1
40	Executive- Online Database Maintenance	Logistics	E2 – E5	1
41	Executive- IT software development	Logistics	E2 – E5	1
42	Executive- IT systems maintenance	Logistics	S1- E2	1
43	Executive- Applied R & D	Logistics	E2 – E5	1
44	Executive- Communication System	Logistics	S1 – E2	1
45	Executive- LDC Fees and Charges	Services	E2 – E5	1
46	Executive- Human Resource Management	Services	E2 – E5	1
47	Executive- Law and Regulatory Affairs	Services	E2 – E5	1
48	Executive- Procurement & Outsourcing	Services	E2 – E5	1
49	Executive- Administration (Library, Canteen, DG etc,)	Services	E2 – E5	1
50	Executive- Establishment (Payroll, claims, incentives)	Services	S1 – E2	2
51	Executive- CSR, Renewables, Energy Efficiency	Services	E2- E5	1

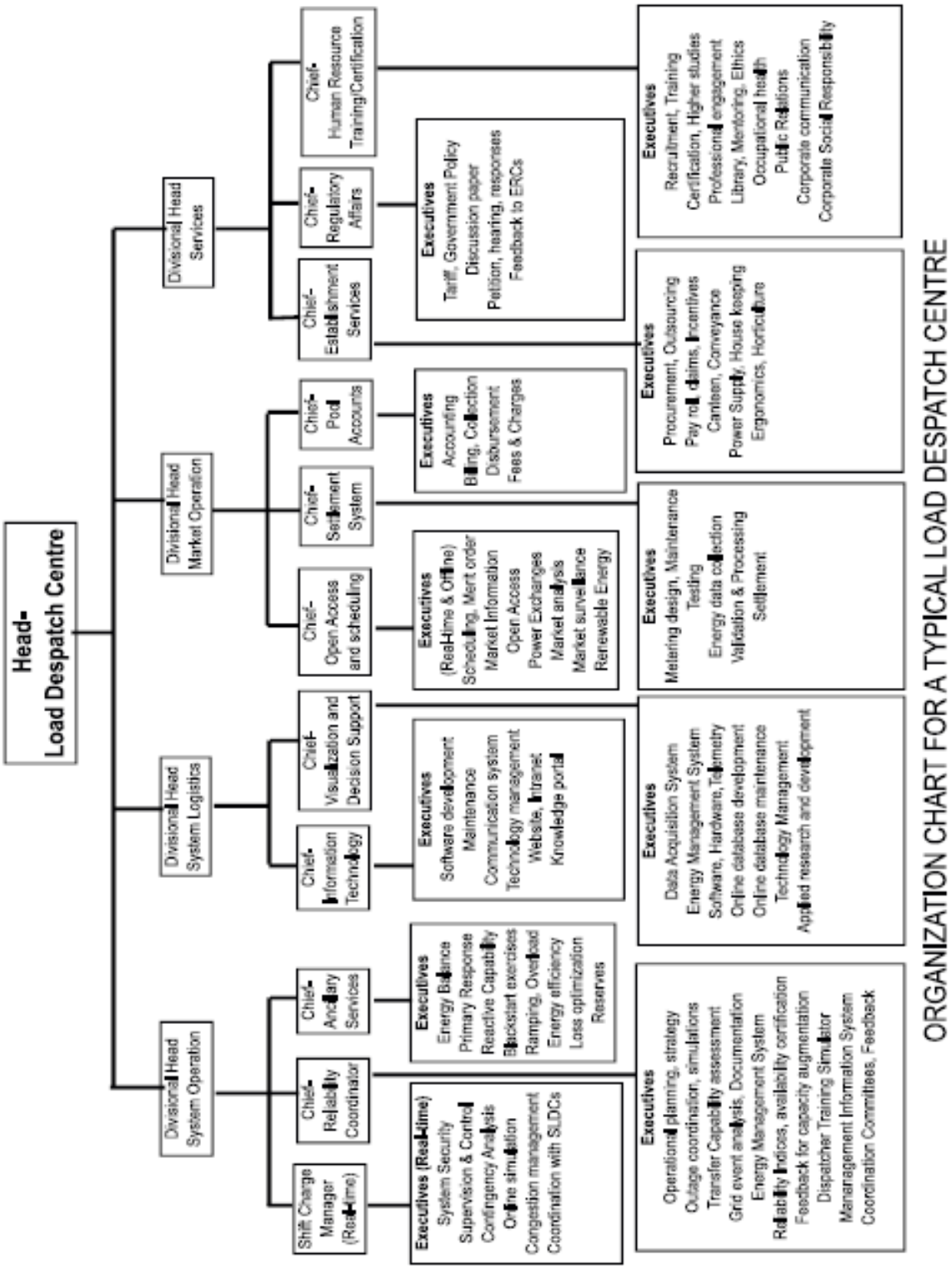
Total executives in a typical LDC: 60 - 70

Total estimated number for all India with 39 control centres: 2250 - 2750

Assumptions:

LDCs would focus on their core activities and outsource the routine and non-core activities to improve their productivity.

Typical Organisation Structure for LDC



Annexure-2.1: Compensation Structure and Incentive for LDC personnel

Recommendation-4:

The highly specialised technical nature of LDC function necessitates a suitable compensation structure to attract and retain talent. The Committee recommends:

a) The compensation structure for LDC personnel should be substantially higher than comparable companies in the power sector both in the public as well as private.

b) Apart from compensation structure, innovative incentive schemes, such as sabbaticals for higher learning and opportunities for Professional Engagement (PE) in the form of attending seminars/workshops and conferences both in India and abroad must be provided.

c) Once the certification system is introduced, monetary incentives similar to Air Traffic Controllers can be provided to the System Operators based on their ratings.

Annexure-2.2: Training Requirements for LDC personnel

Recommendation-3:

The Committee recommends:

a) Introduction of a system of certification of System Operators by an independent Central body, similar to the system followed in case of Air Traffic Controllers.

b) Establishment of a Central Institute for training of System Operators. Initially, the National Power Training Institute (NPTI) may be entrusted with the responsibility of training and certification.

c) Within the next one year, all the course material, system and procedures required for administrating a 'basic level' of training and certification should be developed.

d) All LDCs must ensure that all the personnel of LDCs undergo this 'basic level' training and certification and only certified personnel staff the LDCs within two years from the release of this Report. The appropriate Electricity Regulatory Commissions would be furnished with an Annual Compliance Report of this requirement. Subsequently, advanced level training and certification programme must be introduced.

e) Fresh recruitment at regular intervals for lowering the average age of the work force in the LDCs.

f) Introduction of suitably designed courses in the Indian Institute of Technology and National Institutes of Technology for ensuring availability of skilled manpower.

g) Active collaboration of LDCs with educational institutes for research and development related to Indian power system and electricity market operation.

Annexure-2.3: Organisational Structure for SLDCs

Recommendation-1:

The Committee recommends that the LDCs should be ring-fenced suitably to ensure their functional autonomy by taking the following steps:

a) The Appropriate Government should take suitable steps to facilitate independent functioning of the Load Despatch Centres in line with the Electricity Act 2003 and National Electricity Policy. To begin with, the State Governments are urged to create a separate representative board structure for governance of LDCs on the lines of wholly owned subsidiary being created for the independent System Operation of RLDCs and NLDC.

b) The financial accounts should be separated for all LDCs by 31st March 2009, with the Appropriate Electricity Regulatory Commissions (ERCs) specifying the fees and charges payable.

c) Capital Expenditure (CAPEX) plans for modernisation of all LDCs during 2009-12 should be submitted and the approval of the respective Electricity Regulatory Commission (ERC) should be obtained by 31st March 2009. The Central Transmission Utility (CTU) and Regional Load Despatch Centres (RLDCs) should extend the necessary assistance to SLDCs in this area.

d) In the next stage, rolling 5-year CAPEX plans should be prepared by each LDC and got approved by the respective ERCs to take care of the system expansion, associated real-time data requirements as well as technological innovations and obsolescence of

control centre equipment. ERCs may examine CAPEX proposal considering a shorter life cycle of 7-10 years for such equipment.

Annexure-2.4: Ensuring Financial Independence of SLDCs

Recommendation-2:

For making LDCs financially self-reliant, the Electricity Regulatory Commissions (ERCs) should recognise the three distinct revenue streams:

e) Fees and charges for system operation.

f) Tariff for decision support system and IT infrastructure (currently only ULDC tariff)

g) Operating charges for scheduling, metering and settlement for market players.

All Generating Companies and licensees using the services of the LDCs would make all the above payments. In addition, the LDCs could provide value added services (studies, manpower development, reports, access to data archives etc.) on chargeable basis.

Annexure-2.5: Suggested Principles for SLDC Fees and Charges

(a) SLDC charges and Fees can comprise three components

i. Registration or Connection Fees

ii. Annual SLDC Fees – corresponding to annualized capital cost recovery component linked to 'specified period' to be payable on semi-annual basis.

iii. SLDC Operating Charges – corresponding to annual operating costs recovery component comprising Employee expense, R&M expense, A&G expense, interest on working capital and RLDC fees and charges, payable monthly in arrears.

(b) **Annual SLDC Fees** – shall be determined based on annualized capital cost recovery component based on approved capex schemes and approved 'specified period' for annualisation depending on nature of scheme. The annualized capital cost shall comprise cost of amortization over specified period, interest and financing cost including return on equity, if any. The SLDC should submit investment plan alongwith capex plan for approval for each scheme separately, for capex amount exceeding say, Rs 250 Lakh. Annual SLDC fees should include depreciation on capitalized costs and interest cost of borrowing corresponding to SLDC assets and return on equity, wherever applicable. Until separate accounting for SLDC function is maintained, STUs will have to submit 'Allocation Statement' for asset base and operating costs corresponding to SLDC function.

(c) **SLDC Operating charges** - corresponding to annual operating costs comprising Employee expense, R&M expense, A&G expense, interest on working capital and RLDC related fees and charges, payable monthly in arrears.

(d) **Payment Modalities**: Recovery of Annual SLDC Fees and Annual SLDC Operating Charges should be shared between Generating Companies and Distribution licensees on 50:50 basis. Further, such charges should be levied on distribution licensees and long term transmission open access users in proportion to their maximum demand (MW) met during previous year and in case of generating company it should be levied on installed capacity (MW) of the generating station. Annual SLDC Fees should be recovered on semi-annual basis on 10th April and 10th October of each fiscal year, whereas Annual SLDC Operating Charges should be recovered on monthly basis, in arrears.

(e) **Rescheduling Charges**: To be levied on generating companies, distribution licensees, trading companies, transmission OA users, as the case may be, at the rate

of Rs 3000 per schedule for revision in schedule upon finalization of schedules by SLDC on day-ahead basis or for non-submission of schedule as per State Grid Code requirements.

Annexure-3 (A): Summary of Open Access Charges across eight States

Chhattisgarh Electricity Regulatory Commission

Case 1 Charges for 5 MW at 33 KV industrial consumer availing short-term open access for 1 month (based on TO 2007-08)						
S.No.	**Particulars**			**Calculations**		
1	Load at drawal point (Consumer)			A	MW	5
2	Transmission Charges in kind			B	%	4.03
3	Wheeling Charges in kind			C	%	6
4	For users using both transmission and distribution system - Transmission and Wheeling Charges in kind			D	%	6
5	Load at injection point			E=A/(1-6/100)	MW	5.32
6	Base Energy Consumption			F=Ax1000x24x30	kwh	3600000
7	Energy injected into system			G=F/(1-6/100)	kwh	3829787.23
8	For users using both transmission and distribution system the energy injected into distribution system			H=Gx(1-B/100)	kwh	3675446.81
9	**Injection Voltage level / Drawal Voltage Level**				132/33	33/33
10	**Charges**	**Applicable Tariff (Charges)**		**Calculations**	**Rs.**	**Rs.**
11	Transmission Charges	Rs. / MW / day	518	I=518xEx30	82659.57	0
12	Wheeling Charges	paise per kwh	15	J=15xG/100 (for 33/33), J=15xH/100 (for 132/33)	551317.02	674468.09
13	Operating Charge (SLDC Charges)	Rs. Per day	1000	K	30000	30000
14	Reactive Energy Charges*	paise per kvarh		L	As per actual	As per actual
15	Cross Subsidy Surcharge . 132 KV	paise per kwh	65	M	NA	NA
	33 kV	paise per kwh	38	N=Fx38/100	1368000	1368000
16	Additional surcharge	Nil		O	NA	NA
17	Interconnection Charges	Nil		P	NA	NA
18	Standby Charges	Nil		Q	NA	NA
19	Parallel operation charges*	Rs / kVA / month	10	R	NA	NA
	Other charge			S	NA	NA
	Connectivity Charges	Nil		T	NA	NA
20	OA Application Registration Fee**	Rs.	5000	U	NA	NA
21	OA agreement Fee**	Rs.	5000	V	NA	NA
22	Net Open Access Charge	Rs.		W=SUM (I:V)	2031976.59	1972468.08
23	Effictive Open Access Charge (per Unit)	Rs./kwh		X=W/F	0.58	0.55

Note: ***** Open Access Application fee and Open Access agreement fees are one time charge and it is not billed on monthly basis

** Parallel Operation charges and reative energy charge is leveled only to captive generating plants.

There is no transmission charge for users using distribution system only (33 kV)

Himachal Pradesh Electricity Regulatory Commission

CASE-I Charges for 5MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month

Monthly Open Access Charges:

S.No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW capacity for 1 Month (Rs.)	
	Total Power transferred in a Month (Units)		5000x30x24	3600000 Units		A
1	Transmission Charges	Rs. 43621.00 /MW/Month	43621.00x5		218,105.00	B
	Transmission Loss of % in kind which will be deducted from the energy input	3.71%	0.0371x5x43621.00		8092	C
	Net Transmission Charges		B+C		226,197.00	D
2	Wheeling Charges	Rs. 0.75/Unit	3600000x0.75		2,700,000.00	E
	Wheeling Loss of % in kind which will be deducted from the energy input	7.50%	3600000x0.75x0.75		202,506	F
	Net Wheeling Charges		E+F		2,902,500.00	G
3	Operating Charge (SLDC Charges)	Rs. 1000.00 per day, considering one transaction per day	1000.00x30		30,000.00	H
4	Reactive Energy Charges	Nil				I
5	Cross Subsidy Surcharge	Nil				J
6	Additional surcharge	Nil				K
7	Interconnection Charges	Nil				L
8	Standby Charges	Nil				M
9	Parallel operation charges	Nil				N
10	Other Charges	Nil				O
	Connectivity Charges	Nil				P
	OA Application Registration Fee	Rs.100000.00			100000	Q
	OA agreement fee	Nil				R
	Net Open Access Charge		D+G+H+I+J+K+L+M+N+O+P+Q+R		3258697	S
	Effective Open Access Charge (per unit)		S/A		0.90/unit	Rs./Unit

CASE-II Tariff for consumer taking power from licensee (5MW at 11 KV) as per HPERC Tariff order May 30, 2008 by considering power factor 0.9, Contract Demand as 90% of the Connected load & Peak Load Exemption 25% of the Contract Demand

S.No.	Particulars	Charges	Calculation	Total	Remarks	
1	Energy consumption in a month off peak load		5000x30x21	3150000 Unit		A
2	Unit consumed in peak load		1250x3x30	112500 Unit	PLE= 25% of the contract demand for 3 hrs	B
3	Unit consumed in the night hours		5000x6x30	900000 Unit		C
4	Total unit consumed		A+B	3262500 Unit		O
5	Demand Charges	90% of the contract demand of KVA @ 225(RS/KVA/per month)	5556x0.90x225	Rs. 11,25,090.00	Peak load consumption charges	D
6	Addl. Demand Charges on expected load i.e. PLEC (Rs./KVA/month)	50 (Rs./KVA/Per month)	1250x50.00	Rs. 62500.00	By considering total contract demand i.e. 1250 KVA for allowing peak load exemption. As per Utility policy initiated for peak load exemption i.e. 25% of the contract demand or the captive generation installed at the industry whichever is less, for 1 MVA and above. The type of industry will also be taken into consideration while allowing the peak load exemption.	E
7	Total demand Charges		D+E	Rs. 1187590.00		
8	Energy charges for peak hours	5.00 (Rs/KVAh)	1250x30x3x5.00	Rs. 562500.00		F
9	Energy charges for consumption at first tariff slab	2.50 (Rs/KVAh) upto 300 KVAh/month	5000x300x2.50	Rs. 3750000.00		G

10	Energy charges for consumption at second tariff slab	2.65 (Rs/KVAh) remaining energy per month	(3150000-1500000)x2.65	Rs. 4372500.00		H
11	Night time concession	@ 20 P/KVAh	90,00,00x0.20	Rs. 180000.00		I
12	Total energy charges	F+G+H-I		Rs. 8505000.00		J
13	Consumer service charges	250 Rs/month		Rs. 250.00		K
14	Total charges per month		J+K+(D+E)	Rs.9692840.00		L
15	Low voltage supply surcharge	3% of energy charges	8505000.00x0.03	Rs. 255150.00	As per HPERC Tariff order May 20, 2008. The standard supply voltage to the Connected load 2001 JW upto 10000 KW is 33 or 66 KV (50 Hz). For supply at 11 KV in this case there is provision of 3% low voltage supply surcharge	M
16	Net effective monthly bill		L+M	Rs.9947990.00		N
17	Effective charges Rs/unit		N/O	Rs./Unit 3.04		

Punjab State Electricity Regulatory Commission, Chandigarh

Case 1 : Charges for 5 MW at 11 KV Industrial consumers availing Intra-State Open Access for 1 month

Monthly Open Access Charges:

S. No.	Particular	Charges for 5 MW Capacity for 1 month (Rs.)
1	No. of units to be delivered to the consumer.	36,00,000 units
2	T & D Lossess at 11 KV	9.75% (50% of T&D loss determined by the Commission)
3	Units required to be injected in the System	36,00,000 / 0.9025 = 39,88,920 units
4	Transmission & Wheeling Charges @ 11 paise unit	Rs.4,38,781
5	Operating Charge @ Rs.1000/day	Rs.30,000
6	Reactive Energy Charges	-
7	Cross Subsidy Surcharge	-
8	Additional Surcharge	-
9	Interconnection Charges	-
10	Standby Charges	-
11	Parallel Operating Charges	-
12	Other Charge	-
	Connectivity Charges	-
	OA Application Registration Fee	Rs.10,000
	OA Agreement Fee	-
	Net Open Access Charge	Rs.4,78,781
	Effective Open Access Charge (unit)	13.3 paise/unit

Note:
1. The 5 MW load as per General conditions of Tariff is to be released on 66 KV, where the T&D loss is 5.85% (30% of T&D loss determined by the Commission). Calculations at 11 KV
2. The Open Access customer will also have to bear the cost of 3,88,920 units lost in
3. Electricity Duty and Octroi are statutory levies which are chargeable as per State

Case-II: Tariff for consumer taking power from Licensee (5MW at 11 KV)

S. No.	Charges	Calculation	Total (Rs.)
1	Monthly Consumption	5000×30×24	36,00,000 units
2	Energy Charges (Monthly)@Rs.3.95 per unit	36,00,000 × 3.95	1,42,20,000
3	Demand Charges (Monthly)		Nil
4	Subsidy by Government		Nil
5	Any other Charges (Please specify) 5 MW is supplied at 66KV only.Surcharge, if supplied at 11 kv@17.5%	1,42,20,000×17.5%	24,88,500
6	Electricity Duty @ 10% advalorem	1,67,08,500	16,70,850
7	Octroi @ 10 paise/unit	36,00,000 × 0.10	3,60,000
8	Total Charges per month		1,87,39,350
9	**Effective Charges Rs./unit**	1,87,39,350/36,00,000	Rs.5.20 per unit

Orissa Electricity Regulatory Commission

CASE-I: Charges for 5 MW at 11 kV industrial consumer availing Intra-State Open Access for 1 Month

Monthly Open Access Charges:

S. No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW capacity for 1 Month (Rs.)	
	Total Power transferred in a Month (Units)		**5000 x 30 x 24**	**3600000 units**		A
1	Transmission Charges	1260 MW per day		189,000.00		B
	Transmission Loss of % in kind which will be deducted from the energy input.	Additional injection to be made to make up the transmission loss @ 4.5%				C
	Net Transmission Charges		B+C	189,000		D
2	Wheeling Charges	* In case of WESCO-52 P/U (Separate sheet enclosed)		1,872,000		E
	Wheeling Loss of % in kind which will be deducted from the energy input	Additional injection to be made to make up the wheeling loss @ 8.0%				F
	Net Wheeling Charges		E+F	1,872,000		G
3	Operating Charge (SLDC Charges)	Rs.1000/- per day		30,000		H
4	Reactive Energy Charges	Yet to be determied				I
5	Cross Subsidy Surcharge	* In case of WESCO-47 P/U (Separate sheet enclosed)		1,692,000		J
6	Additional Surcharge	Not determined				K
7	Interconnection Charges	Nil				L
8	Standby Charges	Nil				M
9	Parallel operating charges	Nil				N
10	Other Charge	Meter Rent as applicable				O
	Connectivity Charges	Nil				P
	OA Application Registration Fee			5,000		Q
	OA Agreement Fee					R
	Net Open Access Charge	Rs.	D+GH+I+J+K+L+M +N+O+P+Q+R	3,788,000.00		S
	Effective Open Access Charge (per unit)		S/A	1.05		Rs./unit

CASE-II: Tariff for consumer taking power from licensee (5 MW at 11 kV)

S. No.	Charges	Calculation	Total (Rs.)	
1	Monthly Consumption	5000 x 30 x 24	3,60,000 unit	a
2	Energy Charges (Monthly)	260.50 P/U	9,378,000	b
3	Demand Chages (Monthly)	30.44 P/U	1,095,840	c
4	Subsidy by Govt.			d
5	Any Other Charges (Please specify)	Customer Service Charge	700	e
	Meter Rent as Applicable			
6	Total Charges per month	b+c+d+e	10,474,540	f
	Effective Charge Rs./unit		**2.91**	**Rs./unit**

*** Surcharge for HT for 2008-09**

		WESCO	NESCO	SOUTHCO (Revised)	CESU
Wheeling ch.p/u		**52**	**64**	**85**	**74**
Load Factor%	**Tariff (HT) p/u**	**Surcharge for HT for 2008-09**			
100%	291	47	69	108	84
90%	299	54	77	116	92
80%	309	64	87	125	102
70%	321	77	100	138	115
60%	338	94	117	155	132
50%	361	116	139	178	154
40%	376	132	154	193	170
30%	401	157	180	218	195
20%	452	208	231	269	246

Uttar Pradesh Electricity Regulatory Commission

CASE-I: Charges for 5 MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month

Monthly Open Access Charges: **(Short-Term Open Access)**

S. No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW capacity for 1 Month (Rs.)	
	Total Power transferred in a Month (Units)		5000x30x24	3600000 Units		A
1	Transmission Charges	Rs.0.05/kWH	3600000x0.05		180000	B
	Transmission Loss of % in kind which will be deducted from the energy input.	5.00%	180000x0.05		9000	C
	Net Transmission Charges		B+C		189000	D
2	Wheeling Charges	Rs.0.11/kWH	3600000x0.11		396000	E
	Wheeling Loss of % in kind which will be deducted from the energy input	8.00%	396000x0.08		31680	F
	Net Wheeling Charges		E+F		427680	G
3	Operating Charge (SLDC Charges)	embeded in Transmission Charges				H
4	Reactive Energy Charges	as specified by CERC from time to time				I
5	Cross Subsidy Surcharge	0				J
6	Additional Surcharge	0				K
7	Interconnection Charges	0				L
8	Standby Charges	0				M
9	Parallel operating charges	0				N'
10	Other Charge	0				O
	Connectivity Charges	0				P
	OA Application Registration Fee	Rs.5000			5000	Q
	OA Agreement Fee	Rs.20000			20000	R
	Net Open Access Charge	**Rs.**	D+G+H+I+J+K+L+M+N +O+P+Q+R		641680	s
	Effective Open Access Charge (per unit)		S/A		**0.178**	**Rs./unit**
					Say Rs.0.18/unit	

CASE: II: Tariff for consumer taking power from licensee (5MW at 11 KV)

S. No.	Charges	Calculation	Total (Rs.)		
1	Monthly Consumption	5000x30x24	3600000 Units	a	
2	Energy Charges (Monthly)	3600000xRs.4.00/kVAh	14400000	b	
3	Demand Chages (Monthly)	5000xRs.210/kVA	1050000	c	
4	Subsidy by Govt.			d	
5	Any Other Charges (Please specify)			e	
6	Total Charges per month	b+c+d+e	15450000	f	
	Effective Charge Rs./unit	f/a	**4.29**	**Rs./unit**	

Note: 1. Energy Charges under Urban Schedule shall be billed as per TOD rates as applicable to the hour of operation as follows: (refer UPERC's Tariff Order dt. 15th April, 2008 page 285-286 for Discoms Tranco)

(a) The consumer shall be entitled to a rebate of 7.5% during 22 hrs-06 hrs.

(b) The consumer shall pay extra 15% during 17 hrs.-22hrs

Whereas the Consumer under Rural Schedule shall be billed without TOD rates and shall be entitled to a rebate of 15% on Energy Charge.

2. Consumer, in case of no arrears, shall be eligible for graded Load Factor Rebate as per UPERC's Tariff Order dt.15th April, 2008 page 287-288

Haryana Electricity Regulatory Commission, Panchkula

Case 1 Charges for 5MW at 11 KV industrial consumers availing Intra-State Open Access for 1 Month

Monthly Open Access Charges:

S.No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW Capacity for 1 Month (Rs.)	
	Total Power transferred in a Month (Units)		5000 X 3 0 X 24	3600000 Units		A
1	Transmission Charges	Rs.0.19 per kWH	3600000 X 0.19	684000	684000	B
	Transmission Loss of % in kind which will be deducted from the energy input.	2.1% of the power transferred =75600 Units	75600 X 0.19	14364	14364	C
	Net Transmission Charges		B+C	698364	698364	D
2	Wheeling Charges	Rs.025 per kWH	3600000 X 0.25	900000	900000	E
	Wheeling Loss of % in kind which will be deductedfrom the energy input.	6% of the power transferred = 216000	216000 X 0.25	54000	54000	F
	Net Wheeling Charges		E + F	954000	954000	G
3	Operating Charge (SLDC Charges)	Rs. 1000 per day	1000 X 30	3000	3000	H
4	Reactive Energy Charges	Nil (Please see Note given below)				I
5	Cross Subsidy Surcharge	Nil				J
6	Additional Surcharge	Nil				K
7	Interconnection Charges	Nil				L
8	Standby Charges	Nil				M
9	Parallel Operation charges	Nil				N
10	Other Charge	Nil				O
	Connectivity Charges	Nil				P
	OA Application Registration Fee	Rs.5000		5000	5000	Q
	OA Agreement fee	Nil				R
	Net Open Access Charge	**Rs.**	**D+G+H+I+J+K+L+ M+N+O+P+Q+R**		**1687364**	**S**
	Effective Open Access Charge (Unit)		**S/A**		**0.468**	**Rs.0.468/Unit**

Note: Will be decided on case to case basis

Case-II Tariff for consumer taking power from licensee (5MW at 11 KV)

S.No.	Charges	Calculation	Total (Rs.)	
1	Monthly Consumption	5000 X 30 X 24	3600000 Units	a
2	Energy Charges (Monthly)	3600000 X 4.55 (including Rs.0.46/Unit FSA)	16380000	b
3	Demand Charges (Monthly)	Nil		c
4	Subsidy by Govt.	Nil		d
5	Any other Charges (Please specify)	Power Factor Surcharge (As per Note given below)		e
6	Total Charges per month	b+c+d+e	16380000	f
	Effective Charges Rs./Unit	**f/a**	**Rs.4.55**	**Rs.4.55/Unit**

Note: Power Factor Surcharge

The monthly average power factor of the plant and apparatus installed by the consumer shall not be less than 90% lagging. The monthly average power facor shall mean the ratio expressed, as percentage of total kWh to total kVAH supplied during the month. The ratio shall be rounded up to two figures. In case the monthly average power factor falls below 90% lagging, the consumer shall have to pay a surcharge of 1% of SOP charges for every 1% decrease in the power factor up to 80% and 2% of SOP charges for every 1% decrease in Power Factor below 80%. Rebate of 0.5% on SOP will be allowed for every 1% increase in Power Factor above 90% as per HERC Order on Distribution and Retail Supply ARR and Tariff-2000

Rajasthan Electricity Regulatory Commission

CASE I:- Charge for 5 MW at 33 kV Industrial consumer avaling Intra-State Open Access for 1 month=5000 x 30 x 24 = 3600000

Monthly Open Access Charges

S.No.	Particular	Rate	Units	Charges in Rs.	
1	Transmission Charges	94780 Rs./MW/month	3600000	473900	A
	Transmission Loss of % in kind which will be deducted from the energy input.	4.40%	158400		B
	Net Transmission Charges			473900	C
2	Wheeling Charges	0.11 Rs./kwh		396000	D
	Wheeling Loss of % in kind which will be deducted from the energy input.	3.80%	136800		E
	Net Wheeling Charges			396000	F
3	Operating Charge (SLDC Charges)	100 Rs./MW/day		15000	G
4	Reactive Energy Charges	5.50 paisa/KVArh			H
5	Cross Subsidy Surcharge	0.38 Rs/kwh	3600000	1368000	I
6	Additional Surcharge				J
7	Interconnection Charges				K
8	Standby Charges				L
9	Parallel operation charges				M
10	Other Charges				N
	Connectivity Charges				O
	OA Application Registration fee	5000 Rs/year			P
	OA agreement fee				Q
11	Net Open Access Charges (C+F+G+I)			2252900	R
12	Effective Open Access Charge (per unit)	R/A	3600000	0.6258	

CASE II:- Tariff for consumer taking power from licensee (5MW at 33 kV) for 1 month=5000 x 30 x 24 = 3600000

S.No.	Charges	Rate	Units	Total (Rs.)	
1	Energy Charges (Monthly)	4.01 Rs./kWh	3600000	14436000	a
2	Demand Charges (Monthly)	90 Rs/kVA/month		47368	b
3	Rebate	1.00%		144834	c
4	Any other Charges (Please Specify)			0	d
5	Total Charges per month (Rs.) (a+b-c+d)			14338534	e
	Effective Charges Rs./Unit	e/a	3600000	3.9829	

Karnataka Electricity Regulatory Commission-BESCOM						
Charges for 5MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month-BESCOM						
Monthly Open Access Charges:						
S. No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW capacity for 1 Month (Rs.)	
	Total Power transfered in a Month(Units)		**5000x30x24**	**3600000 Units**	**3600000**	A
1	Transmission Charges [Per MW basis]		5x95869	479345		B
	Transmission Loss of % in kind which will be deducted from the energy input.		4.03%	20129		C
	Net Transmission Charges		B+C	**499474**	**499474**	D
2	Wheeling Charges for BESCOM [Per unit basis]		3600000x0.06	216000		E
	Wheeling Loss of % in kind which will be deducted from the energy input.		4.06%	9141		F
	Net Wheeling Charges		E+F	**225141**	**225141**	G
3	Operating Charge (SLDC Charges)	SLDC charges included in Transmissiion charges				H
4	Reactive Energy Charges per Kvar $					I
5	Cross Subsidy Surcharge per unit basis for BESCOM		3600000x0.78	**2808000**	**2808000**	J
6	Additional surcharge		case to case basis			K
7	Interconnection Charges		Not applicable			L
8	Standby Charges [Minimum]*		(200/.745)x5000	**1342282**	**1342282**	M
10	Parallel operation charges/Grid support charges		((5000/0.9)*.75*180)	**750000**	**750000**	N
13	Other Charge[Meter reading cahrges]		1*1000	**1000**	**1000**	O
	Connectivity Charges		not applicable			P
	OA Application Registration Fee + Processing fee**		5000+30000	**35000**		Q
	OA agreement fee					R
	Net Open Access Charge	Rs	D+G+H+I+J+K+LM+N+O+P+Q+R		**5625896**	S
	Effective Open Access Charge(per Unit)		S / A		**1.56**	**Rs/Unit**
CASE-II	**Tariff for consumer taking power from licensee (5MW at 11 KV)**					
S. No.	**Charges**	**Calculation**	**Total (Rs.)**			
1	**Monthly Consumption**	**5000x30x24**	**3600000 Units**	a	**3600000**	
2	Energy Charges (Monthly)	)0000*3.55+3500000*3.9	**14180000**	b	**14180000**	
3	Demand Charges (Monthly)	(5000/0.9)*.75*180)	**750000**	c	**750000**	
4	Subsidy by Govt.		0	d	**0**	
7	Any Other Charges (Please Specify)		0	e	**0**	
8	Total Charges per month	b+c-d+e	14930000	f	**14930000**	
	Effective Charge Rs/Unit	f / a		**Rs/Unit**	**4.15**	
	$ The Consumer has to maintain PF at 0.90.					
	* assuming no energy is drawn. If energy is drawn Rs. 6/unit is to be paid.					
	* *One time fee and therefore not included in per unit cost.					
	Note: 1. For NCE sources Transmission & wheeling charges are in Kind only and is fixed at 5%.In addition for wind & Mini-hydel Banking charges at 2% is levied.					
	2. The above charges are as per the latest order issued by the Commission, which is challenged befor APTEL.					

Karnataka Electricity Regulatory Commission-CESC						
CASE I	**Charges for 5MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month-CESC**					
Monthly Open Access Charges:						
S. No.	**Particular**	**Charges**	**Calculation**	**Total (Rs.)**	**Charges for 5 MW capacity for 1 Month (Rs.)**	
	Total Power transfered in a Month(Units)		**5000x30x24**	**3600000 Units**	**3600000**	A
1	Transmission Charges [Per MW basis]		5x95869	479345		B
	Transmission Loss of % in kind which will be deducted from the energy input.		4.03%	20129		C
	Net Transmission Charges		B+C	**499474**	**499474**	D
2	Wheeling Charges for BESCOM [Per unit basis]		3600000x0.16	576000		E
	Wheeling Loss of % in kind which will be deducted from the energy input.		7.81%	48797		F
	Net Wheeling Charges		E+F	**624797**	**624797**	G
3	Operating Charge (SLDC Charges)	SLDC charges included in Transmissiion charges				H
4	Reactive Energy Charges per Kvar $					I
5	Cross Subsidy Surcharge per unit basis for BESCOM		3600000x0.20	**720000**	**720000**	J
6	Additional surcharge		case to case basis			K
7	Interconnection Charges		Not applicable			L
8	Standby Charges [Minimum]*		(200/.745)x5000	**1342282**	**1342282**	M
10	Parallel operation charges/Grid support charges		((5000/0.9)*.75*170)	**708333**	**708333**	N
13	Other Charge[Meter reading cahrges]		1*1000	**1000**	**1000**	O
	Connectivity Charges		not applicable			P
	OA Application Registration Fee + Processing fee**		5000+30000	**35000**		Q
	OA agreement fee					R
	Net Open Access Charge	Rs	D+G+H+I+J+K+LM+N+O+P+Q+R		**3895886**	S
	Effective Open Access Charge(per Unit)		S / A		**1.08**	**Rs/Unit**
CASE-II	**Tariff for consumer taking power from licensee (5MW at 11 KV)**					
S. No.	**Charges**	**Calculation**	**Total (Rs.)**			
1	**Monthly Consumption**	**5000x30x24**	**3600000 Units**	a	**3600000**	
2	Energy Charges (Monthly)	(100000*3.55+3500000*3.95)	**14180000**	b	**14180000**	
3	Demand Charges (Monthly)	(5000/0.9)*.75*170)	**708333.3333**	c	**708333.3333**	
4	Subsidy by Govt.		0	d	**0**	
7	Any Other Charges (Please Specify)		0	e	**0**	
8	Total Charges per month	b+c-d+e	14888333.33	f	**14888333.33**	
	Effective Charge Rs/Unit	f / a		**Rs/Unit**	**4.14**	
	$ The Consumer has to maintain PF at 0.90.					
	* assuming no energy is drawn. If energy is drawn Rs. 6/unit is to be paid.					
	**One time fee and therefore not included in per unit cost.					
	Note: 1. For NCE sources Transmission & wheeling charges are in Kind only and is fixed at 5%.In addition for wind & Mini-hydel Banking charges at 2% is levied.					
	2. The above charges are as per the latest order issued by the Commission, which is challenged befor APTEL.					

Karnataka Electricity Regulatory Commission-GESCOM						
CASE I	**Charges for 5MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month-GESCOM**					
Monthly Open Access Charges:						
S. No.	**Particular**	**Charges**	**Calculation**	**Total (Rs.)**	**Charges for 5 MW capacity for 1 Month (Rs.)**	
	Total Power transfered in a Month(Units)		**5000x30x24**	**3600000 Units**	**3600000**	A
1	Transmission Charges [Per MW basis]		5x95869	479345		B
	Transmission Loss of % in kind which will be deducted from the energy input.		4.03%	20129		C
	Net Transmission Charges		B+C	**499474**	**499474**	D
2	Wheeling Charges for BESCOM [Per unit basis]		3600000x0.20	720000		E
	Wheeling Loss of % in kind which will be deducted from the energy input.		6.01%	46039		F
	Net Wheeling Charges		E+F	**766039**	**766039**	G
3	Operating Charge (SLDC Charges)	SLDC charges included in Transmissiion charges				H
4	Reactive Energy Charges per Kvar $					I
5	Cross Subsidy Surcharge per unit basis for BESCOM		3600000x0.67	**2412000**	**2412000**	J
6	Additional surcharge		case to case basis			K
7	Interconnection Charges		Not applicable			L
8	Standby Charges [Minimum]*		(200/.745)x5000	**1342282**	**1342282**	M
10	Parallel operation charges/Grid support charges		((5000/0.9)*.75*170)	**708333**	**708333**	N
13	Other Charge[Meter reading cahrges]		1*1000	**1000**	**1000**	O
	Connectivity Charges		not applicable			P
	OA Application Registration Fee + Processing fee**		5000+30000	**35000**		Q
	OA agreement fee					R
	Net Open Access Charge	Rs	D+G+H+I+J+K+LM+N+O+P+Q+R		**5729128**	S
	Effective Open Access Charge(per Unit)		S / A		**1.59**	**Rs/Unit**
CASE-II	**Tariff for consumer taking power from licensee (5MW at 11 KV)**					
S. No.	**Charges**	**Calculation**	**Total (Rs.)**			
1	**Monthly Consumption**	**5000x30x24**	**3600000 Units**	a	**3600000**	
2	Energy Charges (Monthly)	(100000*3.55+3500000*3.95)	**14180000**	b	**14180000**	
3	Demand Charges (Monthly)	(5000/0.9)*.75*170)	**708333.3333**	c	**708333.3333**	
4	Subsidy by Govt.		0	d	**0**	
7	Any Other Charges (Please Specify)		0	e	**0**	
8	Total Charges per month	b+c-d+e	14888333.33	f	**14888333.33**	
	Effective Charge Rs/Unit	f / a		**Rs/Unit**	**4.14**	
	$ The Consumer has to maintain PF at 0.90.					
	* assuming no energy is drawn. If energy is drawn Rs. 6/unit is to be paid.					
	* *One time fee and therefore not included in per unit cost.					
	Note: 1. For NCE sources Transmission & wheeling charges are in Kind only and is fixed at 5%.In addition for wind & Mini-hydel Banking charges at 2% is levied.					
	2. The above charges are as per the latest order issued by the Commission, which is challenged befor APTEL.					

Karnataka Electricity Regulatory Commission-HESCOM

CASE I **Charges for 5MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month-HESCOM**

Monthly Open Access Charges:

S. No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW capacity for 1 Month (Rs.)	
	Total Power transfered in a Month(Units)		**5000x30x24**	**3600000 Units**	**3600000**	A
1	Transmission Charges [Per MW basis]		5x95869	479345		B
	Transmission Loss of % in kind which will be deducted from the energy input.		4.03%	20129		C
	Net Transmission Charges		B+C	**499474**	**499474**	D
2	Wheeling Charges for BESCOM [Per unit basis]		3600000x0.17	612000		E
	Wheeling Loss of % in kind which will be deducted from the energy input.		12.54%	87748		F
	Net Wheeling Charges		E+F	**699748**	**699748**	G
3	Operating Charge (SLDC Charges)	SLDC charges included in Transmissiion charges				H
4	Reactive Energy Charges per Kvar $					I
5	Cross Subsidy Surcharge per unit basis for BESCOM		3600000x0.22	**792000**	**792000**	J
6	Additional surcharge		case to case basis			K
7	Interconnection Charges		Not applicable			L
8	Standby Charges [Minimum]*		(200/.745)x5000	**1342282**	**1342282**	M
10	Parallel operation charges/Grid support charges		((5000/0.9)*.75*170)	**708333**	**708333**	N
13	Other Charge[Meter reading cahrges]		1*1000	**1000**	**1000**	O
	Connectivity Charges		not applicable			P
	OA Application Registration Fee + Processing fee**		5000+30000	**35000**		Q
	OA agreement fee					R
	Net Open Access Charge	Rs	D+G+H+I+J+K+LM+N+O+P+Q+R		**4042837**	S
	Effective Open Access Charge(per Unit)		S / A		**1.12**	**Rs/Unit**

CASE-II **Tariff for consumer taking power from licensee (5MW at 11 KV)**

S. No.	Charges	Calculation	Total (Rs.)			
1	**Monthly Consumption**	**5000x30x24**	**3600000 Units**	a	**3600000**	
2	Energy Charges (Monthly)	(100000*3.55+3500000*3.95)	**14180000**	b	**14180000**	
3	Demand Charges (Monthly)	(5000/0.9)*.75*170)	**708333.3333**	c	**708333.3333**	
4	Subsidy by Govt.		0	d	**0**	
7	Any Other Charges (Please Specify)		0	e	**0**	
8	Total Charges per month	b+c-d+e	14888333.33	f	**14888333.33**	
	Effective Charge Rs/Unit	f / a		**Rs/Unit**	**4.14**	

$ The Consumer has to maintain PF at 0.90.

* assuming no energy is drawn. If energy is drawn Rs. 6/unit is to be paid.

* *One time fee and therefore not included in per unit cost.

Note: 1. For NCE sources Transmission & wheeling charges are in Kind only and is fixed at 5%.In addition for wind & Mini-hydel Banking charges at 2% is levied.

2. The above charges are as per the latest order issued by the Commission, which is challenged befor APTEL.

Karnataka Electricity Regulatory Commission-MESCOM						
CASE I	Charges for 5MW at 11 KV industrial consumer availing Intra-State Open Access for 1 Month-MESCOM					
Monthly Open Access Charges:						
S. No.	Particular	Charges	Calculation	Total (Rs.)	Charges for 5 MW capacity for 1 Month (Rs.)	
	Total Power transfered in a Month(Units)		**5000x30x24**	**3600000 Units**	**3600000**	A
1	Transmission Charges [Per MW basis]		5x95869	479345		B
	Transmission Loss of % in kind which will be deducted from the energy input.		4.03%	20129		C
	Net Transmission Charges		B+C	**499474**	**499474**	D
2	Wheeling Charges for BESCOM [Per unit basis]		3600000x0.17	612000		E
	Wheeling Loss of % in kind which will be deducted from the energy input.		6.22%	40591		F
	Net Wheeling Charges		E+F	**652591**	**652591**	G
3	Operating Charge (SLDC Charges)	SLDC charges included in Transmissiion charges				H
4	Reactive Energy Charges per Kvar $					I
5	Cross Subsidy Surcharge per unit basis for BESCOM		3600000x0.34	**1224000**	**1224000**	J
6	Additional surcharge		case to case basis			K
7	Interconnection Charges		Not applicable			L
8	Standby Charges [Minimum]*		(200/.745)x5000	**1342282**	**1342282**	M
10	Parallel operation charges/Grid support charges		((5000/0.9)*.75*170)	**708333**	**708333**	N
13	Other Charge[Meter reading cahrges]		1*1000	**1000**	**1000**	O
	Connectivity Charges		not applicable			P
	OA Application Registration Fee + Processing fee**		5000+30000	**35000**		Q
	OA agreement fee					R
	Net Open Access Charge	Rs	D+G+H+I+J+K+LM+N+O+P+Q+R		**4427680**	S
	Effective Open Access Charge(per Unit)		S / A		**1.23**	**Rs/Unit**
CASE-II	**Tariff for consumer taking power from licensee (5MW at 11 KV)**					
S. No.	Charges	Calculation	Total (Rs.)			
1	**Monthly Consumption**	**5000x30x24**	**3600000 Units**	a	3600000	
2	Energy Charges (Monthly)	(100000*3.55+3500000*3.95)	**14180000**	b	14180000	
3	Demand Charges (Monthly)	(5000/0.9)*.75*170)	**708333**	c	708333	
4	Subsidy by Govt.		0	d	**0**	
7	Any Other Charges (Please Specify)		0	e	**0**	
8	Total Charges per month	b+c-d+e	14888333	f	**14888333**	
	Effective Charge Rs/Unit	f / a		**Rs/Unit**	**4.14**	
	$ The Consumer has to maintain PF at 0.90.					
	* assuming no energy is drawn. If energy is drawn Rs. 6/unit is to be paid.					
	**One time fee and therefore not included in per unit cost.					
	Note: 1. For NCE sources Transmission & wheeling charges are in Kind only and is fixed at 5% In addition for wind & Mini-hydel Banking charges at 2% is levied.					
	2. The above charges are as per the latest order issued by the Commission, which is challenged befor APTEL.					

Annexure-3 (B): Open Access Charges (Maharashtra)

Annexure-3.1: EXPLANATORY NOTE

1. **Applicability of Wheeling Charge**: The Commission had determined wheeling charges and wheeling loss for use of distribution network of various distribution licensees under its MYT Order for FY 2007-08 and under its APR Orders for FY 2008-09 for each distribution licensee, separately. For example, following APR Orders forms basis for applicable wheeling charges for use of distribution network of the concerned distribution licensee:
    - Case 72 of 2007 : APR Order for MSEDCL for FY 2008-09
    - Case 69 of 2007 : APR Order for TPC-D for FY 2008-09
    - Case 66 of 2007 : APR Order for REL-D for FY 2008-09
    - Case 104 of 2007: APR Order for Transmission Tariff for InSTS for FY 2008-09.

2. **Wheeling Charge for MSEDCL network:** The Commission has determined the wheeling charges for MSEDCL network under APR Order for FY 2008-09 as under: ***(Ref. Cl 6.6, Page 221/224 of Order in Case No 72 of 2007)***

Voltage Level	**Wheeling Charge** (Rs./ kW/ month)
33 kV	20
22 kV/11 kV	110
LT level	191

3. **Wheeling loss for MSEDCL network**: The Commission has ruled that the wheeling losses applicable to open access transaction for MSEDCL network under APR Order for FY 2008-09 shall be as under: ***(Ref. Cl 6.6, Page 221/224 of Order in Case No 72 of 2007)***

Voltage Level	**Wheeling loss** (%)
33 kV	6%
22 kV/11 kV	9%
LT level	14%

4. **Transmission Tariff for InSTS**: In addition, the Commission has separately determined transmission tariff for use of InSTS under its Transmission Tariff Order (Case 104 of 2007) for FY 2008-09 as under: ***(ref. cl. 9 page 4 of Order in Case 104 of 2007)***

Item Description	Units	FY 2008-09
Transmission Tariff (long-term)	Rs/kW/month	150.37
Transmission Tariff (long-term)	Rs/MW/day	4944.00
Transmission Tariff (short-term)	Rs/MW/day	1236.00

Further, in case of short-term open access transactions, the Commission has clarified as under:

> *Transmission Tariff for short-term open access transactions for FY 2008-09, shall be* ***Rs 1236.00 per MW per day or Rs 51.50 per MW per hour*** *Further, it is clarified that as stipulated under Para 3.2.5.6 of Order on Transmission Pricing Framework, the short-term transmission charges shall be payable for minimum 6 hours duration within a day and shall be accordingly 1/4th of short term transmission open access charge per day. The recovery from short term transmission open access charges shall be used to reduce total transmission system charge (TTSC) for the intra-State transmission system and in turn benefit long term transmission system users.*

5. **Transmission loss for InSTS**: The Commission had ruled that applicable Transmission loss for InSTS for FY 2008-09 shall be 4.85%. However, actual transmission loss shall be borne by all TSUs on pro-rata basis based on their energy drawal depending on actual transmission loss level. ***(ref. Cl. 19 page 8 of Order in Case No. 104 of 2008 and cl. 26,27 of Order in Case no 31 of 2006)***

6. **Wheeling Charge and Wheeling loss for TPC-D:** The Commission has determined wheeling charge and wheeling loss for use of distribution network of TPC-D under Order in Case No. 69 of 2007 as under: ***(ref. cl. 5.6 page 98 of Order in Case No 69 of 2007)***

Item Description	Wheeling Charge (Rs/kW/month)	Wheeling Loss (%)

HT level	101	2.4%
LT level	196	2.4%

7. **<u>Wheeling Charge and Wheeling loss REL-D</u>:** The Commission has determined wheeling charge and wheeling loss for use of distribution network of REL-D under Order in Case No. 66 of 2007 as under: ***(ref. cl. 5.6 page 129 of Order in Case No 66 of 2007)***

Item Description	**Wheeling Charge** (Rs/kW/month)	**Wheeling Loss (%)**
HT level	122	2.4%
LT level	140	9.3%

8. Depending on nature of open access transaction, the injection point(s) and drawal point(s) for open access wheeling transaction could lead to use of distribution assets of multiple distribution licensees and/or use of intra-state transmission system. Even in case of particular distribution licensees, the wheeling charges applicable for a particular open access transaction shall depend on voltage level at injection point(s) and drawal point(s), as wheeling charges are determined in accordance with voltage level. Accordingly, transmission charges, transmission losses, wheeling charges and wheeling losses applicable for a particular transaction have to be ascertained on the basis of use of assets of concerned licensee and extent of use at a particular voltage level.

9. A summary of applicable transmission charge, transmission loss, wheeling charge and wheeling loss for various cases of open access wheeling transaction is presented below in tabular form for ease of understanding.

Table 1.1: Summary of Transmission charge, Transmission loss, wheeling charge and wheeling loss for different distribution licensees at various voltage levels

Transmission Charge and Transmission loss	**Units**	**Transmission Charge**	**Transmission loss**	**Reference of Order**
Transmission Tariff (long-term)	Rs/kW/month	150.37	4.85%	MERC Transmission tariff Order (FY 2008-09), (Case No. 104 of 2007) Cl. 9 of Page 4
Transmission Tariff (long-term)	Rs/MW/day	4944.00	4.85%	
Transmission Tariff (short-term)	Rs/MW/day	1236.00	4.85%	

Wheeling Charges and Wheeling losses		**Wheeling Charge**	**Wheeling loss**	
MSEDCL				
-132 kV	Rs/kW/month	0	0%	Ref. Cl 6.6, Page 221/224 of Order in Case No 72 of 2007
-33 kV	Rs/kW/month	20	6%	
-22 kV/ 11 kV	Rs/kW/month	110	9%	
LT level	Rs/kW/month	191	14%	
TPC-D				
-33kV/22 kV/ 11kV(HT)	Rs/kW/month	101	2.4%	Ref. cl. 5.6 page 98 of Order in Case No 69 of 2007
LT level	Rs/kW/month	196	2.4%	
REL-D				
-33kV/22 kV/ 11kV (HT)	Rs/kW/month	122	2.4%	ref. cl. 5.6 page 129 of Order in Case No 66 of 2007
LT level	Rs/kW/month	140	9.3%	

Nomenclature used for wheeling charge and wheeling loss of various distribution licensees at various voltage levels is given in following table 1.2 for ease of reference:

Table 1.2: Nomenclature adopted for wheeling charge and wheeling loss for different distribution licensees

Nomenclature	**Wheeling charge (wc)**	**Wheeling loss (wl)**
MSEDCL_ 132 kV	$M_{wc}132$	$M_{wl}132$
MSEDCL_33 kV	$M_{wc}33$	$M_{wl}33$
MSEDCL_11 Kv	$M_{wc}11$	$M_{wl}11$
MSEDCL_LT	$M_{wc}lt$	$M_{wl}lt$
TPC_HT	$T_{wc}ht$	$T_{wl}ht$
TPC_LT	$T_{wc}lt$	$T_{wl}lt$
REL_HT	$R_{wc}ht$	$R_{wl}ht$
REL_LT	$R_{wc}lt$	$R_{wl}lt$

Table 1.3: Applicable Wheeling charge for open access wheeling transaction with different Injection Point(s) and Drawal Point(s)

Table for Wheeling Cost		**Rs/kW/ month**	**$M_{wc}132$**	**$M_{wc}33$**	**$M_{wc}11$**	$M_{wl}lt$	**$T_{wc}ht$**	$T_{wl}lt$	**$R_{wc}ht$**	$R_{wl}lt$
		Injection	**I1**	**I2**	**I3**	**I4**	**I5**	**I6**	**I7**	**I8**
Rs/kW /month	**Drawal**		**MSE_ 132 kV**	**MSE_ 33kV**	**MSE_ 11V**	**MSE_L T**	**TPC_H T**	**TPC_ LT**	**REL_ HT**	REL_ LT
$M_{wc}132$	**D1**	**MSE_132kV**	0	$M_{wc}33$	$M_{wc}11$	$M_{wc}lt$	$T_{wc}ht$	$T_{wc}lt$	$R_{wc}ht$	$R_{wc}lt$
$M_{wc}33$	**D2**	**MSE_33kV**	$M_{wc}33$	$M_{wc}33$	$M_{wc}11$	$M_{wc}lt$	$M_{wc}33$ + $T_{wc}ht$	$M_{wc}33$ + $T_{wc}lt$	$M_{wc}33$ + $R_{wc}ht$	$M_{wc}33$ + $R_{wc}lt$
$M_{wc}11$	**D3**	**MSE_11V**	$M_{wc}11$	$M_{wc}11$	$M_{wc}11$	$M_{wc}lt$	$M_{wc}11$ + $T_{wc}ht$	$M_{wc}11$ + $T_{wc}lt$	$M_{wc}11$ + $R_{wc}ht$	$M_{wc}11$ + $R_{wc}lt$
$M_{wc}lt$	**D4**	**MSE_LT**	$M_{wc}lt$	$M_{wc}lt$	$M_{wc}lt$	$M_{wc}lt$	$M_{wc}lt$+ $T_{wc}ht$	$M_{wc}lt$+ $T_{wc}lt$	$M_{wc}lt$+ $R_{wc}ht$	$M_{wc}lt$+ $R_{wc}lt$
$T_{wc}ht$	**D5**	**TPC_HT**	$T_{wc}ht$	$M_{wc}33$+ $T_{wc}ht$	$M_{wc}11$+ $T_{wc}ht$	$M_{wc}lt$+ $T_{wc}ht$	$T_{wc}ht$	$T_{wc}lt$	$T_{wc}ht$+ $R_{wc}ht$	$T_{wc}ht$+ $R_{wc}lt$
$T_{wc}lt$	**D6**	**TPC_LT**	$T_{wc}lt$	$M_{wc}33$+ $T_{wc}lt$	$M_{wc}11$+ $T_{wc}lt$	$M_{wc}lt$+ $R_{wc}ht$	$T_{wc}lt$	$T_{wc}lt$	$T_{wc}lt$+ $R_{wc}ht$	$T_{wc}lt$ $R_{wc}lt$
$R_{wc}ht$	**D7**	**REL_HT**	$R_{wc}ht$	$M_{wc}33$+ $R_{wc}ht$	$M_{wc}11$+ $R_{wc}ht$	$M_{wc}lt$+ $R_{wc}ht$	$T_{wc}ht$+ $R_{wc}ht$	$T_{wc}lt$+ $R_{wc}ht$	$R_{wc}ht$	$R_{wc}lt$
$R_{wc}lt$	**D8**	**REL_LT**	$R_{wc}lt$	$M_{wc}33$+ $R_{wc}lt$	$M_{wc}11$+ $R_{wc}lt$	$M_{wc}lt$+ $R_{wc}lt$	$T_{wc}ht$+ $R_{wc}lt$	$T_{wc}lt$+ $R_{wc}lt$	$R_{wc}lt$	$R_{wc}lt$

Table for Wheeling Cost		**Rs/kW/month**	**0**	**20**	**110**	**191**	**101**	**196**	**122**	**140**
		Injection	**I1**	**I2**	**I3**	**I4**	**I5**	**I6**	**I7**	**I8**
Rs/kW /month	**Drawal**		**MSE_ 132kV**	**MSE_ 33kV**	**MSE_ 11kV**	**MSE_ LT**	**TPC_ HT**	**TPC_ LT**	**REL_ HT**	**REL_ LT**
0	**D1**	**MSE_ 132kV**	0	20	110	191	101	196	122	140
20	**D2**	**MSE_ 33kV**	20	20	110	191	121	216	142	160
110	**D3**	**MSE_ 11V**	110	110	110	191	211	306	232	250
191	**D4**	**MSE_ LT**	191	191	191	191	292	387	313	331
101	**D5**	**TPC_ HT**	101	121	211	292	101	196	223	241
196	**D6**	**TPC_ LT**	196	216	296	387	196	196	318	336
122	**D7**	**REL_ HT**	122	142	232	313	223	318	122	140
140	**D8**	**REL_ LT**	140	160	250	331	241	336	140	140

In addition to above wheeling charge, transmission charge (long-term or short-term), as the case, shall be applicable, in case Intra-State Transmission system (InSTS) is being used for the purpose of open access wheeling transaction.

Table 1.4: Applicable Wheeling loss for open access wheeling transaction with different Injection Point(s) and Drawal Point(s)

Table for Wheeling loss		**%**	**M_{wl}132**	**M_{wl}33**	**M_{wl}11**	**M_{wl}lt**	**T_{wl}ht**	**T_{wl}lt**	**R_{wl}ht**	**R_{wl}lt**
		Injection	**I1**	**I2**	**I3**	**I4**	**I5**	**I6**	**I7**	**I8**
%	**Drawal**		**MSE_ 132kV**	**MSE_ 33kV**	**MSE_ 11V**	**MSE_ LT**	**TPC_ HT**	**TPC_ LT**	**REL_ HT**	**REL_ LT**
M_{wl}132	**D1**	**MSE_ 132kV**	0	M_{wl}33	M_{wl}11	M_{wl}lt	T_{wl}ht	T_{wl}lt	R_{wl}ht	R_{wl}lt
M_{wl}33	**D2**	**MSE_ 33kV**	M_{wl}33	M_{wl}33	M_{wl}11	M_{wl}lt	T_{wl}ht + M_{wl}33	T_{wl}lt+ M_{wl}33	R_{wl}ht+ M_{wl}33	R_{wl}lt+ M_{wl}33
M_{wl}11	**D3**	**MSE_ 11V**	M_{wl}11	M_{wl}11	M_{wl}11	M_{wl}lt	T_{wl}ht + M_{wl}11	T_{wl}lt+ M_{wl}11	R_{wl}ht+ M_{wl}11	R_{wl}lt+ M_{wl}11
M_{wl}lt	**D4**	**MSE_ LT**	M_{wl}lt	M_{wl}lt	M_{wl}lt	M_{wl}lt	T_{wl}ht+ M_{wl}lt	T_{wl}lt+ M_{wl}lt	R_{wl}ht+ M_{wl}lt	R_{wl}lt+ M_{wl}lt
T_{wl}ht	**D5**	**TPC_ HT**	T_{wl}ht	M_{wl}33+ T_{wc}ht	M_{wl}11+ T_{wc}ht	M_{wl}lt + T_{wc}ht	T_{wl}ht	T_{wl}lt	R_{wl}ht+ T_{wl}ht	R_{wl}lt+ T_{wl}ht
T_{wl}lt	**D6**	**TPC_ LT**	T_{wl}lt	M_{wl}33+ T_{wc}lt	M_{wl}11+ T_{wc}lt	M_{wl}lt + T_{wc}lt	T_{wl}lt	T_{wl}lt	R_{wl}ht+ T_{wl}lt	R_{wl}lt+ T_{wl}lt
R_{wl}ht	**D7**	**REL_ HT**	R_{wl}ht	M_{wl}33+ R_{wl}ht	M_{wl}11+ R_{wl}ht	M_{wl}lt + R_{wl}ht	T_{wl}ht + R_{wl}ht	T_{wl}lt+ R_{wl}ht	R_{wl}ht	R_{wl}lt
R_{wl}lt	**D8**	**REL_ LT**	R_{wl}lt	M_{wl}33+ R_{wl}lt	M_{wl}11+ R_{wl}lt	M_{wl}lt + R_{wl}lt	T_{wl}ht + R_{wl}lt	T_{wl}lt+ R_{wl}lt	R_{wl}lt	R_{wl}lt

Table for Wheeling loss		**%**	**0**	**6%**	**9%**	**14%**	**2.4%**	**2.4%**	**2.4%**	**9.3%**
		Injection	**I1**	**I2**	**I3**	**I4**	**I5**	**I6**	**I7**	**I8**
%	**Drawal**			**MSE_ 33kV**	**MSE_ 11V**	**MSE_ LT**	**TPC_ HT**	**TPC_ LT**	**REL_ HT**	**REL_LT**
0	**D1**	**MSE_ 132kV**	0	6%	9%	14%	2.4%	2.4%	2.4%	9.3%
6%	**D2**	**MSE_ 33kV**	6%	6%	9%	14%	8.4%	8.4%	8.4%	15.3%
9%	**D3**	**MSE_ 11V**	9%	9%	9%	14%	11.4%	11.4%	11.4%	18.3%
14%	**D4**	**MSE_ LT**	14%	14%	14%	14%	16.4%	16.4%	16.4%	23.3%
2.4%	**D5**	**TPC_ HT**	2.4%	8.4%	11.4%	16.4%	2.4%	2.4%	4.8%	11.7%
2.4%	**D6**	**TPC_ LT**	2.4%	8.4%	11.4%	16.4%	2.4%	2.4%	4.8%	11.7%
2.4%	**D7**	**REL_ HT**	2.4%	8.4%	11.4%	16.4%	4.8%	4.8%	2.4%	9.3%
9.3%	**D8**	**REL_ LT**	9.3%	15.3%	18.3%	23.3%	11.7%	11.7%	9.3%	9.3%

In addition to above wheeling loss, transmission loss, shall be applicable, in case Intra-State Transmission system (InSTS) is being used for the purpose of open access wheeling transaction.

10. Sample illustration in respect of the following case scenarios of the open access wheeling transaction is summarized in the following section:-
    - Case Scenario-1: Injection at 132 kV (InSTS) and Drawal at 132 KV(InSTS)
    - Case Scenario-2: Injection at 132 kV (InSTS) and Drawal at 33 KV(MSEDCL, TPC, REL)
    - Case Scenario-3: Injection at 132 kV (InSTS) and Drawal at 11 KV(MSEDCL, TPC, REL)
    - Case Scenario-4: Injection at 132 kV (InSTS) and Drawal at LT level (MSEDCL, TPC, REL)

Assumption for the purpose of Sample Illustration

Open Access wheeling capacity	-	25 MW
Load Factor/ capacity utilization factor	-	80%
Cost of OA generation (ex-bus)	-	Rs. 2.50 per kWh

Annexure-3.2: SAMPLE ILLUSTRATION:

11. Sample Illustration with effective landed cost for Open Access wheeling transaction of the OA consumer for short-term open access wheeling of 25 MW power under various case scenarios is summarized in the following **Table 1.5**.

The working for effective landed cost takes into consideration applicable transmission tariff, transmission loss, wheeling charge and wheeling loss as elaborated under earlier paragraph 9.

Table1.5. Sample Illustration for 25 MW Short-term Open Access wheeling Transaction at various Voltage levels

Charges as Per APR Orders		**MSEDCL**	**TPC**	**REL**
Transmission Charge (Rs./kW/month)	Short-term	37.59		
	Long-term	150.37		
Transmission loss Compensation		4.85%		
Wheeling Charges (Rs./kW/month)	33kV	20	101	122
	22/11kV	110		
	LT level	191	196	140
Wheeling Loss Compensation	33kV	6%	2.40%	2.40%
	22/11kV	9%		
	LT level	14%		9.30%
Cross Subsidy Surcharge		NIL	NIL	NIL
Additional Surcharge	TO BE DECIDED ON CASE TO CASE BASIS			
Default Service Charges*	Rs/month/ connection	250		200
	Rs/kWh	12.00	Not Specified	13.27**
Balancing Market Charge	On Marginal Pricing basis as per Intra-State ABT Order, Currently applicable only for full TOAU (Transmission Open Access Users)			

* Default Service Charges have been considered same as HT Temporary Tariff.

** includes 27 Paise/kWh of standby charges and 250 Paise/kWh of expensive power charges

The working for Sample Illustration is given in the following **Table 1.6.**

Table 1.6: Background workings for the Sample Illustration

Parameter Description	Case 1	Case 2	Case 3	Case 4
Generator Voltage(kV) (injection Point)	132	132	132	132
Consumer Voltage (kV) (drawal point)	132	33	11	LT
Open access at generator end (MW)	25	25	25	25
Load Factor %	80	80	80	80
Energy Injected (Mu)	14.4	14.4	14.4	14.4
Nature of Open Access	Short-term	Short-term	Short-term	Short-term
Cost of Generation (Rs/kWh)	2.5	2.5	2.5	2.5
MSEDCL				
Energy Drawn at Transmission end (MU)	13.70	13.70	13.70	13.70
Energy Drawn at consumer end (MU)	13.70	12.88	12.47	11.78
Amount Paid to generator (Rs Mn)	36.00	36.00	36.00	36.00
Transmission Charge (Rs. Mn)	0.94	0.94	0.94	0.94
Wheeling Charge (Rs Mn)	0.00	0.50	2.75	4.78
Cross-subsidy surcharge (Rs Mn)	0.00	0.00	0.00	0.00
Additional surcharge (Rs Mn)	0.00	0.00	0.00	0.00
Total Charges Paid	36.94	37.44	39.69	41.72
Effective Rate (Rs/kWh)	2.70	2.91	3.18	3.54
TPC				
Energy Drawn at Transmission end (MU)	13.70	13.70	13.70	13.70
Energy Drawn at consumer end (MU)	13.70	13.37	13.37	13.37
Amount Paid to generator (Rs Mn)	36.00	36.00	36.00	36.00
Transmission Charge (Rs. Mn)	0.94	0.94	0.94	0.94
Wheeling Charge (Rs Mn)	0.00	2.53	2.53	4.90
Cross-subsidy surcharge (Rs Mn)	0.00	0.00	0.00	0.00
Additional surcharge (Rs Mn)	0.00	0.00	0.00	0.00
Total Charges Paid	36.94	39.47	39.47	41.84
Effective Rate (Rs/kWh)	2.70	2.95	2.95	3.13
REL				
Energy Drawn at Transmission end (MU)	13.70	13.70	13.70	13.70
Energy Drawn at consumer end (MU)	13.70	13.37	13.37	12.43
Amount Paid to generator (Rs Mn)	36.00	36.00	36.00	36.00
Transmission Charge (Rs. Mn)	0.94	0.94	0.94	0.94
Wheeling Charge (Rs Mn)	0.00	3.05	3.05	3.05
Cross-subsidy surcharge (Rs Mn)	0.00	0.00	0.00	0.00
Additional surcharge (Rs Mn)	0.00	0.00	0.00	0.00
Total Charges Paid	36.94	39.99	39.99	39.99
Effective Rate (Rs/kWh)	2.70	2.99	2.99	3.22

Annexure-4: Comparison of Cross-Subsidy Surcharge

CROSS-SUBSIDY SURCHARGE STATUS IN DISTRIBUTION (01.10.08)									
S. No.	States		Cross-Subsidy Surcharge (Paise/Unit)					Surcharge Methodology	Year
1	Andhra Pradesh		yet to be decided for year 2008-09					Embedded Cost method	2008-09
2	Assam	LT General Supply	6					Cost of Supply method	2007-08
		Public Water Works	77						
		Bulk(Educational)	46						
		HT bulk Supply	38						
		HT Industries I	47						
		HT Industries II	35						
		Tea & Coffee	148						
		Oil & Coal	41						
3	Bihar	132KV EHT	170					-	2007-08
		33KV HT	141						
4	Chhattisgarh	132kV & above	65					Average cost method	
		33kV	38						
5	Delhi		Industrial	Non-Domestic	Railway			As per Tariff Policy	2008-09
	BRPL	Above 66KV	119.79	198.35	88.05				
		At 33/66KV	92.76	171.32	61.02				
		At 11 KV	20.93	99.49	-				
		At LT	-	12.2	-				
	BYPL	Above 66KV	107.16	198.59	-				
		At 33/66KV	78.76	170.19	-				
		At 11 KV	2.48	93.91	-				
	NDPL	Above 66KV	97.03	193.3	67.74				
		At 33/66KV	72.98	169.25	43.69				
		At 11 KV	-	87.18	-				
		At LT	-	15.17	-				
6	Gujarat		100					Annually approved on submission of ARR	2007-08
7	Haryana		Yet to be decided					Embedded Cost	2008-09
8	H.P.		Nil					Avoided Cost/Embedded Cost (acc to Tariff Policy)	2007-08
9	Jharkhand	EHT(132KV)	29					Average Cost of Supply	
		HT(33KV)	39						
10	J&K		0					-	2007-08
12	Karnataka		BESCOM	MESCOM	CESC	HESCOM	GESCOM	Cost of Supply	2008-09
		EHT	93	62	52	66	86		
		HT bulk supply	78	34	20	22	67		
11	Kerala		5					As specified in Tariff Policy	2008-09
13	MP	132kV & above	94					As specified in Tariff Policy	2007-08
		33kV & above	63						
14	Maharashtra		Nil					-	2008-09
15	Meghalaya		Yet to be decided					-	
16	Orissa		determined					Avoided Cost	2008-09
17	Punjab		-					Surcharge shall be equal to one-half(50%) of the current level of cross subsidy	
18	Rajasthan	LIP-EHV	55.00					Embedded Cost	2008-09
		LIP-33KV	38.00						
		LIP-11KV	16.00						
		ML-132KV	44.00						
		ML-33KV	28.00						
		ML-11KV	5.00						
		NDS-132KV	147.00						
		NDS-33KV	130.00						
		NDS-11KV	108.00						
19	Tamil Nadu	Injection Voltage	Drawl Voltage	Industrial consumer	Educational Inst	Commercial Consumer		As per Tariff Policy	2006-07
		22KV/11KV	22KV/11KV	97.17	91.71	274.87			
		33 KV	22KV/11KV	105.47	100.01	283.17			
		110 KV	22KV/11KV	108.49	103.03	286.19			
		110 KV	33 KV	116.8	111.34	294.5			
		110 KV	110 KV	119.82	114.36	297.52			
		230 KV	22KV/11KV	110.76	105.3	288.46			
		230 KV	33 KV	119.06	113.6	296.46			
		230 KV	110 KV	122.08	116.62	299.78			
		230 KV	230 KV	124.35	118.89	302.05			
20	Tripura		Yet to be decided					-	
21	Uttarakhand		Nil						2008-09
22	Uttar Pradesh		Nil					As per Tariff Policy	2008-09
23	West Bengal		CESC LTD	WBSEDCL	DPSC LTD	DPL		Avoided Cost	2007-08
			192.75	239.88	307.93	118.42			

Annexure-5: TNERC Order for Standby support

5.22 GRID AVAILABILITY CHARGES

5.22.1 As per Regulation 9 (7) of the TNERC Intra-State open access regulations 2005, the distribution licensee is entitled to collect grid availability charges for providing standby arrangements (backup supply from grid) to open access customers in the following cases.

i. In case of outages of generator supplying to a consumer on open access, and when the generator who happens to be an open access customer is permitted to avail start up power from the grid at the charges to be determined by the Commission.

ii. When the scheduled generation is not maintained and when the drawal by the consumer is in excess of the schedule.

5.22.2 The TNEB have not submitted any proposal for determining grid support charges.

5.22.3 **Outage of Generator conditions and providing Start up Power**:

Para 8.5.6 of the National Tariff policy stipulates that in case of outages of generator supplying to a consumer on open access, standby arrangements should be provided by the licensee on payment of tariff for **temporary connection to that consumer category as specified by the Appropriate Commission**. The Commission has not specified any tariff for temporary supply to HT categories. However, it has been specified in the tariff order in force from 16-3-2003 , that, the industries requiring HT supply during construction period shall be charged under HT tariff III (Applicable to commercial establishment and other categories of consumers not covered under HT tariff – IA, IIA, IIB and V) Accordingly, in case of outages of generator supplying to a consumer on open access, standby arrangements should be provided by the licensee to meet the demand of the open access beneficiary, on payment of consumption charges (energy charges plus the energy equated demand charges) applicable to HT tariff III , which is presently 621.81 paise per unit. Similarly, in case of drawal by

the generator for start up power from the Licensee, the generator shall be permitted to draw the start up power on payment of consumption charges (energy charges plus the energy equated demand charges) applicable to HT tariff III, which is presently 621.81 paise per unit.

5.22.4 **When the scheduled generation is not maintained and / or when the drawal by the consumer is in excess of the schedule.**

The Open Access regulations specified by the Commission stipulates that "*the applicable tariff of that consumer category shall be allowed as grid support charges till ABT regime is implemented and as and when ABT regime is implemented the grid availability charges shall be UI charges or the tariff applicable for that particular category whichever is higher.*"

In this context, the applicable tariff as referred above, consist of energy charges and demand charges.

a) Energy Charges applicable: When the generator is synchronized with the Grid, energy charges shall be payable by the open access customer, for the units supplied by the Distribution Licensee (i.e. balance units arrived at after subtracting the units supplied by the generator from the total consumption of the user during the billing month) at the applicable rate for that category. The time of day consumption (TOD) shall be charged for the nett consumption only (deducting the generated energy from the energy consumed during the respective time slots).

b) Demand charges applicable: In addition to energy charges stipulated above, the open access customer shall pay applicable demand charges as detailed below:

There are 2880 time blocks of 15 minutes interval in a billing month. It is not feasible to segregate precisely the quantum of demand supplied in each time block in the billing month to the open access user by the generator and by the licensee distinctly. This segregation may be computed by matching the demand recorded in each time block at the generator end (A) with the demand

---

recorded in the corresponding time block at the open access users end (B) then

Case 1: If (B) is lesser than (A), it means there is no supply of demand by the licensee to the open access user.

Case 2: If (B) is greater than (A), it means that there is supply of demand by the licensee in that respective time block.

As per the tariff order, a demand charge in a billing month by any HT consumer is 90% of sanctioned demand or recorded demand which ever is higher. As the demand is recorded at every 15 minutes time block, the recorded demand will show the maximum demand recorded in any of the 15 minutes time block in that billing period of one month.

The probability of occurrence of case 1 is zero and the probability of licensee supplying the demand in any one of the time blocks in a billing month as in case 2 is 100 percent. In such a scenario, whether the licensee is entitled to receive the demand charges in full, even though the generator is also injecting the demand into the grid continuously, needs to be addressed. It is no doubt that, all the fluctuation in the generator end and user end is met by the licensee. However, the percentage of the demand, injected by generator is also to be taken for consideration and to that extent, the demand charges receivable by the Licensee is to be restricted.

Till a mechanism is put in place to ascertain the relation between the demand generated in each of the 2880 fifteen minutes time blocks and the demand recorded at the consumer end in the related time blocks, a reasonable approximation has to be followed to arrive at the demand supplied by the generator. Since the variation in meeting the demand of the open access customer by the two parties involved, is possible in the full range of 0 to 100 %

54

TP.1 / 2005 – Order on Transmission and Wheeling Charges, etc.

and only the actual energy generated is available at the generation end, it is considered prudent to convert 51 % of the energy generated for the open access user, into an equated demand with reasonable approximations as the deemed demand supplied by the generator. In line with such an approximation, a deemed demand concept is proposed.

The demand charges for a open access user shall, accordingly, be such percentage as specified for the **"deemed demand"** supplied by the generator plus 100% of the applicable demand charges for that category of Open access user for the balance demand supplied by the Distribution Licensee.(i.e. the difference between the maximum demand recorded and the deemed demand subject to the tariff order issued then and there on demand charges).

Deemed demand charges: The transmission losses in each voltage play a vital role in deciding the deemed demand. The loss levels at each voltage are given above. The loss factor depends on the voltage at which the power is injected and the voltage at which the open access user draws. Since various combinations are possible, a simple methodology is adopted to approximate the loss factor under various scenarios. Even though the power, in an interconnected grid, flows by displacement and does not actually traverse the whole distance from point of injection to the point of travel, the accepted principle, in general is, that the loss estimation shall be based on the theoretical route of flow. For example, even though the generated power is injected by a generator at 11 kV and is also drawn at the same voltage of 11 kV at a distant place , the power is supposed to have been transformed through the higher voltages of 33, 110,230 kV etc., again transformed into the lower levels and reach the point of drawal. To emulate such scenarios it is assumed that the said power, flows in an upward and downward direction as indicated below, through various voltage transformation levels and undergoes 50 % of the loss, in each direction, in that level.

55

TP.1 / 2005 – Order on Transmission and Wheeling Charges, etc.

Injection voltage level and 50% of the loss		Drawal voltage level and 50% of the loss	
5	230 kV (0.5 %)	230 kV (0.5 %)	6
4	110 kV (0.75 %)	110 kV (0.75 %)	7
3	66 kV (0.25 %)	66 kV (0.25 %)	8
2	33 kV (0.75 %)	33 kV (0.75 %)	9
1	22 kV/11 kV (2.75 %)	22 kV/11 kV (2.75 %)	10

The loss factor in each level is estimated to be as follows:

Injection voltage / box no	Drawal voltage / box no	Route	Total loss	Loss factor = (100-% loss) /100
22 kV/ 11 kV (1)	22 kV / 11 kV (10)	1 to 5 & 6 to 10	(2.75+0.75 +0.25+0.75+0.5) & (0.5+0.75+0.25+0.75+2.75) = 10.00 %	0.90
33 kV (2)	22 kV / 11 kV (10)	2 to 5 & 6 to 10	(+0.75 +0.25+0.75+0.5) & (0.5+0.75+0.25+0.75+2.75) = 7.25 %	0.9275
110 kV (4)	22 kV / 11 kV (10)	4 to 5 & 6 to 10	(0.75+0.5) & (0.5+0.75+0.25+0.75+2.75) = 6.25 %	0.9375
110 kV (4)	33 kV (9)	4 to 5 & 6 to 9	(0.75+0.5) & (0.5+0.75+0.25+0.75) = 3.50 %	0.965
110 kV (4)	110 kV (7)	4 to 5 & 6 to 7	(0.75+0.5) & (0.5+0.75) = 2.50 %	0.975
230 kV (5)	22 kV / 11 kV (10)	5 & 6 to 10	(0.5) & (0.5+0.75+0.25+0.75+2.75) = 5.5 %	0.945
230 kV (5)	33 kV (9)	5 & 6 to 9	(0.5) & (0.5+0.75+0.25+0.75) = 2.75 %	0.9725
230 kV (5)	110 kV (7)	5 & 6 to 7	(0.5 %) + (0.5 %+ 0.75 %) = 1.75 %	0. 9825
230 kV (5)	230 kV (6)	5 & 6	(0.5 % + 0.5 %) = 1.0 %	0.99

c). Deemed Demand Charges: The percentage of deemed demand supplied by the Licensee, for typical cases of injection and drawal and based on the loss factors as above, is arrived at as below:

56

TP.1 / 2005 – Order on Transmission and Wheeling Charges, etc.

Cases	Loss factor { (100 - %loss)/100}	% of deemed units supplied at generator end { 51 / Loss factor}	Deemed demand supplied by gnerator {(3) / pf}	% of deemed demand supplied by the licensee {100 – (4)}
(1)	(2)	(3)	(4)	(5)
Injection at 11/22 KV and drawal at 11/22 KV	0.90	51 / 0.90 = 56.667	56.667/0.9 = 62.96	100 – 62.96 = 37.04
Injection at 33 KV and drawal at 22/11 KV	0.9275	51 / 0.9275 = 54.987	54.987 / 0.9 = 61.10	100 – 61.10 = 38.90
Injection at 110 KV and drawal at 22/11 KV	0.9375	51 / 0.9375 = 54.40	54.40/ 0.9 = 60.44	100 – 60.44 = 39.56
Injection at 110 KV and drawal at 33 KV	0.965	51 / 0.965 = 52.850	52.850/ 0.9 = 58.72	100 – 58.72 = 41.28
Injection at 110 KV and drawal at 110 KV	0.975	51 / 0.975 = 52.308	52.308/ 0.9 = 58.12	100 – 58.12 = 41.88
Injection at 230 KV and drawal at 22/11 KV	0.945	51 / 0.945 = 53.968	53.968 / 0.9 = 59.96	100 - 59.96 = 40.04
Injection at 230 KV and drawal at 33 KV	0.9725	51 / 0.9725 = 52.442	52.442 / 0.9 = 58.27	100 - 58.27 = 41.73
Injection at 230 KV and drawal at 110 KV	0.9825	51 / 0.9825 = 51.908	51.908 / 0.9 = 57.68	100 - 57.68 = 42.32
Injection at 230 KV and drawal at 230 KV	0.99	51 / 0.99 = 51.515	51.515 / 0.9 = 57.24	100 - 57.24 = 42.76

The billing of monthly consumption is segregated into two parts:

(i) Quantum of energy supplied by the generator at open access user end and;

(ii) Quantum of energy supplied by Distribution licensee to open access user.

The demand charges in a billing month are to be arrived at as detailed below:

(a) The maximum demand recorded in a month shall be segregated into demand supplied by the generator and the demand supplied by the licensee taking into account the actual energy consumed in units, the actual energy in units supplied by the generator and average power factor maintained at the consumption point in the billing month.

(b) The demand charges payable by the open access customer will be calculated as below:

57

TP.1 / 2005 – Order on Transmission and Wheeling Charges, etc.

Case 1:

Injection Voltage	110 kV
Drawal Voltage	33 kV

Percentage of deemed demand as per the table = 41.28

Sanction Demand	1000 Kva
Recorded Demand	855 Kva
Units consumed	650000 units
Power factor	0.95

Units supplied by generator (at consumption point) : 500000 units

Demand supplied by generator = 500000/720*0.95 = 659.72 Kva

Demand supplied by the licensee = 855-659.72 = 195.28 Kva

Billable demand –supplied by licensee = 900 – 659.72 = 240.28
(at 90% of the sanctioned demand)

Demand charges payable = (659.72*0.4128*300)+(240.28*300)
= 81699.72 + 72084 = 153783.72

Case 2:

Injection Voltage	230 kV
Drawal Voltage	22 / 11 kV

Percentage of deemed demand as per the table above = 40.04

Sanction Demand	1000 Kva
Recorded Demand	950 Kva
Units consumed	700000 units
Power factor	0.92

Units supplied by generator (at consumption point): 700000 units

Demand supplied by generator = 700000/720*0.92 = 894.44 Kva

Demand supplied by the licensee = 950-894.44 = 55.56 Kva

Billable demand –supplied by licensee = 950 – 894.44 = 55.56 Kva

Demand charges payable = (894.44*0.4004*300)+(55.56*300)
= 107440.13 + 16668 = 124108.13
