

**CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI**

Coram:

- 1. Shri Ashok Basu, Chairman**
- 2. Shri K.N. Sinha, Member**

In the matter of

Open Access in inter-state transmission

ORDER

The Electricity Act, 2003 empowers the Appropriate Commission to specify by regulations, the provisions for non-discriminatory use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation, briefly termed as "open access". A concept paper prepared by the staff of the Commission on open access in inter-state transmission has been placed before us.

2. We have pursued the concept paper. We direct that the concept paper be treated as a suo moto petition and be given wide publicity, through press and otherwise with a view to inviting objections or comments from the stakeholders and interested persons on the document prepared by the staff. The concept paper should also be posted on the website of the Commission. The objections/comments shall be filed by the persons concerned latest by 7th September, 2003. The hearing on the petition shall be fixed thereafter before framing regulations on the subject.

Sd/-
(K.N. SINHA)
MEMBER

Sd/-
(ASHOK BASU)
CHAIRMAN

New Delhi dated the 14th August 2003



CONCEPT PAPER

**OPEN ACCESS
IN
INTER-STATE TRANSMISSION**

AUGUST, 2003



CENTRAL ELECTRICITY REGULATORY COMMISSION

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ABBREVIATIONS

ABT	Availability Based Tariff
ATC	Available Transmission Capacity
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
Ckt	Circuit
CTU	Central Transmission Utility
DISCOM	Distribution Company
ER	Eastern Region
IEGC	Indian Electricity Grid Code
IPP	Independent Power Producer
ISGS	Inter State Generating Station
Km	Kilometer
KV	Kilo Volt
KVAR	Kilovolt Ampere
KWH	Kilo Watt Hour
MW	Mega Watt
NE	North Eastern Region
NR	Northern Region
POWERGRID	Powergrid Corporation Of India Ltd.
REB	Regional Electricity Board
RLDC	Regional Load Dispatch Center
RPC	Regional Power Committee
Rs	Rupees
SEB	State Electricity Board
SEM	Special Energy Meter
SLDC	State Load Dispatch Center
SR	Southern Region
STU	State Transmission Utility
TRANSCO	Transmission Company
TSC	Transmission Service Charges
TSP	Transmission Service Provider
TTC	Total Transmission Capacity
UI	Unscheduled Interchange
WR	Western Region

CONCEPT PAPER

OPEN ACCESS IN INTER-STATE TRANSMISSION

1.0 Introduction

Enactment of the Electricity Act, 2003 (herein after referred to as The Act) has opened up hitherto constrained electricity market which was characterized by long term PPAs and inability of Distribution Companies & consumers to have a choice of suppliers. Besides, delicensing generation and removing controls on captive generation, the provision regarding availability of non-discriminatory open access in transmission from the very beginning and distribution in phased manner is the core of the Act. This creates enabling environment for competition among generators/traders to choose their customers and vice versa. While issuing the Discussion Paper on terms and conditions of tariff in June, 2003, the Commission had indicated that the consultation paper on open access in the Inter State transmission and pricing of transmission and related services in the open access regime will be circulated shortly. This paper is prepared with the objective of generating a debate on the important issues associated with the 'open access' and frame regulations as the outcome of the exercise.

1.1 Legal framework: Relevant provisions of the Act with regard to inter-State Transmission and open access are as follows:

"1(47):'Open Access' means the non-discriminatory provision for use of transmission line or distribution system or associated facilities with such line or system by any licensee or consumer or a person engaged in generation in accordance with the regulation specified by the appropriate Commission."

"1(36):'Inter-State Transmission System'-includes

- i) any system for conveyance of electricity by means of main transmission line from the territory of one State to another State ;*

- ii) *the conveyance of electricity across the territory of an intervening State as well as conveyance within the State which is incidental to such inter-state transmission of electricity;*
- iii) *the transmission of electricity within a State on a system built, owned , operated, maintained or controlled by CTU."*

"38(2) the function of Central Transmission Utility shall be –

- (a).....*
- (b).....*
- (c).....*
- (d) to provide non-discriminatory open access to its transmission system for use by –*
 - (i) any licensee or generating company on payment of transmission charges; or*
 - (ii) any consumer as and when such open access is provided by the State Commission under sub section(2) of Section 42, on payment of transmission charges and a surcharge thereon as may be specified by the Central Commission:*

Provided that such surcharge shall be utilised for the purpose of meeting the requirement of current level of cross-subsidy:

Provided further that such surcharge and cross subsidy shall be progressively reduced and eliminated in the manner as may be specified by the Central Commission:

Provided also that such surcharge may be levied till such time the cross-subsidy or not eliminated:

Provided also that the manner of payment and utilisation of surcharge shall be specified by the Central Commission:

Provided also that surcharge shall not be leviable in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use."

"39(2) The functions of the State Transmission Utility shall be -

- (a)*
- (b)*
- (c)*
- (d) to provide non-discriminatory open access to its transmission system for use by –*
 - (i) any licensee or generating company on payment of the transmission charges; or*

- (ii) *any consumer as and when such open access is provided by the State Commission under sub-section (2) of section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission:*

Provided that such surcharge shall be utilised for the purpose of meeting the requirement of current level of cross-subsidy:

Provided further that such surcharge and cross subsidy shall be progressively reduced and eliminated in the manner as may be specified by the Central Commission:

Provided also that such surcharge may be levied till such time the cross-subsidy are not eliminated:

Provided also that the manner of payment and utilisation of surcharge shall be specified by the Central Commission:

Provided also that surcharge shall not be leviable in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use."

"40.It shall be the duty of a transmission licensee-

(a)

(b)

(c) to provide non-discriminatory open access to its transmission system for use by –

- (i) any licensee or generating company on payment of the transmission charges; or*

- (ii) any consumer as and when such open access is provided by the State Commission under sub-section (2) of section 42, on payment of the transmission charges and a surcharge thereon, as may be specified by the State Commission:*

Provided that such surcharge shall be utilised for the purpose of meeting the requirement of current level of cross-subsidy:

Provided further that such surcharge and cross subsidy shall be progressively reduced and eliminated in the manner as may be specified by the Appropriate Commission:

Provided also that such surcharge may be levied till such time the cross-subsidy are not eliminated:

Provided also that the manner of payment and utilisation of surcharge shall be specified by the Appropriate Commission:

Provided also that surcharge shall not be leviable in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use."

"42 (2) The State Commission shall introduce open access in such phases and subject to such conditions, (including the cross subsidies, and other operational constraints) as may be specified within one year of the appointed date by it and in specifying the extent of open access in successive phases and in determining the charges for wheeling, it shall have due regard to all relevant factors including such cross subsidies, and other operational constraints:

Provided that such open access may be allowed before the cross subsidies are eliminated on payment of surcharge in addition to the charges for wheeling as may be determined by the State Commission:

Provided further that such surcharge shall be utilised to meet the requirements of current level of cross within the area of supply of the distribution licensee:

Provided also that such surcharge and cross subsidies shall be progressively reduced and eliminated in the manner as may be specified by the State Commission:

Provided also that such surcharge shall not be leviable in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use."

"9(2) every person, who has constructed a captive generating plant and maintains and operates such plant, shall have the right to open access for the purposes of carrying electricity from his captive generating plant to the destination of his use:

Provided that such open access shall be subject to availability of adequate transmission facility and such availability of transmission facility shall be determined by the Central Transmission Utility or the State Transmission Utility, as the case may be:

Provided further that any dispute regarding the availability of transmission facility shall be adjudicated upon by the appropriate Commission.

With the open access regime in place, following types of transactions will be facilitated:

- i) Distribution Companies wherever they have been constituted as a result of unbundling/SEBs can access power from any source, a generator, a trader, another distribution company, a captive generator etc., with payment of transmission wheeling charges without payment of surcharge.

CTU/STU/Transmission licensees are obliged to provide open access for transfer of such power subject to regulations framed for the purpose by the appropriate Commission - Central Commission for inter-State transactions and State Commissions for transactions within the concerned State.

- ii) A captive generating plant can carry power from its generating facility to the destination of its use without payment of surcharge.
- iii) Any consumer can access a trader, generator, distribution licensee other than his own distribution licensee when the State Commission allows him open access under Section 42(2) of the Act, on payment of wheeling charges and a surcharge to take care of current level of cross subsidy or additional surcharge under section 42(4), as the case may be.

1.2 Management of RLDC: At present, CTU is managing the RLDCs, but the new law [Section 27 (2)] empowers the Central Government to entrust the RLDC operation to any Government Company, or any authority or Corporation constituted under any Central Act. The Act debars CTU from generation or trading in electricity (Section 38) and STUs from trading in electricity (Section 39). The RLDCs are also debarred from generation or trading in electricity (Section 27) and SLDCs are debarred from engaging in trading of electricity. This is in line with the philosophy of unbundling, creating competition and avoiding monopoly abuses. The provision under Section 27 (2), which allows the Central Government to assign RLDC function to an organization other than the CTU, is also a step in the same direction.

2.0 Existing Scenario

2.1 Role of CTU: Prior to implementing any inter-State or inter-Regional transmission scheme, the CTU holds consultation with the various constituents of concerned Regions, such as the Central Generating Company, SEBs, TRANSCOs etc and enters into bulk power

transmission agreement (BPTA) with concerned parties. The CTU transmission network facilitates the evacuation of Central generation to the beneficiary States and is also utilised for transmitting or wheeling surplus power, in case a particular State wishes to trade its own generation or its share of the Central generation with another State. At the inter-State level, the REBs have been actively involved in facilitating inter-State and inter-Regional power exchanges. Inter-State energy exchanges are being arranged bilaterally or through the power traders. Inter-State energy exchanges have been growing rapidly as a result of the concerted efforts of REBs, RLDCs and cooperation of the CTU, which has a critical role in providing transmission access for inter-State energy flows. A number of inter-Regional links have been built by the CTU in accordance with the perspective transmission plans prepared by CEA to facilitate greater inter-State energy transaction spanning different Regions. The inter-State transaction is coordinated and organized at the REB/RLDC level. All aspects of energy transfer, including feasibility study, period of transaction, urgency, priorities, system impact analysis, energy accounting etc are taken care of. Evacuation of the allocated Central generating power to respective State is the top priority, as the CTU transmission system has been basically built for this purpose and there are BPTAs to this effect. It stands to reason that existing transmission agreements will have to be honoured until modified and open access should be made available to the extent of spare transmission capacity. In future also, if new transmission lines are built on the basis of firm long term transmission agreements, such contracts would have to be honoured, else the issue of compensation would arise.

2.2 **CTU Tariff:** Since the enactment of Electricity Regulatory Commissions Act, 1998, the CTU has been exclusively regulated by the CERC and it continues to be so after the enactment of the Act. The transmission and wheeling tariff of the CTU is presently determined by CERC tariff notification dated 26.3.2001, which is valid up to 31.3.2004. The annual transmission service charges (TSC) of the CTU are calculated Region-wise

according to the above notification and recovered from the beneficiaries on monthly basis. Where ABT has been implemented, the TSC are apportioned to different beneficiaries pro-rata on the basis of their capacity allocation (MW) out of the total capacity (MW) handled by the transmission system of a Region. This takes into account the allocated central generating capacity to different states, bilateral exchanges as well as capacity brought in through trading. In the pre-ABT period, the TSC apportioning was done pro-rata on energy drawal basis. The TSC are inclusive of Return On Equity, Interest on loan, depreciation, Operation & Maintenance expenses, Interest on Working Capital etc as per the existing CERC tariff notification. Discussion Paper on the Terms & Conditions of Tariff (also covers transmission tariff) for the tariff period commencing 1.4.2004 has already been floated by CERC and the same is available on CERC web site www.cercind.org. At present, TSC are being billed by the CTU to the States (SEB/TRANSCO) on the basis of accounts prepared by REB. It is for the SEB/TRANSCO to further allocate or recover the TSC from various entities within the State such as DISCOMS.

In a given Region, the transmission service charges of the CTU are recovered from the various States on postage stamp basis. In case of inter-Regional transactions, the drawing utility has to pay to the CTU, transmission charges of its Region and wheeling charges for the exporting Region. At present, there are no wheeling charges for the use of CTU network in intermediate Region. The wheeling and transmission charges are being levied at same rates for CTU system. However, for the use of State transmission network, wheeling charges are being levied by contracted path method. The RLDC charges for the scheduling and dispatch services are being recovered at present from the beneficiary State of a Region on the basis of cost of services approved by the Commission.

2.3 Scheduling and Dispatch: The RLDCs are responsible for real time scheduling and dispatch of electricity at the Regional level and for supervision and control of inter-State transmission (Section 28). They have a key

role in arranging transmission access at the inter-State level for all eligible customers, who have been given the right to seek open access under the Act. The Regional accounting for scheduled energy, transmission charges, and energy losses and UI charges is done by the REBs at present. The unscheduled energy interchange account (UI account) is presently, being managed by the RLDCs on behalf of the REBs. However, under the section 28(3) (c) of the Act, RLDC is to keep accounts of the quantity of the electricity transmitted through the regional grid.

3.0 **Transmission Pricing Design**

3.1 **Objectives:** Transmission open access presents new challenges for maintaining reliable and secure electrical system operation, while at the same time promoting economic marketing of energy. In addition to meeting the transmission revenue requirement, a transmission pricing scheme should:

- Promote efficient day to day operation of the bulk power market including power trading;
- Give economic signal for efficient use of transmission resources;
- Give economic signal for investment in transmission;
- Give economic signal for location of new generation and loads;
- Compensate the owner of the transmission system; and
- Be simple and practical.

An important objective in the design of the open access charges should be to recover the sunk cost of the transmission system in an equitable manner, while minimizing impact on the efficiency of short-term markets. Wheeling charges recovered from open access customers by the CTU through sale of (short term/long term/firm/non-firm) transmission capacity are to be reduced from the total TSC requirement of CTU and only the balance (net) TSC to be apportioned among the beneficiaries. However, open access would require some

additional efforts, arrangements and infrastructure to be provided by the CTU, which would have to be compensated. Similarly, RLDC expenses, which are presently being shared by the drawing beneficiaries only, could be apportioned equitably among the beneficiaries of the Region, Generators (Central, IPPs, Captive) and open access customers to compensate RLDCs for scheduling, system control and dispatch services rendered by them.

3.2 Market Based Pricing: The two major regulatory options are the cost of service approach as described above and a fully competitive market based pricing which is based on the premise that transmission in electricity occurs because of differences in generating costs. From an economist's perspective, efficient pricing of transmission means that prices should equal marginal costs, which consist of marginal line losses and, in the event of a transmission constraint, transmission congestion rents. Efficient transmission pricing is necessary to assure economic dispatch of existing generation capacity - delivery of electricity to consumers at its minimum cost, including both generation and transmission costs. If transmission is priced below its marginal cost, it becomes profitable to import power from distant generating sources, even though less-distant sources might entail a lower (social) cost. If, on the other hand, transmission is priced too high, the geographic market for electricity is artificially narrowed, which limits the import of low-cost generation and the competitiveness of the generation market in general. This method has been tried in Latin America and it generally does not yield sufficient return for the recovery of sunk transmission costs.

3.3 Pricing Options

3.3.1 The simplest and most common type of transmission pricing is postage stamp pricing. A postage stamp rate is a fixed charge per unit of energy transmitted within a particular zone, regardless of the distance that the energy travels. Transmitting across several utility systems or zones and accumulating utility or zone

access charges is often called "pancaking". Postage stamp rates are based on average system costs and may have a variety of rate designs, based on energy charges, capacity charges, or both. Rates often include separate charges for peak and off-peak periods, may vary by season, and, in some cases, set different charges for weekdays versus weekend and holiday usage. Transmission services also are generally offered on both firm and non-firm basis. Firm transmission service guarantees service subject to emergency curtailments or system congestion. In contrast, non-firm transmission service is more economical than firm service, but is subject to curtailment or interruption, often with little or no notice by transmitting utilities.

3.3.2 Historically, firm transmission service contracts were long term. Non-firm agreements can be either short or long term. In the US, utilities are required to offer both point-to-point and network transmission service. Point-to-point service has specified points of delivery and receipt, transmission direction and quantities. Network service typically is negotiated through a longer-term contract and involves flexible delivery points and quantities. Network service typically is arranged to meet a wholesale customer's varying load requirements. Thus, even with a postage stamp rate, the terms and conditions of posted prices may vary substantially.

3.3.3 Traditional transmission pricing is based on a routing scheme known as a "contract path". A contract path rate is one, which follows a fictional transmission path agreed upon by transaction participants. Contract path pricing may be selected to minimize transmission charges and also to avoid "pan caking". However, contract path pricing does not reflect actual power flows through the transmission grid, including loop and parallel path flows.

3.3.4 An alternative is "flow-based pricing". One type is "megawatt-mile" pricing, where the transmission rates explicitly reflect the cost of transmission, based on both the megawatts of power flow and the

distance between the receipt and delivery points. The cost of transmission per megawatt-mile is the total cost averaged over megawatt miles of usage.

3.3.5 Much of the interest in transmission pricing reform involves moving away from utility-by-utility contract path pricing to regional transmission tariffs based on power flows, as well as "congestion pricing". Congestion pricing sets transmission rates to allocate limited transmission capabilities over constrained interfaces to those transmission customers that most value the ability to make power transfers. Thus, rates increase as the demand for electricity transmission increases and the system is used efficiently. Congestion on transmission systems is not reflected in either the postage-stamp or megawatt-mile pricing described above. Prices that do not increase as congestion increases will tend to allocate the transmission capacity inefficiently, because available capacity is not necessarily allocated to the user for which the transmission has the greatest value.

3.3.6 Congestion costs can either be assigned directly to users causing the congestion or shared among all users. When the transmission system becomes congested so that no more power can be transferred from a specified point of delivery to a specified point of receipt, more expensive generation may have to operate on one side of the transmission constraint than the other. In a competitive market, regardless of the form of transmission pricing utilized, this would create a difference in generation prices between the two locations. (Any lower cost power generated on one side of a constraint could be sold at the higher price on the other side of the constraint, assuming the difference exceeds the transmission cost, in the absence of the congestion.) The difference between these electricity prices is the "economic price of transmission." It reflects the cost of congestion and losses. In the absence of congestion pricing for transmission service, these "economic rents" would represent a windfall to the generation suppliers that are able to sell through the congested interconnection.

As a result, transmission prices will recover congestion rents from those suppliers who are able to complete transactions through the constrained interface.

4.0 Open Access Transmission Tariff

4.1 Alternatives:

4.1.1 At this stage of introducing open access in transmission, simplicity and practicability of the pricing scheme is very important for its success. Postage stamp pricing method at the Regional level is a tried and tested technique but has the draw back of insensitivity to the distance of transmission. Sensitivity to the distance is important to send the right economic signal to the future generators and loads. Contracted path method is also a traditional and proven method. It reflects true cost based prices and it is distance sensitive as well. However, it tends to become imaginary, when the network is complex with many parallel paths. MW-mile is a sophisticated and scientific analytical method, but the true cost can be known post-facto, otherwise one has to presume that the current took the same parallel paths as were generated during the computer simulation. It requires complete network data and details and it can also take into account the cost of energy losses.

4.1.2 **Alternative-I (Contracted Path Method):** In the case of inter-State transmission, the network is not so cramped and it is possible to assess the length of the contracted path to a large extent. The contracted path method would reflect distance in its charges, giving right economic signals, and also avoid pan caking to a large extent. Therefore, the contracted path method could be adopted for the determination of open access transmission charges. For this purpose, contracted path is the shortest route formed by series of transmission lines which are capable of carrying the contracted power between point of drawal and point of injection.

Alternative-II (Incremental Postage Stamp Method): Another alternative would be to reduce the size of the

existing postage stamp which is presently assigned for transmission in a Region. An incremental postage stamp rate could be applied to a zone much smaller than a Region in order to avoid pan caking in the case of inter-Regional transactions. If an incremental postage stamp rate is assigned to a zone of 100 km X 100 km, then the charges for distances greater than 100 km would become sensitive to distance.

4.2 Pricing Philosophy: The open access wheeling will be levied on capacity reservation basis irrespective of drawal. It is proposed to give a ceiling price based on all India average cost of inter-State transmission. This price will be in Rs./MW/km/Duration of contracted path in case of **Alternative-I** or in Rs./MW/Zone/Duration in case of **Alternative-II**. The Commission may review and revise the ceiling price at the end of every financial year. The transmission service providers (CTU, STU, Transmission Licensee etc.) will be free to offer wheeling services at any price below the ceiling price. The philosophy is to allow the market forces to operate freely and create correct economic signals for future siting of generating capacity, loads and new lines, while at the same time preventing monopoly abuse by the transmission service providers at the time of congestion. Other option could be that instead of fixing the ceiling rate, prices for various types of transmission services may be fixed every year.

4.3 Non-discriminatory Treatment of Original Beneficiaries: At present the beneficiary of one region drawing power from other region pay transmission charges in proportion to total MW allocation from central generating stations including contracted power from new sources. In the open access scenario, the original beneficiaries will also have to apply for open access services, like other open access customers, for bilateral exchanges and contracted power from new sources and pay wheeling charges at par. This will save original beneficiaries from pan caking in case of inter-Regional exchanges.

4.4 Open Access Ceiling Rate

4.4.1 **Alternative-I (Contracted Path Method)** : The contracted path ceiling rate can be found by dividing the average monthly transmission service charges (TSC) of a transmission system with total circuit kilometer (c-km) and average line capacity (L-MW):

$$\text{TSC Rs/MW/KM/Month} = \frac{\text{TSC}}{(\text{L-MW}) (\text{c-km})}$$

$$\text{say} = x$$

The above rate can be converted in terms of rate per kwh per 100 circuit kilometers by the following formula:

$$\text{Rate in paise/kwh/100 km} = \frac{(x) (100) (100)}{(1000) (30) (24)}$$

$$\text{say} = y$$

Typical calculations for the month of May, 2003 for the transmission system for Powergrid have been done at **Annex-I**. It could be seen that the wheeling charges are of the order of Rs.142 per MW/month/km or paise 1.98 per kwh per 100 km.

4.4.2 **Alternative - II (Incremental Postage Stamp Rate)**

The above wheeling charges of y Paise/KWh, which is the transmission cost of traversing 100 circuit km, could also be perceived as the cost of crossing a square zone of size 100 km X 100 km, provided the circuit path is straight and parallel to the side. However, actual path could be zigzag or diagonal. This could be accounted for by counting the square zones between two points horizontally and vertically (and not diagonally).

This rate could be called the **incremental postage stamp rate** and expressed as y paise/KWh per zone. Such a rate can be applied by drawing grid lines 100km apart, on the map of India, from north to south and from east to west.

Counting Rule: The rule would be to count the distance zones horizontally and vertically to arrive at the number of zones between two points.

Incremental postage stamp ceiling rate will avoid the need to assign a specific path for each transaction as required in the contracted path method. Nonetheless, the feasibility, ATC etc would have to be ascertained as usual. The above rate would be sensitive to distances exceeding 100km.

Sharing of zone stamp:

- i) Stamps between the STU end point and the nearest CTU point of interconnection will be counted as per the horizontal and vertical counting rule.
- ii) Stamps between two CTU points shall be counted as per the above counting rule.
- iii) The stamp for inter-connection zone between the STU and CTU shall be shared in the ratio of 50:50.
- iv) If more than one region is involved, the CTU stamps will be divided between two Regions as per the direction of RLDC.

4.5 Charges for creating dedicated system: If a transmission service provider constructs a dedicated system for connecting supply point and/or delivery point to its network, the entire service charges for the same shall be borne by the open access customer. The charges for the dedicated system shall be in addition to the distance based open access charges for the rest of the transmission system.

4.6 Sharing of TSC among beneficiaries: The net TSC of the CTU will be calculated after deducting the revenue recovered from all open access customers. The net TSC will then be apportioned among the beneficiaries in the ratio of the capacity allocation and total central generating capacity in the region.

4.7 Scheduling and system operation charges: The open access customers will be required to pay scheduling and system operation charges to RLDCs and SLDCs involved. RLDC charges per MW per year may be calculated by dividing the RLDC charges approved by the Commission

for the year 2003-04 by the Installed Capacity of the Central Sector stations in the country. Typical calculations for scheduling and system operation charges are given at **Annexure-II**. Minimum RLDC charges payable will be on per week basis irrespective of distance. Revenue recovered by RLDC from open access customers shall be used for reduction in total RLDC charges payable by the original beneficiaries.

4.8 Compensation to transmission service provider:

Compensation for information system and associated facilities for open access to be developed by CTU/STU/transmission licensee would have to be provided as the same has not been included in the ceiling price arrived above. It is proposed to levy open access service charges @ Rs 50 per MW/week on open access customer which will be payable to CTU/ STU/transmission licensee separately.

4.9 Surcharge: Any consumer embedded in the distribution system can also seek open access from the CTU under section 38, subject to approval by the State Commission under section 42 (2). In such cases, the Central Commission is required to specify the surcharge as per section 38(2)(d)(ii). While determining such surcharge, the Central Commission may keep in view the information furnished by the State Commissions in this regard.

5.0 Methodology and Procedure

The following methodology and procedure is proposed:

5.1 Information System: The transmission service provider (CTU/STU/Transmission Licensee) will provide information with regard to line-wise total transmission capacity (TTC), existing allocations of the transmission capacity and available transmission capacity (ATC) for open access customers. The information system will be updated on hourly basis and it will be accessible through Internet to the authorised users. The system will be conducive to power trading in general and spot market in particular. To begin with, the CTU will give information of their

complete network on all India basis. All STUs will provide information up to 132 or 66 KV level of their network, including the points of inter-connection with CTU and DISCOM.

5.2 Who Can Apply: Only eligible customers as per the Act can apply for open access for inter-State transmission.

5.3 Application: The open access customers will have to apply for seeking inter-State transmission access on a format to be prescribed by the Commission giving necessary details such as capacity required, point of injection, point of drawal, duration, type of service required, average load, peak load etc. An application fee may be prescribed. The application for firm capacity allocation shall be duly supported by agreement for purchase/sale/drawal of power.

5.4 Nodal Agency: The RLDC, under whose area the point of drawal is located, will be the nodal agency for processing the application of open access customer. The nodal RLDC will do the necessary coordination with the CTU, SLDC, STU etc. The applications will be entertained on first come, first serve basis in the order of the priority of service.

5.5 Adherence to IEGC: The open access customer will have to give an undertaking to abide by the IEGC and to follow day to day instructions of the RLDC.

5.6 Processing of Application: The request for transmission access will be processed by the nodal RLDC in a time bound manner taking into account line loading, voltage profile, system stability etc and ensuring that the existing loads continued to be serviced with reasonable reliability. The system impact studies will be carried out, as necessary.

5.7 Agreement: Prior to commencement of service, the open access customer will sign a written agreement with the transmission service providers (CTU, STU and Transmission Licensee as applicable).

5.8 Special Energy Meters: As and when required, the open access customer will have to provide, in his premises, at the agreed point, special energy meter capable of time differentiated (by 15 minutes) measurement of active and reactive energy as per IEGC specifications and the same shall be open for inspection/testing by the CTU/RLDC. The meters shall be tested and maintained in good condition as per IEGC.

5.9 Force Majeure: Neither the transmission service provider nor the open access transmission customer will be considered in default as to any obligation under the open access agreement if prevented from fulfilling the obligation due to force majeure. However, the party hindered by event of force majeure shall make all reasonable efforts to resume its obligations.

5.10 Indemnification: The open access transmission customers shall at all time indemnify the transmission service provider from any damages or obligations to a third party.

5.11 Credit Worthiness: The prospective open access customer shall establish his creditworthiness as per normal commercial practices.

5.12 Adjudication: Any dispute between the open access customer and the transmission service provider shall be presented to the Commission in case no amicable solution could be found by mutual dialogue and arbitration.

5.13 Type of Services: The transmission service provider shall provide open access between two specified points (point of injection and point of drawal) on the Firm and Non-firm basis at prices to be declared in advance. The transmission service provider would further categorise Firm and Non-firm service according to its duration as indicated below:

Firm service

- i) Long term (duration more than or equal to one year)

- ii) Short term (duration more than or equal to one month and less than one year)
- iii) Short term (duration more than or equal to one week and less than one month)

Non-firm service

- i) One hour up to one day
- ii) More than one day up to one week
- iii) More than one week up to one month

5.14 Declaration of Prices: The prices for all the above service categories will be declared in advance by the transmission service provider. The prices for all these Service will be capped at the ceiling price to be declared by the Commission.

5.15. Priority in Allotment :

5.15.1 Subject to ATC, the long-term customers will have priority over short-term customers and firm customers will have priority over non-firm customers in allocation of capacity.

5.15.2 The Non-firm customer can be replaced i) by a Firm customer or ii) by a longer term Non-firm customer or iii) by a Non-firm customer of equal duration offering a higher price (subject to the ceiling price), any time with prior notice. A non-firm customer can also opt out of service at any time with prior notice.

5.15.3 Conditional Reservation for short-term Firm Customers: The reservation for short-term Firm customers (less than one year) shall be conditional until one week before the commencement of weekly service, and one month before the commencement of monthly service. The conditional reservations may be displaced by competing requests for longer-term service.

5.16 Penalty for Hoarding: The original users and the Firm transmission customers will not lose their right to firm capacity simply because they do not use the capacity for certain period of time. In case of substantial allegation that a transmission customer is

withholding scarce capacity in anti-competitive way, the Commission could invoke its powers under Section 142 of the Act. The Commission may also cancel or suspend the transmission rights of such a defaulter.

5.17 First Right of Refusal: Current open access customers will have first right to refusal to capacity, they previously used, if they are willing to match the rate offered by another potential customer, and to accept a contract term at least as long as that offered by another potential customer.

5.18 Curtailment due to Constraints: The RLDC will have discretion to curtail service whether Firm or Non-firm to relieve a transmission constraint in the event of system problems of grid emergency. Curtailment must be made in a non-discriminatory manner in accordance with the defined priorities. Firm customers will be curtailed only after curtailing all non-firm customers. Short-term firm customers will be curtailed before long-term firm customers. Thereafter, curtailment shall be applied on pro-rata basis for long term firm customers. The original beneficiaries (SEBs and its successors) shall be curtailed as a last resort.

6.0 Energy Accounting

6.1 Active Energy:

6.1.1 The issue of energy accounting is more closely related to trading rather than open access in transmission. In the unbundled scenario, the open access customer has to pay only the wheeling charges for the use of a transmission system. The principles of regional energy accounting are well established for transactions between ISGS and States as well as among the States. The transactions between ISGS and States are scheduled by the RLDC on the basis of the availability declared by the ISGS and drawal requirement submitted by the States on a day ahead basis for each time block of 15 minutes as per the procedure laid out in IEGC. The drawal schedule of the State is topped by the estimated losses to arrive

at the generation schedule of the ISGS. The scheduled energy charges are paid directly by the buyer to the seller. Any deviation from the drawal or generation schedule is priced as per the frequency dependent unscheduled inter-change (UI) rate approved by the Commission. The UI account is managed by RLDC on behalf of REB. The open access customers could be of two types - i) directly connected to the CTU network (direct customers) or ii) Embedded in the State and connected to the CTU through the State network (Embedded customers). The direct customers would be treated at par with existing entities connected to CTU network and their energy accounting will be done in an identical manner. As regards embedded customers, the following methodologies could be followed:

- i. The SLDC shall forward their own drawal schedule and the drawal/injection schedule of the embedded customers separately to RLDC on day ahead basis,
- ii. For any deviations from the schedules, the RLDC will present a composite UI bill to the State (SEB/TRANSCO) as is being done now. Further apportioning/recovery of the UI charges from the various DISCOMs and embedded customers in the State would normally be the responsibility of the State/SLDC.

6.1.2 However, if required, the embedded inter-State customers may have to install the Special Energy Meters (SEMs) capable of time differentiated measurement (15 minutes) of active and reactive power as per IEGC specifications.

6.1.3 It will be the responsibility of the open access customer to give matching drawal and injection schedule to the concerned SLDC/RLDC and to settle scheduled energy charges directly. The drawal/injection schedule of the open access customer will normally be honoured unless there is a transmission constraint.

6.2 Reactive Energy

6.2.1 Reactive energy flows in the transmission network reduce the active power carrying capability of the system apart from increasing transmission losses and reducing voltage at the points of drawls. Reactive energy flows can be compensated by means of capacitor installations in the local networks. As such, for the inter-State energy transactions, the associated reactive energy has not been assigned a price, but there is a scheme approved by the Commission, which penalizes reactive energy drawl and rewards reactive energy injection @ 4 paise/KVAR, when the voltage at the inter-State connection point is below 97% of nominal value. Similarly, the scheme penalizes reactive energy injection and rewards reactive energy drawl @ 4 paise/KVAR, when the voltage at the inter-State connection point is above 103% of nominal value. The reactive energy accounting is done by the REB based on the readings of the SEMs installed at the point of interconnections with State network and between two States. The same scheme can be extended to open access customers who will be directly connected to State network. As regard the embedded customers, it will not be appropriate to apply the above pricing scheme on them.

6.2.2 It may be mentioned that at present, the reactive energy management of the states varies from very good to very poor in spite of monitoring by CEA, resulting in sub-optimal utilization of transmission resources. In the context of open access scenario, maximum utilization of available transmission capacity is important for serving more number of open access customers. As such, it is suggested that the Commission could review the existing scheme of reactive energy pricing at CTU interconnection points, so that there is a stronger economic signal for better reactive power management by the States.

6.3 Energy Losses

6.3.1 The Energy losses may be handled in two ways. In the first method, the nodal agency shall carry out studies to assess incremental energy losses attributable to the new transaction. The drawal

schedule of the each intervening system shall be increased by the amount of losses assessed for that system. At first glance, this method appears logical as any increase/decrease in losses due to incremental transaction is attributed to this transaction. However, it is difficult to estimate losses for the all sorts of real operating conditions. Further, as more and more such transactions will take place, this method will give rise to unnecessary complications.

6.3.2 The second method could be the method presently being followed in various Regions. The actual losses in the CTU network of a Region are calculated from the SEM readings at the point of generation and drawal. The weekly average losses in percentage are then found in this manner for a Region. These percentage average losses of the previous week are then applied to arrive at drawal schedule of each beneficiary in the Region. The slight mismatch in the estimated losses considered in the scheduling process and actual losses during the week get adjusted in the settlement of UI accounts by REB/RLDC. The same method could be extended to open access customers for transmission loss appropriation. If, State network is also involved, the STU will recover the losses in its system from the open access customer as per above method. This method is simple to understand and implement. The main advantage of this method is that complete commercial implications of a transaction on account of transmission losses are known in advance. As the estimated losses for current transactions are calculated based on previous week actual losses, the loss allocations are very realistic. In view of the above, the second option of apportioning the losses is recommended.

7.0 Key Points/Summary

1. The Act provides for open access to any licensee, consumer or person engaged in generation over the transmission and distribution system.
2. The existing long-term transmission agreements should be honoured until modified; else the issue of stranded assets would arise.
3. To begin with only spare transmission capacity can be made available for open access.
4. Since, RLDCs will have a key role to play in the open access related issues, neutrality in their functioning is expected.
5. RLDC in the Region in which the drawal points of open access customer is located is best suited for the role of nodal agency.
6. At present the original beneficiaries (SEBs and its successors) are charged on the postage stamp rate basis, which is arrived at by pooling the Transmission Service Charges for the entire CTU network in the Region.
7. In the new scenario, original beneficiaries will also be treated as open access customers at par, for the purpose of power trading and bilateral exchanges. However, the original beneficiaries shall continue to pay transmission charges for transmission of allocated power from the ISGS.
8. The following two methods of Open Access Pricing have been suggested:
Alternative-I (Contracted Path Method) and
Alternative -II (Incremental Postage Stamp Method)
9. The Transmission Service Provider shall declare total transmission capacity and available transmission capacity in advance as per the approved system of information.

10. The service may be of various types-
 - Firm service (One week or more)
 - Non-firm service (one hour to one month)
11. The Transmission Service Providers in the country (CTU, STU, Licensees etc.) will have to declare rates for various types of services within the ceiling price as decided by the Commission.
12. Amongst the open access customers, the firm service will have higher priority than the non-firm service and the service of longer duration will have higher priority than service of shorter duration.
15. The revenue accrued to CTU from open access customers shall be used for reduction in the TSC payable by the original beneficiaries.
16. In addition to TSC, the open access customers shall also be required to pay scheduling and system operation charges to RLDCs and SLDCs.
17. The RLDC charges payable by the open access customer will be Rs 200 per MW per week irrespective of distance. SLDC charges will also be payable at the same rate as RLDC charges.
18. It is proposed to levy open access service charges @ Rs 50/MW/week irrespective of distance on open access customers, which will be payable to CTU/STU/transmission licensee separately.
19. Special Energy Meters will be installed by the open access customer as and when required.
20. The open access customers directly connected to the CTU network would be treated at par with existing entities connected to CTU network and their energy accounting will be done in the identical manner.
21. For the open access customers embedded in the state, the SLDC shall forward their own drawal schedule and the drawal/injection schedule of the

embedded customers separately to RLDC on day ahead basis. The RLDC will present a composite UI bill to the State (SEB/TRANSCO). Further apportioning/recovery of the UI charges from the various DISCOMs and embedded customers in the State would normally be the responsibility of the State/SLDC.

Open Access Ceiling Rate Calculations

1. **Contracted Path Method:** The ceiling price for open access transmission has been calculated based on the transmission Service Charges (TSC) for the month of May, 2003, actually billed by POWERGRID to its beneficiaries. In this calculation, the TSC for North-Eastern Region have not been taken into account, as the TSC in this region is abnormally high due to non-commissioning of associated generation scheme. To calculate price per MW per circuit, the average loading of the circuit has been considered as 500 MW, since most of the POWERGRID network is at 400 KV level. The all India average TSC works out to Rs 142 per km per MW for one month. Calculations are given below:

Region	Total TSC (Rs Crore for May 2003)	Ckt-km	Unit TSC (Rs/km/MW/month)	
NR	97.06	12525	154.99	
WR	43.4	9168	94.68	
SR	77.15	6847	225.35	
ER	19.13	4752	80.51	
Total	236.74	33292	142.22	

This rate is equivalent to 1.98 paise/KWh per 100 Km. At present the pooled charges are in the range of 12-15 paise/KWh for the CTU network in various regions and are being paid by the beneficiaries irrespective of the distance on postage stamp basis. Ceiling price for services of other duration may be calculated on pro-rata basis.

This ceiling price arrived at on the basis of CTU cost could be applied for the state network because the historical costs of the state transmission network are generally on the lower side.

2. Incremental Postage Stamp Rate: The wheeling rate of 1.98 Paise/KWh or Rs. 14,222 per MW/Month is the transmission cost of traversing 100 circuit km. It could also be perceived as the cost of crossing a square zone of size 100 km X 100 km, provided the circuit path is straight and parallel to the side. However, actual path could be zigzag or diagonal. This could be accounted for by counting the square zones between two points horizontally and vertically (and not diagonally). This rate could be called the incremental postage stamp rate. Such a rate can be applied by drawing grid lines 100km apart, on the map of India, from north to south and from east to west. The rule would be to count the distance zones horizontally and vertically to arrive at the number of zones between two points.

Incremental postage stamp ceiling rate will avoid the need to assign a specific path for each transaction as required in the contracted path method. Nonetheless, the feasibility, ATC etc would have to be ascertained as usual. The above rate would be sensitive to distances exceeding 100 km.

Scheduling and System Operation Charge

Scheduling and System Operation charges per MW per year may be calculated by dividing the RLDC charges approved by the Commission for the year 2003-04 by the Installed Capacity of the Central Sector stations in the country. The RLDC charges works out to Rs 200 per MW per week. Calculations are given below. SLDC charges will be payable at the same rate as RLDC charges.

Calculation of Scheduling Charges

RLDC charges for 2003-04 (Rs Lakhs)	2790.46
Installed Capacity of Central Sector Projects (about) (MW)	26500
Scheduling and System Operation charges Rs per MW per year (irrespective of distance)	10530.03
Scheduling and System Operation charges Rs per MW per month (irrespective of distance)	877.50
Scheduling and System Operation charges Rs per MW per week (irrespective of distance)	204.75

(say Rs 200)

The above rate for scheduling and system operation are payable to each RLDC and SLDC involved. This rate of Rs 200 per MW per week is equivalent to 0.12 paise / KWh.