DETAILED STUDY OF BUSINESS FRAMEWORK AND OPEN ACCESS IN POWER TRADING

Submitted by:

Sumit Kuamr Pandey

SAP ID: 500031335

Guided by:

Mr. Rajesh Sharma

Assistant Manager (EE&I)

J K Tyre and Industries Ltd

A DISSERTATION REPORT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

MBA (Power Management)

OF

UNIVERSITY OF PETROLEUM & ENERGY STUDIES, INDIA

CENTRE FOR CONTINUING EDUCATION

UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

Acknowledgement

This is to acknowledge with thanks the help, guidance and support that I have been received during the dissertation.

I have no words to express a deep sense of gratitude to the management of **J K Tyre and Industries Limited** for giving me an opportunity to pursue my Dissertation, and in particular **Mr. Rajesh Sharma (Assistant Manager-EE&I)**, for his able guidance and support.

I must also thank to **Mr. M.K Sharma (Chief Manager-EE&I)** and **Mr. Devendra Singh Seervi (General Manager)** for their valuable support.

I also place on record my appreciation of the support provided by **Mr. K.K Godhra** and other staff of **J K KTP** Library.

Sumit Kumar Pandey

Room No-18, Trainee Hostel

Jaykay Gram, J K Tyre and Industries Ltd

Kankroli, Rajsamand- 313342 (Rajasthan)

M.NO- 8233885834

Email ID: sumitkumarpandey88@gmail.com

Date: 20-04-2016

Place: Kankroli (Rajasthan)

JK TYRE & INDUSTRIES LTD.

Declaration by the Guide

This is to certify that **Mr Sumit Kumar Pandey**, a student of **Executive MBA (Power Management)**, Roll No- 500031335 of UPES has successfully completed this dissertation report on "**Detailed Study of Business Framework and Open Access in Power Trading**" under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analysed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfilment for the award of degree of MBA.

Rajesh Sharma
Assistant Manager (EE&I)
Address- JK Tyre and Industries Limited
Jaykaygram, Kankroli- 313324
M.NO. +91-9636057671
Email ID- rajeshsharma@ktp.jkmail.com

Date- 12-02-2016
Place- Kankroli (Rajasthan)

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ABBREVIATION

STOA	Short Term Open Access
MTOA	Medium Term Open Access
LTA	Long Term Access
NLDC	National Load Dispatch Centre
RLDC	Regional Load Dispatch Centre
SLDC	State Load Dispatch Centre
TTC	Total Transmission Corridor
ATC	Available Transmission Corridor
IEX	Indian Energy Exchange
RPC	Regional Power Committees
IR Link	Inter-Regional link
RTS	Regional Transmission System
ISGSs	Inter-state Generating System
CEA	Central Electricity Authority
ER	Eastern Regions
NER	North Eastern Region
NR	Northern Region
WR	Western Region
REA	Regional Energy Account
PTC	Power trading Corporation

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EXECUTIVE SUMMARY

Power can be defined as a basic infrastructural part for the economical development of the country. Indian power sector is continuously evolving from more than one hundred years and still facing number of challenges. Power sector reforms of 1991 invited private participation for capacity addition. Indian Electricity Act 2003 has brought numerous changes in this sector from unbundling of SEBs to de-licensing of generation.

Enactment of Indian Electricity Act 2003 has made the trading as distinct license activity. Greatest achievement of act is opening the market for all players and giving freedom to them for buying and selling the electricity thus promoting the competition in the market. Thus freedom to buy and sell electricity thereby creating or tending towards a perfect market in this sector, which was previously almost a monopoly market run and maintained by State Electricity Boards, is now widely opened up for a greater private participation.

One of the key features of Indian electricity Act 2003 is open access which is the soul of Power trading. Open access always was or is the first step in to a free and strong, open and unified power market through the world. It allowed the generator with an excess capacity to sell and take part in the trading of electricity. Central Transmission Utility and State transmission Utilities are obliged to allow their facilities for this purpose .Thus the timing of allotment , charges to taken from users, amount of capacity to be allotted are all major issues which need a quick attention by the regulators.

This report initially tells about what power trading is and shows the scope of power trading in India. After giving the background of power trading the report tells us about the process of power trading and the role of various organizations. Report explains about Renewable Energy certificate (REC) market in power exchange and its present status.

Every activity in business has its own importance, like other trading businesses the main task is to find the buyer and seller, so the study reveals about the business development approach of power trader. Brief overview about the process flow of power trading is explained in the report, such that to simply understand step by step approach from the scratch , which involves developing business model, operational procedure, financial and commercial function of power trading.

The other purpose of this report is to present the trend, process flow and analysis of

power trading in Indian power sector. Analysis of trends in power market plays important role to assess the future growth and perspective of trading, it also informs about the opportunities and competition present in power market.

Latter part of report focuses on developing the methodology to determine the "availability of Inter-regional transmission corridor for STOA at any time", so power trader will take advantage before filing their STOA application for collective transaction and to understand the scenario of power exchange regarding inter-regional transmission corridor.

CHAPTER-1

INTRODUCTION

1.1 Overview

The Power Trading has comprehended much expansion since the Electricity Act 2003 has been enacted. Trading has been acknowledged as a licensed activity. The power scenario of the country has been expanding more rapidly. Generation capacity added during the year was highest ever for any financial year. However, in beginning of the 12th five year plan we have crossed the remarkable figure of 200 GW installed capacity in the country. A large proportion of this addition came from private sector – 58% in financial year 2012 and 41% in 11th plan. Private Participation has raised the bar of performance by bringing projects on fast track and efficiently. Also the Private sector initiative in hydro sector also saw achievement close to the targeted capacity.

In general, power market is growing. This growth has shown a direct impact on the Short-term power market. Short-term power market grew by 16% year on year and now constitutes 11% of the total generation in the country (including Unscheduled Interchange i.e. UI). Bilateral segment has shown comparatively higher growth when compared to power exchanges which shows buyers preference for certainty and longer visibility. Due to frequency band reduction by CERC, there has been pressure on Unscheduled Interchange and it has reduced year on year which is a positive sign. However, there is a need for further tightening of Unscheduled Interchange frequency regime to achieve discipline and avoid kind of grid disturbances that the country faced on 30th July and 31st July 2012.

With Open Access, there has also risen an opportunity to trade in power, managing the surplus-deficit power supply positions arising across the country in different seasons, different months, and even different hours in a day. Such surplus-deficit of power supply may create the market for short-term and medium-term open access. Open Access has also introduced the possibility of demand side bidding, which would help consumers respond to price signals and make the market operate more efficiently and effectively.

The aim of Open Access is to help industry get uninterrupted power, at competitive rates. This will not only help in survival of the industry, but will give a boost to industrial growth. For such developments in power trading power exchanges are protagonist to

heighten the participation through short-term collective transactions. However, there are a few restraints that cannot be ignored and may hinder the short-term market.

This report presents the development of power trading market in India, business model of power trading and moreover focuses on the role of open access with respect to short term and medium term open access and enlargement of power trading market with a detail on the restraints.

1.2 Objective of the Study

The power trading has been figured as a prospective part of the Indian Power Sector. Henceforth, this report focuses on the growth of power trading with details on the fragment of Short-term & Medium term open access through bilateral and collective transactions. Objectives of the study may be summarized as follows:

a) To assess the current scenario of power trading in India.

b) Assessment of various drivers of power trading in the country.

c) To study about the business process of power trader.

d) To find out landed cost of collective and bilateral transaction for STOA.

e) To bring out the other aspects that may lift up the power market and may help in maintaining the system security.

f) To observe the trends in volume and price of the short-term transactions of electricity.

g) Effect of congestion on volume of electricity transacted through power exchanges.

1.3 Scope of Project

This project will help to understand the business process of power trading in Indian Power Market and role of Open Access in power trading, by promoting competition in the market. Establishment of power exchange and their increasing role in power exchange. Analysis of Available transmission corridor (ATC) could be an effective tool for power trader.

1.4 Significance and Purpose of Study

Enactment of the Electricity Act, 2003 has opened up hitherto constrained electricity market which was characterized by long term PPAs. The power markets are taking the

transition from the vertically integrated monopolies model earlier based on the cost to supply regulation to the competitive model with full competition and no regulation. Besides de-licensing 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.

The project aims at developing concept about business process and business development approach strategy of power traders. Open access which is soul of the power trading is analysed deeply in this report. Study about corridor analysis for short term open access shows that a model can be developed to derive the available transmission corridor, which will be very useful for trader to work more efficiently.

CHAPTER-2

LITERATURE REVIEW

2.1 Literature Review

Singh Harry et.al [1998] this paper studies the management of costs associated with transmission constraints (i.e., transmission congestion costs) in a competitive electricity market. The paper examines two approaches for dealing with these costs. The first approach is based on a nodal pricing framework and forms the basis of the so-called pool model. The paper also provides an analysis of financial instruments proposed to complement nodal pricing and includes illustrative test results on a large scale system. The second approach is based on cost allocation procedures proposed for the so-called *bilateral* model. The paper explains the basis for this model including a game-theoretic evaluation of some of its aspects. Both the pool and bilateral models have been at the canter of the electric utility restructuring debate in California.

S.B. Warkad et.al [2005] in journal "**Optimal Electricity Nodal Price Behaviour: a Study in Indian Electricity Market**" identifies that the electric power industry has now entered in an increasingly competitive environment where the trend of electricity market is heading towards Transmission Open Access. In India, the Electricity Act 2003has implemented to undertake comprehensive market reforms in electricity sector. Transmission Open Access seeks to achieve the objective of ensuring optimal development of transmission network, to promote efficient utilization of generation and transmission asset in the country and to attract the required investment in transmission sector and to provide adequate returns.

Ravinder, Talegaonkar Ajay in his journal **[Developing Power Exchanges in India : Issues and challenges]** [2008, Vol. 65, Issue 3] discussed the introduction of open access for inter-state transmission as per the new electricity legislation in India has facilitated bilateral trading resulting in better resource optimization within an overall deficit scenario. While the volume of traded electricity is tiny compared to the total consumption, nonetheless it has electrified an otherwise grim scenario. As a result, the Indian power sector has started at tracing private investment in hydro and thermal generation at an unprecedented scale.

Hari Natarajan in his paper **[An approach to introduce competition in The Indian Power Sector]** proposed a model allowing bilateral between IPPs and large users. Given the current state of transmission infrastructure, the generating companies should be allowed to contract with industrial customers in their own region with first preference to customers within the state in which the generating company is going to be located.

Shafqat Mughal [2010] in National Power Engineering Conference presented a paper on "The Changing Scenario of Electricity Trading and Power Market Mechanism in India" described the significance of Open Access in the power market. He describes Open access as the key to a free and fair electricity market. Power producers (sellers) and dealers/customers (buyers) have to share a common transmission network for wheeling the power from the point of generation to point of consumption. The open access provided non-discriminatory use of the interstate and intrastate transmission system, facilitating the trading of power from one utility to other. It also facilitates setting up of Independent Power Producers (IPPs), Captive Power Producers (CPPs), and merchant power plants. Open access at the state level will be facilitated by the intrastate availability based tariff (ABT). The open access can yield desirable results if one can ensure adequate margins in the transmission system. After implementation of open access, the experience gained has been providing signals for identification of congested corridors and expansion planning.

Schweppe et al [1988. Portland, Oregon] in journal **[Mandatory Wheeling: a Framework for Discussion. in IEEE/PES Summer Meeting]** mentions that "wheeling is a mongrel concept resulting from the mating of two inherently different economic concepts; an ideal world of regulated utilities and an ideal deregulated competitive market. Wheeling would not exist in either extreme."

CERC Concept Paper on [Open Access in Inter-state Transmission] [August 2003] highlights the issues associated with open access and frame regulations as the outcome of the exercise.

It also describes the transmission pricing schemes designed to promote efficient day to day operation of bulk power market including power trading. It gives economic signals for efficient use of transmission resources, investment in transmission, location of new generation and loads, compensating owner of transmission system. It also describes energy accounting e.g. Active Energy, Reactive Energy etc. The paper concluded that:

1. The existing long-term transmission agreements should be honoured until modified; else the issue of stranded assets would arise.
2. To begin with only spare transmission capacity can be made available for open access.
3. Since, RLDCs will have a key role to play in the open access related issues; neutrality in their functioning is expected.
4. 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.
5. Contract Path Method and Incremental Postage Stamp Methods have been suggested for Open Access Pricing
6. 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.
7. Special Energy Meters will be installed by the open access customer as and when required.

David A K et.al [1998] said that Managing dispatch in an open access environment is a new challenge facing independent transmission system operators who are mandated to provide a level playing field for all transmission users. Two issues are especially important via; use-of-transmission-system charges and congestion management.

He has examines aspects of these issues with emphasis on the bilateral and multilateral dispatch coordination are explored and mathematical models developed for each case. The practical case when all three modes coexist is discussed with respect to both forward and real time dispatch.

Iliac M et.al [2003] has suggests that many of Transmission Reliability and Security challenges are direct result of the institutional dichotomy within the once vertically integrated industry.

Namely, while the generation portion of this industry has made major progress toward becoming for profit, value-based industry, both the delivery (transmission) and the end user (distribution) remainders are left without any clear institutional support to adjust and

provide their value to the end users in the changing industry. His work shows that in order to move forward and provide some more natural ways of valuing generation, transmission, distribution and customers' willingness to respond to the changing system constraints, several issues must be resolved. Some possible institutional and technological approaches to solving the system reliability problems in the changing industry were introduced.

S.K. Soonee (C.E.O. POSCO) in his paper **[Open Access in Inter-State Transmission]** cites the significance of Open Access in Trading Market Evolution. It describes various products of Trading, accounts the short term trade in various financial periods.

2.2 Organisation Profile

JK ORGANISATION founded over 100 years ago ranks within the largest private sector group on India interims of assets and sales. The group has multi-business, multi-product and multi-location operations. The group has a distinguished record of having pioneered several new products and processes in India. 'JK' owes its name as an industrial entity was conceived by the two great Visionaries – Late Lala Juggilal Singhania and his son late Lala Kamalapat Singhania. They dreamt of an industrial India and founded the JK Organisation as their signal contribution towards realization of that dream.

JK ORGANISATION comprising more than 50 in number, the Group's companies is mostly public limited, where it has controlling interest ranging from 35 to 80% and the number of public shareholders aggregate 7 lakh. It has made forays into several fields such as Paper and Boards; Cement; Automotive Tyres & Tubes; Synthetic Fibers like Nylon, polyester, Acrylic; Drugs and Pharmaceuticals; Cotton, Wollen and Jute Textiles; Engineering; Agrochemicals; Hybrid Seeds; Cosmetics; audio magnetic tapes; Power transmission including V.Belts, Automotive Belts, Oil Seals; System Engineering, Industrial Electronics and Material Handling Systems; Sugar; Food and Dairy Products; Insurance, International Trading etc.

It is the flagship company of JK Group. In the last 10 years the sales turnover of the company has increased two-fold. The company is headed by Dr. Raghupati Singhania, Vice Chairman & Managing Director. In 1977 the company setup a modern Automotive Tyres & Tubes Plant at Jaykaygram, Kanroli in technical collaboration with General Tire Co., USA and another plant in 1991 at Banmore near Gwalior in M.P. In 1997 the comp ant has acquired two plants of Vikrant Tyres Ltd at Mysore. The company has set up one

more plant of OTR in Mysore and Green field project at Chennai in 2012.

In June, 2008 the company has taken over "Campania Hulera TORNEL" of Mexico, which JK Tyre's first international acquisition. Located in Azcapotzalco, Tultitlan and Hidalgo, the 3 operating tyre plants of Tornel have an aggregate capacity of 6.6 million tyres per annum, while JK Tyre has 6 modern tyre plants with an aggregate capacity of 12.5 million tyres per annum.

CHAPTER-3

RESEARCH DESIGN, METHODOLOGY AND PLAN

3.1 Research Methodology

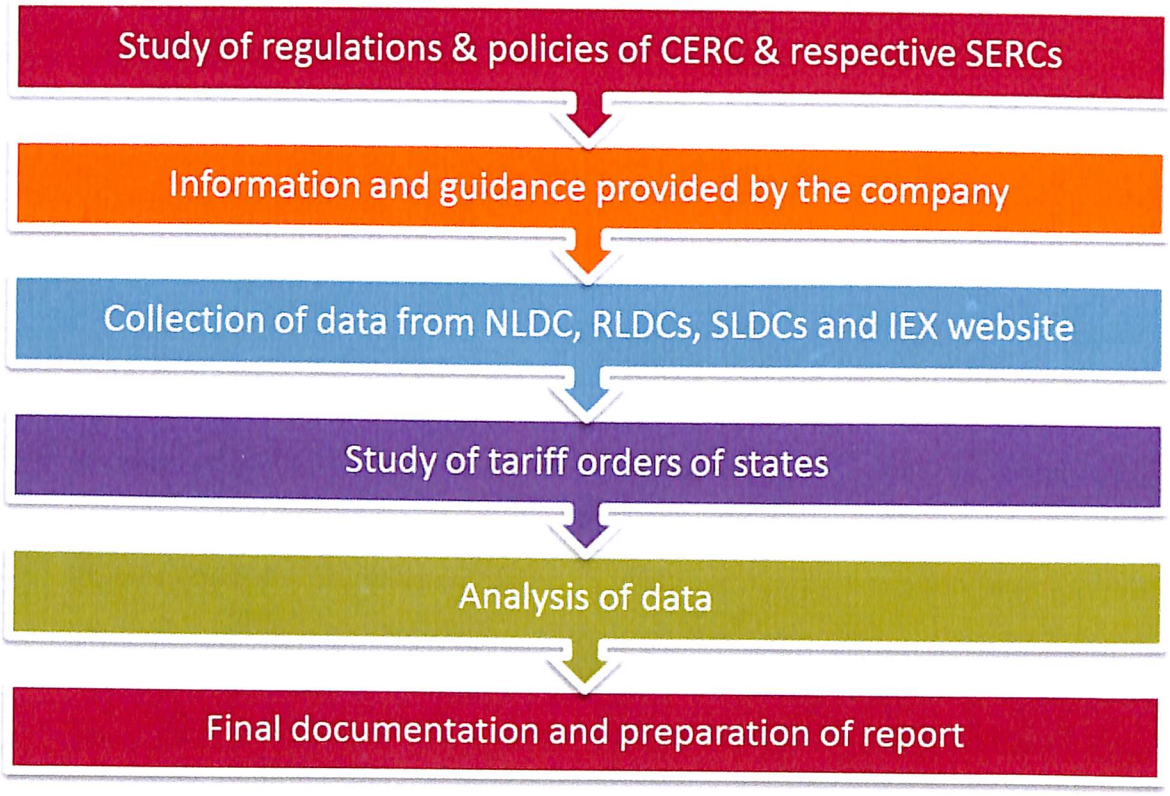

Figure-1 Research Methodology

3.2 REGULATORY FRAMEWORK FOR OPEN ACCESS

It was envisaged in the National Electricity Policy 2005 that open access in transmission will promote competition and in lead to availability of cheaper reliable power supply. As per the Act, Open Access means the non-discriminatory provision for the 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 in accordance with the regulations specified by the Appropriate Commission (i.e. SERC/CERC as applicable). The rights conferred upon consumers of electricity to source their supply from competing generators and the corresponding obligations imposed on transmission and distribution utilities and the system operators (RLDCs/SLDCs) to transport electricity in an efficient and non-discriminatory manner aim at creating a competitive market that would improve efficiencies and cut costs.

The CERC (Open Access in inter-state Transmission) Regulation 2008 has opened a window for industrial consumers and many distribution licensees to opt for the most feasible power source. It allowed them to rely on such a power source where the consumer can buy electricity directly through buyer or through a Registered Trader. Under CERC (Open Access in inter-state Transmission) Regulation, 2008; it is envisaged to categorize under as:

1. Bilateral Transactions
2. Collective Transactions

The introduction of open access in transmission has the following advantages:

- Distribution Licensees (existing or wherever constituted as a result of re-organization of SEBs) can access power from any source; a generator, a trader, another distribution licensee, a captive generator etc., on payment of transmission wheeling charges without payment of surcharge. The Central Transmission Utility (CTU) the State Transmission Utility (STU) and the transmission licensees are obliged to provide on demand open access to their respective system 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 intra-State transactions.
- A person setting up a captive generating plant can carry power from his captive generating facility to the destination of his use without payment of surcharge.

The advantage of the open access in distribution is as follows:

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 and or additional surcharge under section 42(4), as the case may be. Thus the consumer is empowered to select his preferred source of supply of electricity. The scope of this regulation enables the long-term access customers to have relatively higher priority as compared to medium-term and short-term open access customers. And thereby, allows furnishing such transactions for the surplus capacity available

after interstate transmission system allocation, by virtue of following parameters:

1. Inherent Design Margin
2. Margins available due to variation in power flows; and
3. Margins available due to in-built spare transmission capacity created to cater to future load growth or generation addition:

The procedure for both transactions is to be prepared by the Central Transmission Utility (CTU) and approved after the concern of Central Electricity Regulatory Commission. The procedure for bilateral and collective transactions can be obtained from the Regional Load Despatch Centre. Thus we come to know that Open Access in Indian power sector are governed mainly by following Acts, Policies & Regulations

1. Indian Electricity Act 2003, with amendments
2. National Electricity Policy 2005
3. Central Electricity Regulatory Commission (Open Access in Inter-state Transmission) (With amendments) Regulations, 2008
4. Central Electricity Regulatory Commission (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) (with amendments) Regulations,2009
5. Central Electricity Regulatory Commission (Sharing of Inter State Transmission Charges and Losses Regulations), 2010

3.2.1 The Electricity Act, 2003 with amendments-

Main features of Indian Electricity Act 2003 regarding Open Access

Section 2(Definitions), Sub-section (47)

Open access means the non-discriminatory provision for the 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 in accordance with the regulations specified by the Appropriate Commission.

Section 9 (Captive Generation), Sub-section (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.

Section 38 (Central Transmission Utility and functions), sub-section (2)

(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 Central Commission:

Section 39 (State Transmission Utility and functions), sub-section (2)

One of the functions of State Transmission Utility is 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 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.

Section 42 (Duties of distribution licensee and open access), sub-section (42)

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 shall be allowed on payment of a 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 subsidy within the area of supply of the distribution licensee:

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

Provided also that such surcharge shall not be liveable 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:

Provided also that the State Commission shall, not later than five years from the date of commencement of the Electricity (Amendment) Act, 2003, by regulations, provide such open access to all consumers who require a supply of electricity where the maximum power to be made available at any time exceeds one megawatt.

Section 49. (Agreement with respect to supply or purchase of electricity):

Where the Appropriate Commission has allowed open access to certain consumers under section 42, such consumers, notwithstanding the provisions contained in clause (d) of sub-section (1) of section 62, may enter into an agreement with any person for supply or purchase of electricity on such terms and conditions (including tariff) as may be agreed upon by them.

Section 86. (Functions of State Commission) (1) The State Commission shall discharge the following functions, namely: -

(a) determine the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be, within the State: Provided that where open access has been permitted to a category of consumers under section 42, the State Commission

Shall determine only the wheeling charges and surcharge thereon, if any, for the said category of consumers.

3.2.2 The National Electricity Policy, 2005

As per Section 3 of Electricity Act, 2003, the central government has notified The National Electricity Policy, 2005. The relevant section for Open Access is elaborated below:

Section 5.3.3 Open access in transmission has been introduced to promote competition amongst the generating companies who can now sell to different distribution licensees across the country. This should lead to availability of cheaper power. The Act mandates non-discriminatory open access in transmission from the very beginning. When open access to distribution networks is introduced by the respective State Commissions for enabling bulk consumers to buy directly from competing generators, competition in the market would increase the availability of cheaper and reliable power supply. The Regulatory Commissions need to provide facilitative framework for non-discriminatory open access. This requires load dispatch facilities with state-of-the art communication and data acquisition capability on a real time basis. While this is the case currently at the regional load dispatch centres, 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.

Section 5.3.6 The necessary regulatory framework for providing non-discriminatory open access in transmission as mandated in the Electricity Act 2003 is essential for signalling efficient choice in locating generation capacity and for encouraging trading in electricity for optimum utilization of generation resources and consequently for reducing the cost of supply.

Section 5.4.2 The Act provides for a robust regulatory framework for distribution licensees to safeguard consumer interests. It also creates a competitive framework for the distribution business, offering options to consumers, through the concepts of open access and multiple licensees in the same area of supply.

3.2.3 Central Electricity Regulatory Commission (Open Access in Inter-state Transmission) (With amendments) Regulations, 2008

According to Regulation 2(Definitions),

Bilateral transaction means a transaction for exchange of energy (MWH) between a specified buyer and a specified seller, directly or through a trading licensee or discovered at power. Exchange through anonymous bidding, from a specified point of injection to a specified point of drawl for a fixed or varying quantum of power (MW) for any time period during a month.

Collective transaction means a set of transactions discovered in power exchange through anonymous, simultaneous competitive bidding by buyers and sellers.

Short-term open access means open access for a period up to one (1) month at one time.

Short-term customer means a person who has availed or intends to avail short term open access.

According to this regulation nodal Agency for

- Collective transaction-National Load Despatch Centre
- Bilateral transaction-Regional Load despatch centre

This regulation states Nodal agency has to prepare "detailed procedure", which involves whole process from filing of application, scheduling, settlement and curtailment. Procedure is briefly explained in later part of report.

3.2.4 Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters Regulations, 2009

Following are the main features of this regulation-

These regulations apply to the grant of connectivity, long-term access and medium-term open access, in respect of inter-State transmission system:

Provided that a generating station, including captive generating plant or a bulk consumer, seeking connectivity to the inter-State transmission system cannot apply for long-term access or medium-term open access without applying for connectivity:

Provided further that a person may apply for connectivity and long-term access or medium-term open access simultaneously.

Applicant for this regulation

(i) The following in respect grant of connectivity:

1. A generating station with installed capacity of 250 MW and above, including a captive generating plant of exportable capacity of 250 MW and above or;
2. A Hydro Generating station or generating station using renewable source of energy, of installed capacity between 50 MW and 250 MW.
3. One of the Hydro Generating stations or generating stations using renewable sources of energy, individually having less than 50 MW installed capacity, but collectively having an aggregate installed capacity of 50 MW and above, and acting on behalf of all these generating stations, and seeking connection from

CTU at a single connection point at the pooling sub-station under CTU, termed as the lead generator, or;

4. A bulk consumer.

(ii) a generating station including a captive generating plant, a consumer, an Electricity Trader or a distribution licensee, in respect of long-term access or medium-term open access , as the case may be;

Long-term access means the right to use the inter-State transmission system for a period exceeding 12 years but not exceeding 25 years;

Long-term customer means a person who has been granted long-term access and includes a person who has been allocated central sector generation that is electricity supply from a generating station owned or controlled by the Central Government;

Medium-term open access means the right to use the inter-State transmission system for a period exceeding 3 months but not exceeding 3 years;

Medium-term customer means a person who has been granted medium-term open access

Nodal Agency-The nodal agency for grant of connectivity, long-term access and medium term open access to the inter-State transmission system shall be the Central Transmission Utility

3.2.5 Sharing of Inter State Transmission Charges and Losses Regulations, 2010

3.2.5.1 *Principles for sharing ISTS charges and losses.*

1. Based on the Yearly Transmission Charges of ISTS Transmission Licensees and transmission losses in the ISTS network, the Implementing Agency shall compute the Point of Connection charges and Loss Allocation Factors for all DICs:-

(a) Using load-flow based methods; and

(b) Based on the Point of Connection charging method.

2. A detailed explanation of the Hybrid methodology to be applied for sharing the ISTS charges and losses amongst the Designated ISTS Customers is set out in Annexure – I to these. Regulations, which may be reviewed by the Commission from time to time either upon an application by any interested party or otherwise.

3.2.5.2 Mechanism to share ISTS transmission charges.

(1) The sharing of ISTS transmission charges between Designated ISTS Customers shall be computed for an Application Period and shall be determined in advance and shall be subject to periodic true-up as specified subsequently in these regulations;

The sharing of ISTS transmission charges shall be based on the technical and commercial information provided by various Designated ISTS Customers, ISTS Transmission Licensees, and any other relevant entity, including the NLDC, RLDCs and SLDCs to the Implementing Agency.

Provided that in the event of such information not being available within the stipulated timeframe or to the level of detail required, the Commission may authorize the Implementing Agency to obtain such information from alternative sources as per the procedure as may be approved by the Commission in this behalf.

(2) The mechanism for sharing of ISTS charges shall ensure that:-

(a) The Yearly Transmission Charge of the ISTS Licensees are fully and exactly recovered; and

(b) Any adjustment towards Yearly Transmission Charge on account of change in commissioning schedule of elements of the power system and change in factors constituting the transmission charge, approved by the Commission, e.g., FERV, Changes in interest rates shall be fully and exactly recovered etc., as specified subsequently in these regulations.

(4) The Point of Connection transmission charges shall be computed in terms of Rupees per Megawatt per month. The amount to be recovered from any Designated ISTS Customer towards ISTS charges shall be computed on a monthly basis as per these regulations. The Point of Connection transmission charges for short term open access transactions shall be in terms of Rupees per Megawatt per hour and shall be applicable for the duration of short term open access approved by the RLDC/NLDC.

(5) The Implementing Agency may, after seeking approval of the Commission, conduct studies from time to time to refine the mechanism for sharing of transmission charges and losses as detailed in Annexure – I to these Regulations.

3.5.2.3 Mechanism of sharing of ISTS losses.

1. The schedule of electricity of Designated ISTS Customers shall be adjusted to account

for energy losses in the transmission system as estimated by the Regional Load Despatch Centre and the State Load Despatch Centre concerned. These shall be applied in accordance with the detailed procedure to be prepared by NLDC within 30 days of the notification of these regulations. The losses shall be apportioned based on the loss allocation factors determined using the Hybrid methodology.

2. The sharing of ISTS losses shall be computed based on the information provided by various Designated ISTS Customers, ISTS Licensees, and any other relevant entity, including the NLDC, RLDCs and SLDCs and submitted to the Implementing Agency. Provided that in the event of such information not being available within the stipulated timeframe or to the level of detail required, the Commission may authorize the Implementing Agency to obtain such information from alternate sources as may be approved for use by the Commission.

3. The applicable transmission losses for the ISTS shall be declared in advance and shall not be revised retrospectively.

4. The Implementing Agency may, after seeking approval of the Commission, conduct studies from time to time to refine the ISTS loss allocation methods.

3.3 POWER TRADING

Electricity Industry, throughout the world, is undergoing restructuring for last twenty years. Deregulated industry structure is the common path adopted that is transforming to increase in accountability, increase in efficiency and better utilization of the resources and for providing choice and quality service to the consumers at competitive price. The deregulated structure is envisaged to create an electricity market and introducing competition at various levels of electricity related transactions (other than transmission, which is natural monopoly). Under this structure, a competitive market of electricity is created to enable the generators to compete with each other by availing open access to the network. This is achieved by de-licensing the generation and permitting the generators to supply power to the wholesale/retail customers of their choice by entering into bilateral agreements with or without help of a separate market like power exchange.

Over the past two decades a number of countries have restructured their electricity industry by significantly reducing the government's role in the ownership and management of electricity industries. It has seen as necessary conditions for increasing the efficiency of electric energy production and distribution, offering a lower price, higher

quality and secured supply. The forces behind power sector deregulation taking place worldwide are different in different countries. Theses deregulation processes have been developed that have defended the vertically integrated model. Asian countries including India, China, South Korea, Singapore, Japan and Thailand have also taken historic steps to restructure their electricity industry.

The vertically integrated utilities could recover their cost regardless of whether they are operated efficiently or not.

However with the introduction of competition there has been an important shift from this approach. Producers have ceased to be protected by their exclusive rights to generate and supply electricity. Competitive markets are providing the driving force for generators to innovate and operate in most efficient and economic manner in order to remain in business and recover their cost. Other benefits of competitive market include customer benefits, generation economies of scale and investment signals.

Operation and control of restructured electricity market poses technical challenges far more complex than the conventional monopolistic market. The complexity arises due to involvement of several market entities, many types of contractual obligations, and separation of primary and ancillary services and varying models of market management. Some of the technical challenges. Include congestion management, market power, price volatility and ancillary services management.

3.3.1 Background

Disintegrated power system started integrating into the state level power system after nationalization of power sector in the year 1948 onwards. On account of seasonal variation in availability of power from Hydro Power Station and seasonal variation in demand of different states depending upon a nature of load, it was considered useful to create facilities for exchange of power amongst variation states during different season. Some inter-state power lines were built and made operational in late 1950's and exchange of power started in bilateral mode. In this kind of exchange of power that was a form of trading, states having more Hydro Power could supply power during rainy season, to be taken back during the winter season when generation from Hydro Power Stations goes down.

This kind of power trading was found to be very useful. Government of India took a view for integration of power system on regional basis, divided India into 5 regions. Regional

Electricity Board and Regional Load Dispatch Centre were constituted for operation of inter-connected power system for each region separately. This was a land mark decision for promotion of power trading and construction of many more inter-state lines was taken up. Look into the advantage of exchange of power amongst various states within a region, further steps was taken for inter-connection of different regions through inter-regional lines and Government of India started construction of many lines across different regions. This step gave further opportunities for trading of power amongst various states, majority of bilateral basis a some on purchase/sale basis. In due course of time, industrial growth in Eastern Region (the state of Bihar, West Bengal and Orissa) could not take place as visualized. With the result, that generating capacity installed in the regional was in excess of the requirement.

Using interregional lines, Eastern Region constituents could trade the surplus power to states like Andhra Pradesh, Assam etc. in a big way. Looking the benefits of the above kind of power of trading, Government of India constituted Power Trading Corporation of India Limited in the year 1999 to promote trading of power. Even though The Electricity Act (supply) did not recognize power trading as an activity, the Bill for consolidation of Electricity Law was under consideration of the Government of India and had a provision of trading to be a part of power sector activities. Even before the Bill was passed by the Parliament to converted into the Act (The Electricity Act, 2003), power trading started in the structured form in the year 2001 through Power Trading Corporation; have been trading the power in form, purchase of power and sale of power separately. The Electricity Act, 2003, recognized trading to be distinct activity and appropriate commissions format and related for trading of power.

Power trading inherently means a transaction where the price of power is negotiable and options exist about whom to trade with and for what quantum. In India, power trading is in an evolving stage and the volumes of exchange are not huge. All ultimate consumers of electricity are largely served by their respective State Electricity Boards or their successor entities, Power Departments, private licensee's etc. and their relationship is primarily that of captive customers versus monopoly suppliers. In India, the generators of electricity like Central Generating Stations (CGSs), Independent Power Producers (IPP's) and State Electricity Boards (SEB's) have most of their capacities tied up. Each SEB has an allocated share in central sector/ jointly owned projects and is expected to draw its share without much say about the price.

In other words, the suppliers of electricity have little choice about whom to sell the power and the buyers have no choice about whom to purchase power from.

The pricing has primarily been fixed/controlled by the Central and State Governments. However, this is now being done by the Regulatory Commissions at the Centre and also in the States wherever they are already functional. Power generation/transmission is highly capital intensive and the Fixed Charge component makes up a major part of tariff. India being a predominantly agrarian economy, power demand is seasonal, weather sensitive and there exists substantial difference in demand of power during different hours of the day with variations during peak hours and off peak hours. Further, the geographical spread of India is very large and different parts of the country face different types of climate and different types of loads.

Power demand during the rainy seasons is low in the States of Karnataka and Andhra Pradesh and high in Delhi and Punjab. Whereas many of the States face high demand during evening peak hours, cities like Mumbai face high demand during office hours. The Eastern Region has a significant surplus round the clock, and even normally power deficit states with very low agricultural loads like Delhi have surpluses at night. This situation indicates enough opportunities for trading of power. This would improve utilization of existing capacities and reduce the average cost of power to power utilities and consumers.

In view of high fixed charges, average tariff becomes sensitive to PLF. Trading of power from surplus State Utilities to deficit ones, through marginal investment in removing grid constraints, could help in deferring or reducing investment for additional generation capacity, in increasing PLF and reducing average cost of energy. Over and above this, the Scheduled exchange of power will increase and un-scheduled exchange will reduce bringing in grid discipline, a familiar problem.

3.3.2 The Electricity Act 2003 – A Catalyst for Power Trading

The Electricity Act, 2003 introduces and recognizes the concept of "trading" as a distinct licensed activity. The definition of an *electricity trader* reads as follows: "a person who has been granted a license to undertake trading in electricity". The intention of the Act by introducing trading is to provide choice before the consumers and to introduce the competition.

According to Section 12 of the Act, no person shall undertake trading in electricity unless he is authorized to do so by a license issued by the Appropriate Commission, i.e. the

Central Electricity Regulatory Commission or the State Electricity Regulatory Commission respectively. The CERC may, on application made to it, grant a license to any person to undertake trading in electricity as an electricity trader, in any area which may be specified in the license. Importantly, the Act states unambiguously that the license shall continue to be in force for a period of twenty-five years, unless such license is revoked.

There are two CERC functions that are directly related to trading. In the first instance, the issuing of licenses to persons to function as electricity trader with respect to inter-state operations, Section 52 of the Electricity Act 2003 stipulates that the appropriate commission may specify the technical requirement, capital adequacy requirement and credit worthiness for being an electricity trader.

In the second instance, the CERC may also fix the trading margin in the Inter-State trading of electricity, if considered necessary. The Act broadly defines trading as "[the] purchase of electricity for resale thereof and the expression "trade" shall be construed accordingly".

It is important to mention at the outset that the Act distinguishes trading and the prerequisite trading license according to the geographical spread of the activity undertaken, to know: Inter-State trading Licensee; and II. Intra-State Trading Licensee.

3.3.3 What means being an electricity trader?

Technical Requirements

(1) The applicant shall have at least one full-time professional having, experience in each of the following disciplines, namely:

- Power system operations,
- Finance, commerce and accounts.

(2) The technical requirement of staff shall be complied with before undertaking trading activities, notwithstanding the fact that the Commission has granted the license for inter-state trading.

(3) The applicant shall furnish to the Commission the details of the professional and the supporting staff engaged by him on full-time basis before undertaking inter-state trading.

Capital Adequacy Requirement and Credit worthiness:

Previously the trader's licenses were categorized in six different categories from A to F; F being the category of a trader who is trading the highest volumes i.e. above 1000 million units. But the traders are now categorized in four categories i.e. I, II, III and IV. In below given table categories of various licenses are given as amended in timely manner

Category of the License (As per Notification dated 6.2.2004)	Category of the License (As per Notification dated 24.2.2009)	Category of the License (As per Notification dated 11.10.2012)
F (Above 1000 MU's)	I (No Limit)	I (No Limit)
E (between 700 and 1000 MU's)		II (Not more than 1500 MU's)
D (between 500 and 700 MU's)		
C (between 200 and 500 MU's)	II (Not more than 500 MU's)	III (Not more than 500 MU's)
B (between 100 and 200 MU's)		
A (Unto 100 MU's)	III (Up to 100 MU's)	IV (Not more than 100 MU's)

Table 1 Categories of Various Trading Licensee

Considering the volume of inter-state and intra-state trading proposed to be undertaken by the applicant on the basis of the inter-state trading license, the minimum net worth of the electricity trader at the time of application shall not be less than the amounts specified hereunder.

Category of the Trading License	Volume of electricity proposed to be traded in a year including intra-state trading, where applicable	Minimum Net Worth (Rs. In Crore)
Category I	No Limit	50
Category II	Not more than 1500 MU's	15
Category III	Not more than 500 MU's	5
Category IV	Not more than 100 MU's	1

Table 2 Minimum Net worth Requirement

The Annual Subscription Fee for a trader shall be payable as per CERC (Payment of Fees & Charges) Regulation, 2012. The fee shall be paid within thirty days of the date of grant of licence and thereafter, annually by 30th April of each year. The application fee for trading license is Rs. 1, 00,000/- and shall be specified by government in timely manner. The Annual fee for various categories is given below:

Category of license	Fee per annum (Rs.in lakh)
Category-I (No Limit)	40
Category-II (Upto 1500 MU annually)	15
Category-III (Upto 500 MU annually)	6
Category-IV (Upto 100 MU annually)	3

Table 3 Annual Fee for trading Licensee

3.3.4 Mechanism of trading

In current market scenario, based on international market experience following arrangements have been emerged for electricity trading:

1. ***Long-term Bilateral Contract market:*** In long-term bilateral contract market customers, traders, generators and other market players have a choice of entering into contractual arrangements which typically cover long-term commitments between buyers and sellers of electricity and have a fixed volume over a specified period of time. These contractual agreements are purely financial trade instruments. Typically, these long-term bilateral contracts are the cornerstone of all electricity trading markets. Alternative mechanisms are mainly developed to cover additional demands, shortages, as a risk management tool, etc. For instance, in the US electricity market, the majority of sales occur under bilateral market contracts, with the day-ahead and real time markets not accounting for more than 20 per cent of the sales.

2. ***Short-term Forward Trading Market:*** The Short Term Forward Trading market is a market for buying and selling electricity in advance. A forward contract is an agreement to buy electricity from another party at a specified time in the future at a specified price with money changing hands at the future delivery date. These are bilateral physical trades, which mean that two parties such as a generator and a trader may enter into a bilateral contract to deliver electricity at an agreed time in future which may be saying, for the coming winter or the following summer.

In international power markets like UK these types of contracts are used both to manage price risk and speculate against futures prices to avoid the risk of having to buy or sell electricity at the last minute through balancing mechanism or the spot market where prices are very volatile. However, such market has not emerged in current scenario but it holds a significant importance in future of Indian power sector.

3. ***Spot Trading Market:*** In a spot trading market, the supply and demand of electricity is balanced at any point of time. There is a possibility that the electricity market may shift to pool arrangements along with bilateral contacts.

4. ***Balancing Mechanism:*** Someone has to perform the role in balancing mechanism. In such scenario a system operator can play a role of information provider as he would be the most competent person to provide the information on availability and deficit of power in a region or any separating company can be made responsible. It has been seen that well developed spot-markets in electricity trading have emerged in India in the medium-term market, whereas the short-term forward trading market may emerge in the short-term. In view of this, power exchanges have developed in India over time.

Therefore, in due course of time the regulatory commission has come up with guidelines regarding rules and regulations for the operation of a power exchange in India through CERC (Power Market Regulations, 2010). However before Electricity Act 2003, PTC has been engaging mostly in match trading, whereby they match demand and supply requirements, keeping a margin for them in the process.

However, various other potential traders have entered the market after the competitive regime of act and entered into short-term forward contracts. Trading positions entail additional risks such as those associated with price volatility and therefore margin requirements may be high. However, these contracts would have to deal bearing on liquidity requirements of a trader. These issues need to be duly addressed and can also form part of contractual agreement between respective parties. Though it is the responsibility of a regulator to ensure an efficient electricity market and these issues may be addressed in the license conditions.

3.3.5 Existing power supply and trading scenario

Bulk electric power supply in India is mainly tied in long-term contracts. The bulk suppliers are mostly the central or state owned generating stations, as also a few Independent Power Producers (IPPs). Previously the bulk buyers were generally the State Electricity Board (SEBs), which are in the process of being unbundled. The power allocations from various generating stations are being assigned to Distribution companies as part of the unbundling process mandated by the Electricity Act, 2003. The Appropriate Commission regulates the price of bulk supply of a generating station to distribution utilities on the basis of its Terms and Conditions of Tariff or as per the Power Purchase

Agreement (PPA). Thus, most of the existing bulk supply is locked up in long terms contracts having station wise tariff, usually in two-part viz. capacity charge and energy charge.

The SEBs / Distribution companies who have the obligation to provide electricity to their consumers mainly rely on supplies from these long-term contracts. However, it is neither feasible nor economical to meet short term, seasonal or peaking demand through long-term contracts. Be it a deficit scenario or otherwise, power trading is essential for meeting the short terms demand at an optimum cost. Similarly, power trading is essential for distribution utilities for selling short-term surpluses in order to optimize the cost of procurement. A few captive generating plants participate in trading in order to optimize their operating cost and in the process, supply electricity to the grid. The Open Access Regulations and Inter-State Trading Regulations of the Central Commission have facilitated power trading in an organized manner.

Today, it is possible to trade electricity between any two points in India through inter-State Open Access on advance reservation basis, on contingency, day ahead and first come first serve. Transmission charges for trading are applied on Rs./MW/Day basis. Open Access charges are transaction specific depending on the regions/transmission systems involved between point of injection and point of drawl. At present, power is mostly being traded between power surplus distribution utilities in Eastern Region (ER) and North-eastern Region (NER) on one-hand and deficit utilities in Northern Region (NR) and Western Region (WR) on the other.

3.3.6 Trend in Short-term Market

The Short term market being the most attractive as well as prominent at this time as the 5.64% of volume out of various transactions in total generation have been through bilateral transactions for financial year 2012-13 as per market monitoring report of CERC. A total of 51156.89 MU's have been traded through Bilateral Trading. The total of bilateral constitutes of power traded through traders & power exchange and direct bilateral transactions. It is observed that approximately 72% of bilateral transactions have been routed through traders & power exchange. Whereas, a total of 14518 MU's have been traded through direct bilateral contracts and makes a slice of 28%. A table representing monthly traded volumes for the year 2012-13 is shown below:

Total volume of short-term transactions of electricity increased from 94.51 billion kWh

(BU) in 2011-12 to 98.94 BU in 2012-13.

Month-Year	Bilateral		Total Through Bilateral (MU's)
	Through Traders & PX	Direct	
Apr-12	2384.71	1010.98	3395.69
May-12	2416.57	1068.25	3484.82
Jun-12	2946.62	1148.43	4095.05
Jul-12	3766.43	1737.69	5504.12
Aug-12	3855.01	1910.69	5765.7
Sep-12	3072.15	1655.61	4727.76
Oct-12	2433.45	901.7	3335.15
Nov-12	3205.35	931.5	4136.85
Dec-12	3369.52	1086.27	4455.79
Jan-13	3547.34	1192.76	4740.1
Feb-13	2680.55	949.9	3630.45
Mar-13	2960.6	924.81	3885.41
		Total Through Bilateral during FY 2012-13	**51156.89**

Table 4 Total Trading through Bilateral Transactions for Year 2012-13

The bilateral transactions for the financial year 2012-13 have been shown through graphical representation, indicating a highest volume of 5504.12 MU's has been traded in the month of July'12 while lowest plunge of 3335.15 MU's for the month of Oct'12.

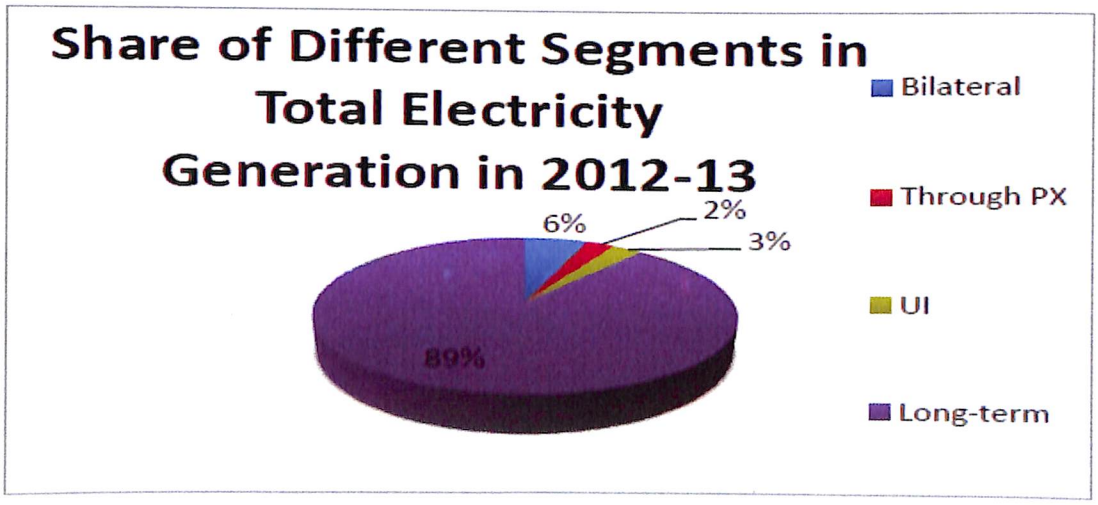

Figure 2 Shares of Different Segments in Total Electricity

The total electricity generated for the year 2012-13 has been 907 BU. The long term contracts holding a share of 808 BU. Thereby holding 89% of total electricity generated. While bilateral, power exchange and unscheduled interchange charges apportioned as

5.64%, 2.54% and 2.73% of the total BU's generated.

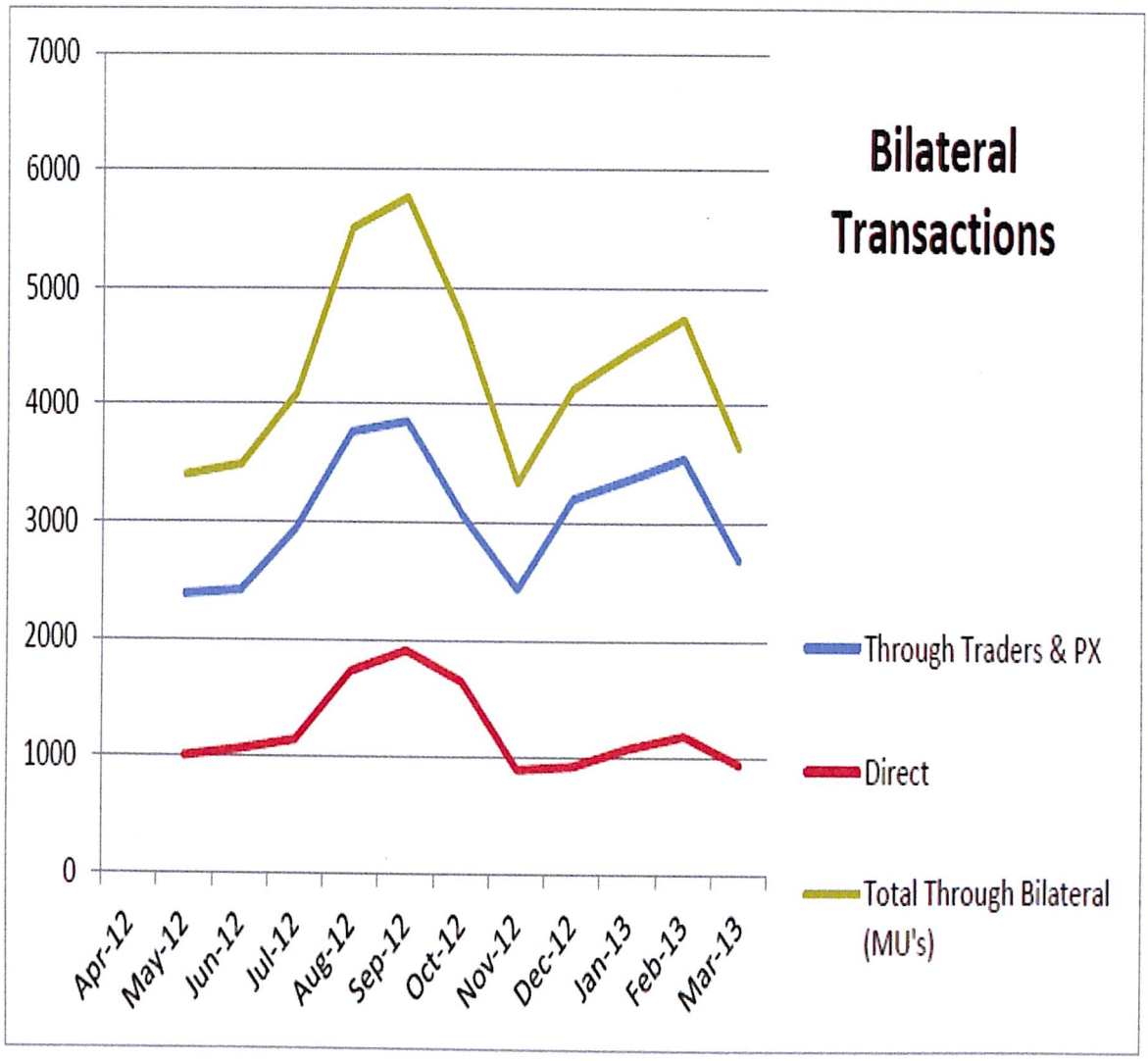

Figure 3 Bilateral Transactions for Year 2012-13

Also, the role of power exchanges has been dominating since the inception of Central Electricity Regulatory Commission (Power Market) Regulations, 2010. However, the total transactions through these exchanges is less than 3%, but it is expected that in coming years their role will be more radical. The development of power market will accommodate competition in the power sector and make it more attractive for both buyers and sellers interested to transact through exchange. Recently government's decision of FDI 49% in the power trading has increased the scope of retail market. So, it is expected that in near future the proportion of these power exchanges.

3.4 BUSINESS FRAMEWORK OF POWER TRADING

As per the Act, the trader is essentially "a person who has been granted a license to

undertake trading in electricity". The trader must obtain a license to trade as per Central Electricity Regulatory Commission (Procedure, Terms and Conditions for grant of trading licence and other related matters) Regulations, 2010. A Trading margin shall be charged as per Central Electricity Regulatory Commission (Fixation of Trading Margin) Regulations, 2010 which is applicable to the short term buy-short term sell contracts for the inter-State trading in electricity undertaken by a licensee.

According to the Regulation, The licensee shall not charge trading margin exceeding seven 7 paisa/kWh in case the sale price is exceeding Rupees 3/kWh and 4 paisa/kWh where the sale price is less than or equal to Rupees three 3/kWh. This margin shall include all charges, except the charges for scheduled energy, open access and transmission losses. The trading margin shall be charged on the scheduled quantity of electricity. Trading is a process and involves various departments and those departments' approaches towards certain objective. The Business Flow of a Trading Company consists of various departments; such as:

a) Business Development

b) Commercial Department

c) Management Information System (MIS)

d) Operations

e) Finance

f) Legal

Each of department has their own importance and must be viewed differently. Function of each of these departments will be explained in the below given business flow of a trading company.

Identification of Buyers & Sellers:

The Identification of Buyers & Sellers is the prime importance and results in business development. Therefore, a dedicated business development team has been developed by many of the traders for identifying potential buyers & sellers to match up with the competitive market players. This business development representative communicates the advantage of trading through trader.

3.4.1 Business framework & Process flow of Bilateral Transaction through Power Trader

In current market scenario as much as 28% of total bilateral trade is traded through direct transactions. The operations and business development team enquires on continuous basis buyers and seller for surplus/deficit power conditions. In case confirmation from buyer/seller is received, the detailed terms and conditions are sent to both buyers and sellers. If various terms & conditions are acceptable to the buyers and sellers, a LOI is forwarded to the trader and further a Power Purchase Agreement (PPA) shall be signed, if required.

Tendering Process

The tenders of various sellers & buyers are tracked by the business development & Operations team. The tender document then shall be sent to buyers & sellers. The related terms & conditions and price to be quoted shall be discussed with the interested sellers & buyers. Based on which the EMD/BG requirements are forwarded to the finance department. Once the term & conditions and other qualifying criterion are finalized, the bid shall be submitted via fax/courier/online/by hand depending upon the mode of submission prescribed in the tender document.

The EMD/BG can be refunded in case a trader does not qualify the Bid Evaluation. Although, the successful trader shall be issued with LOI/LOA for the following reasons:

a) Clients for their information & confirmation if required
b) Operation team for Open Access corridor booking activities
c) Commercial team for billing related activities
d) MIS team for capturing the commercial conditions in the MIS

Issuance of LOI/LOA (Letter of Intent/ Letter of Acceptance)

After receiving the LOI from the seller/buyer, they are crossed checked for any discrepancies; same is brought to the notice of BD team. Next step is signing the Power Purchase agreement (PPA) with the parties.

Terms & conditions of PPA

The various features included in PPA are:

1. Quantum of Power to be sold/ purchased: in MW (Min 1 MW)

This indicates the quantum of power intended to be sold/ purchased. The minimum quantum should be 1 MW for any hour.

2. Supply/Take-off timings: from ….. Hrs to ….. Hrs

This indicates the period for which transaction is intended. 3. Type of Transaction: Firm/Day Ahead

If Power flow is on firm basis, then the transaction is intended for guaranteed supply/off-take of power. This arrangement is made when the seller is certain to generate power and buyer wants guaranteed power. On the other hand, if transaction is on day ahead basis, the power flow is not guaranteed and it depends upon availability of power from the seller side.

4. Source/ Destination

It indicates the source of power or the destination of use.

5. Delivery Point

A delivery point is the point up to which the seller has to bear the transmission charges. This point refers to the node in the transmission corridor which is contracted for scheduled flow.

Example: CESC to NPCL

Figure 4 Schematic Flow of Power

STU= State Transmission Utility.

RTS= Regional Transmission System.

IR Link= Inter-Regional Link.

Case 1: If delivery point is CESC exit or WBSEB entry.

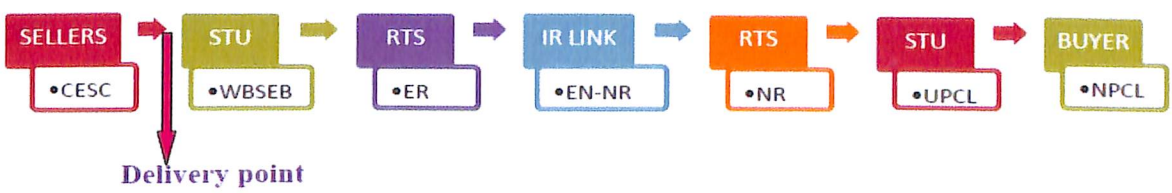

Figure 5 Delivery Point-Seller's Periphery

For billing data is always taken from RLDC website. If delivery point is WBSEB entry then the data is to be taken back to WB entry by adding losses in the energy quantum.

Energy charges payable by:

Seller= Rates negotiated as per agreement.

Buyer= rates negotiated +trading margin.

Case 2: If delivery point is WBSEB exit or ER entry.

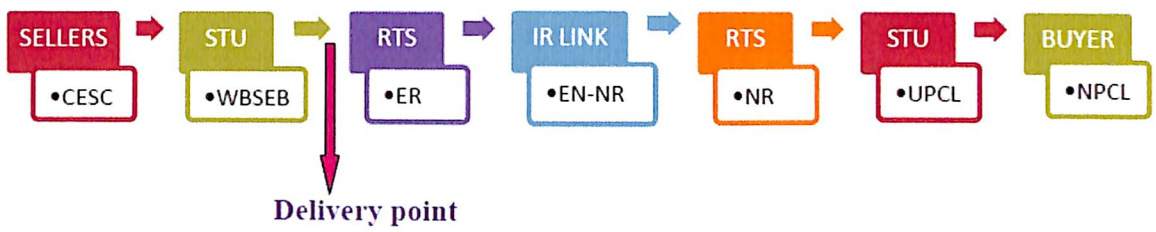

Figure 6 Delivery Point-Seller's state periphery

If delivery point is ER entry then the data taken from RLDC website straight away goes to Energy bill in the energy quantum.

Energy charges payable by:

Seller= Rates negotiated as per agreement.

Buyer= Rates negotiated +Trading margin

Case 3: If delivery point is ER exit or ER-NR entry:

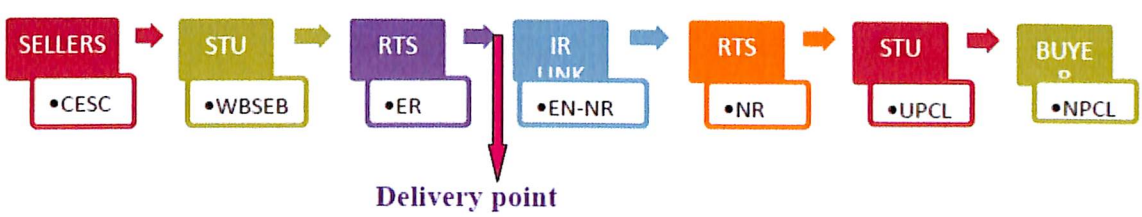

Figure 7 Delivery Point- Seller's Regional Periphery

If delivery point is ER exit then we have to subtract the losses of that region from the data available from RLDC website.

6. Rates/Prices

A suitable rate is mutually agreed between seller/buyer and trading licensee. The rate quoted in the agreement between trading licensee and buyer usually includes the trading margin of trading licensee. In case of inter-state trading the margin can be a max of 4

paisa/unit. Rates can also be the MCP discovered in a power exchange for the day of transaction.

7. Taxes/Duties

This clause indicates that whether the price quoted is inclusive or exclusive of any taxes or duties.

8. Billing Cycle

Billing cycle can be daily, weekly, monthly or yearly as mutually agreed between parties. Generally weekly cycle is followed. The entire month is generally divided to four periods for weekly billing cycles. They are shown in following table

S. No.	Week/Period	Billing On
1	01st -8th day of the month	9th day of the month
2	09th -15h day of the month	16th day of the month
3	16th -23th day of the month	24th day of the month
4	24th -last day of the month	1st day of next month

Table 5 Billing Cycle

This bill is the provisional bill is based on implemented schedules issued by Nodal RLDC. Bills issued to Buyer by adding Trading Margin to the price (Rs/unit) to be paid to Seller. Then final settlement of bill is done by incorporating the actual energy flow based on Regional Energy Account (REA) issued by Regional Power Committees (RPC).

9. Payment terms

This clause indicates the no of days within which the purchaser has to make payment after receipt of the bill.

10. Rebate clause

This clause indicates the percentage of rebate the purchaser is entitled to get if payment is made within a certain no of days.

11. Surcharge for delayed payment:

This indicates the surcharge the purchaser is liable to pay in case of delayed payment.

12. Conditions for Open Access Charges

It is the clause under which it is specified that up to the delivery point the open access

charges are to be borne by the seller and beyond it, charges are to be borne by buyer.

13. Force Measure Conditions

Any situation beyond the control of either party, which results in non-implementation of scheduled power flow, is called a Force Measure Condition. Under this clause such conditions are enumerated and under these conditions, clause 16 would remain void.

14. SLDC/STU concurrence terms under this clause it is mentioned, whether the concurrence would be obtained by the trading licensee or the buyer/seller itself.

15. Compensation for short supply/off take under this clause, compensation rates to buyer in case the seller fails to supply contracted quantum and compensation rates to seller in case the buyer fails to off take contracted quantum is mentioned.

Scheduling of Bilateral Transaction

The bilateral application based on the type of applications is applied to the concerned SLDC's and regular follow up shall be taken. The various types of applications are given as

a) Advanced

b) First come first serve

c) Day ahead

d) Contingency

a) *Procedure for Advance scheduling of bilateral transactions:*

The applications under any of the following category shall be considered as Advanced:

1. An Application for inter-State scheduling during the fourth month shall be made up to the last day of the first month.
2. An Application for inter-State scheduling during the third month shall be made up to the five (5) days prior to the close of the first month.
3. An Application for inter-State scheduling in the second month shall be made up to the ten (10) days prior to the close of the first month.

Table 6 Filing of Application for Advance Scheduling

DAY	RELATIVE DEADLINE	PROCESS
A[1]	17:30 Hrs.	Applications received on the last day shall be taken up together for consideration.
A+1	12:00 Hrs.	The Nodal RLDC shall seek the concurrence of each of the other RLDCs involved in the transaction
	20:00 Hrs.	Other RLDCs shall give their concurrence/denial

A- Applicable last date for submission of Application.

A+2	12:00 Hrs.	In case congestion is perceived nodal RLDC will inform the concerned applicant(s)
A+3	11:00 Hrs.	The Applicants must inform the nodal RLDC: in any of the following cases: a) Reduced Request for Scheduling: b) opt for Scheduling only for the duration when no congestion is anticipated: c) opt for Scheduling through the alternate route
A+4	-	In case. congestion is still anticipated, nodal RLDC may invite electronic bids
A+5	-	1. If nodal RLDC accepts the Request, it shall convey to the applicant 2.In case, the nodal RLDC rejects an application ,it shall convey its reasons to the Applicant in writing

b) Procedure for scheduling of bilateral transactions First-Come-First-Served basis:

The following categories of bilateral transactions fall under the category of First-Come-First-

Serve (FCFS):

- Application received under "First Come First Served" category for Short-Term Open Access shall be considered only when transactions are commencing and

terminating in the same calendar month.

- Application for scheduling a Bilateral Transaction which is commencing in the same month in which Application is made, provided that such Application is received at least four (4) days in advance from the date of commencement of the Bilateral Transaction. All such Application shall be processed and decided within three days of their receipt.

Application received during the last ten (10) days of the first month, for scheduling of transactions in the second month. However, Applications received up to five (5) days prior to the end of the month shall be processed only after completing the process for Advance Scheduling of Bilateral Transactions for the second month.

***c) Procedure for scheduling for day-ahead transaction*:**

All applications for bilateral transactions received within three days prior to the date of scheduling and up to 1500 hrs. Of the day immediately preceding the date of scheduling shall be clubbed and treated at par, and shall be processed after processing of the applications for collective transactions received till 1500 hrs. Example: An application for the scheduling a transaction on 26th day of the month, shall be processed on first come first served basic only if such application is received till 22nd day of the month. If the application is received on 23rd day or 24th day or up to 1500hrs on 25th day, it shall be treated only after processing of the applications for collective transaction received up to 1500hrs on 25th day for scheduling on 26th day.

d) Procedure for scheduling of transactions in a contingency:

In the event of contingency, buying utility may locate a source of power to meet short-term contingency requirement even after the cut off time of 1500 hrs. Of the preceding day and apply to the nodal RLDC for open access and scheduling and in that event, the nodal RLDC shall endeavour to accommodate such request as soon as and to the extent practically feasible, in accordance with the detailed procedure. Nodal RLDC shall take steps to incorporate such Bilateral Transactions in Day Ahead schedules/same day schedules, as the case may be. In case of Same Day, the transaction shall be scheduled from the 6th time block, counting the block in which acceptance is accorded as the first time block.

Applications received by 1800 hrs. Under the contingency category for scheduling of

bilateral transactions on the next day shall be taken up together for processing. Applications received after 1800 hrs. Under the contingency category for scheduling of bilateral transactions on the next day and those applications received on the same day shall be processed on a first come first serve basis.

Payment of Open Access Charges to Nodal RLDC

Payment of Open Access Charges is made to Nodal RLDC within 3 days of issuance of Acceptance of Schedule. Power flow takes place as per this schedule. The implemented schedules are displayed in RLDC website. Then Trading Licensee issues open access bills of apportioned amount to Buyer and Seller to recover the payment made to Nodal RLDC.

Energy Billing on the basis of Provisional Schedule

Provisional Billing is based on implemented schedules issued by Seller RLDC (displayed on its website). The schedules displayed show the quantum of power flow (15 minute time-blocks wise). Based on this quantum provisional Bills are issued to Buyer as per rates agreed in PPA and by adding trading margin to it. Similarly, the seller issues provisional bills to the trading licensee as per the quantum shown in implemented schedules.

Final Settlement of bill

Final settlement of bill is done by incorporating the actual energy flow based on Regional Energy Account (REA) issued by Regional Power Committees (RPC). REA for the past month is issued by RPCs in current month. The deviations from schedule or the actual injection and drawl of energy are known from REA.

Banking

Banking is the process of supplying a given quantum of energy to another party for a particular period and drawing the same quantum of energy in a future period from the same party. It is a kind of arrangement where, an entity having surplus power supplies power to another entity having requirement for short term power in a particular period of a year and draws the same quantum of energy, when required from the same entity during another period of the year. Usually, this is done between entities having similar conditions of surplus power during some season of the year and deficit during other season of the year.

Advantages of Banking:

An entity may have surplus power in any period of the year, but selling it may not fetch the entity a good price, because prices of electricity in market may be down at that time. On the other hand, the prices of electricity may become high in market may become high at the time, when the entity is facing power deficit and will have to purchase short term power. In order to hedge against such price fluctuations, the entities usually go for banking. Under this arrangement, one entity having surplus power supplies power to another entity having requirement for short term power in a particular period of a year and draws the same quantum of power, when required from the same entity during another period of the year. Supplying energy in this case does not involve any financial transaction, except that the trading margin is charged by the trading licensee to the buyer. The procedure for arranging transaction from A to B and again from B to A is same as that of bilateral transaction.

3.4.2 Business Framework & Process flow of Collective transactions in Power Trading

The business development representatives play a major role in bringing potential buyers & sellers to the Power Exchange. After receiving the documents of the Clients from the BD team, they are crossed checked for any discrepancies; same is brought to the notice of BD team. The commercial team checks for the funds available with the client.

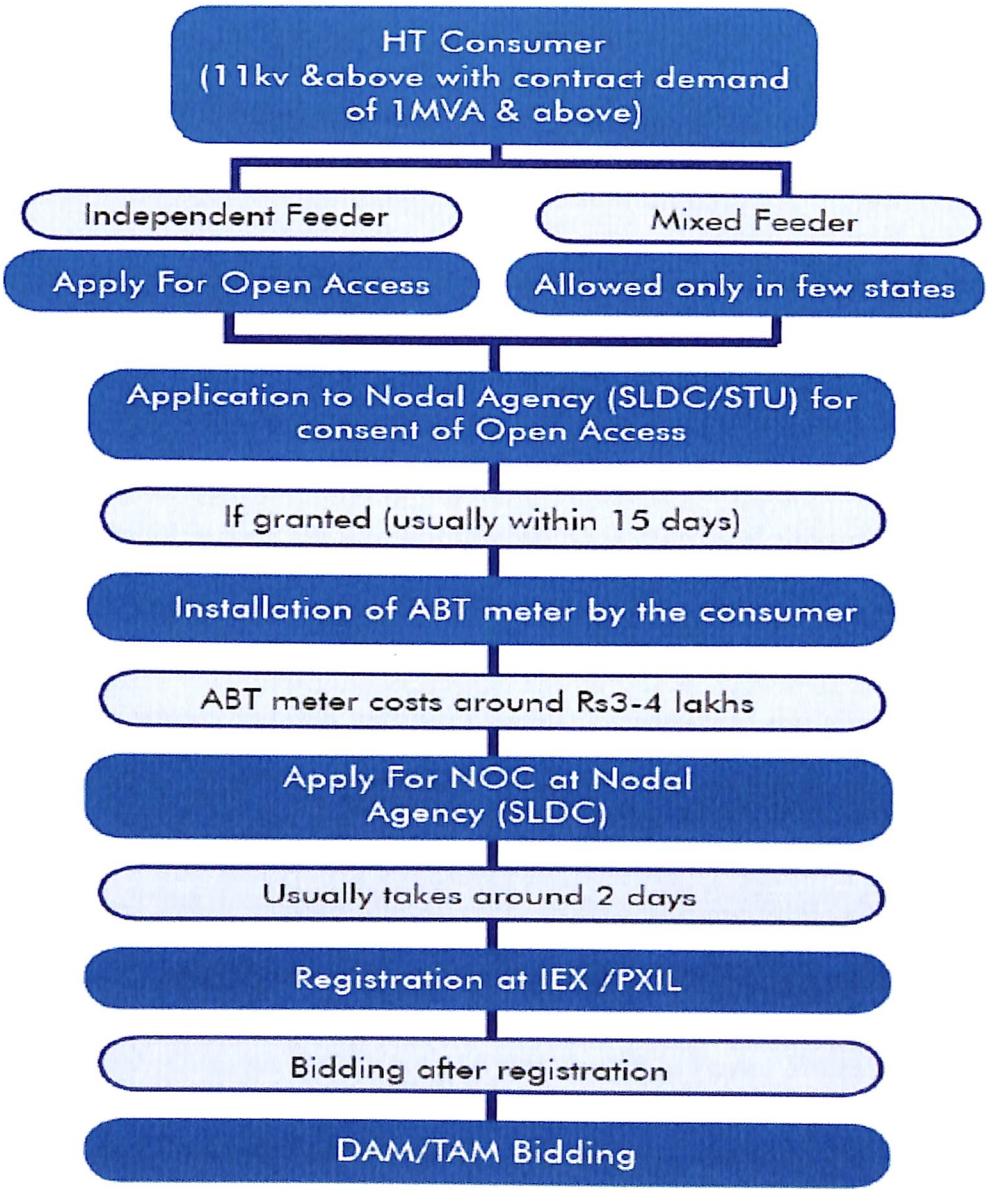

Figure 8 Process flow for Power Exchange

Once the documents are provided & approval from commercial team is obtained; the client shall be registered in power exchange. This shall be furnished by the trader and a unique client portfolio shall be maintained by trader. The bid format shall be sent to the client and bid shall be obtained on the respective bid format. The daily bids can be placed on the power exchange from 10-12 Hrs. after commercial team checking for the sufficient funds available with the client. If funds are available, such bid shall be placed on power exchange. PX declares results, which is being circulated to all the clients by Operations team. The Daily Obligation Report (DOR) and schedule of successful bidders shall be circulated to the respective clientele. In case funds are found insufficient, the bid will be

deleted.

***Note-Flow chart of business process of power trading can be seen at Annexure-I**

3.4.3 Role of Power Exchange in Power trading

3.4.3.1 Power Exchange

An Exchange is essential to a market-driven economy where prices are decided by the forces of demand and supply. These forces are contradictory: e.g., the seller wants high prices while the buyer wants low prices. These conflicting forces determine the correct price of a commodity at a given time in a market-driven economy. But the problem is that the market has its potential influencers. For example, big buyers and big sellers can manipulate the market in their own favour and to the detriment of the larger social and economic interests.

It is therefore important that while market-forces are encouraged to slug it out in the market, they must remain Faceless and Anonymous. Facelessness and anonymity levels the market for all players. And only when the market is a level field for all participants can a true market-driven economy come into being.

On an electronic Power Exchange, traders from a large geographical spread converge without their identities being revealed. Therefore, anonymity of traders is maintained; hence market manipulation is thwarted and, in effect, a true-market driven power economy is enabled. Thus, we need a nationwide, electronic Power Exchange to enable the market to be driven by the genuine market forces of demand and supply, and not by any of vested interest.

3.4.3.2 Need of a Power Exchange

In market driven economy market forces are contradictory. Buyer wants low price, seller wants otherwise. These conflicting forces determine the correct price of a commodity at a given time.

It is thus important that market forces must remain faceless and anonymous. Facelessness and anonymity creates a level field for all players. Today's power is no more a service, it is a commodity. On an electronic power exchange, buyers and sellers of power from the length and breadth of the country can converge without revealing their identity. For this we need a nationwide Power Exchange to allow the Power Market to be driven by genuine market forces of demand and supply. Along with trans-losses and UI risks,

payment uncertainties prevented the true market driven economy in power market. A Power Exchange wipes off all these issues by: -

- Empowering the Market to discover a uniform market clearing price (MCP) and market clearing volume (MCV).
- Evenly distributing transmission losses at both ends.
- Enabling participants to hedge against UI risks.
- Guaranteeing secure & timely payment to sellers.

In current scenario, two power exchanges are operational. According to Central Electricity Regulatory Commission (Power Market) Regulations, 2010 has furnished that a power exchange shall pay an annual registration charge given as:

Annual Turnover in Power Exchange (Million Units)	**Annual Registration Charge (Rs Lac)**
Above 10.000	50
Above 5.000 and Up to 10.000	20
Upto 5.000	6

Table 7 Annual Registration Charge for Power Exchange

3.4.3.3 Membership in Power Exchange

Membership in Power Exchange shall be of the following three categories:-

***Member who is an Electricity Trader*:** Member who is an Electricity Trader shall trade and clear on their own account or trade and clear on behalf of their clients. This category of members may provide any credit or financing or working capital facility to their clients.

1. ***Member who's a distribution licensee including is deemed distribution licensee or a grid connected entity (or Proprietary Membership):*** Member who is distribution licensee including deemed distribution licensee or grid connected entities shall transact and clear their own account only.
2. ***Member who is neither an Electricity Trader nor distribution licensee including deemed distribution licensee nor a grid connected entity:*** Member who is neither

an Electricity Trader nor distribution licensee including deemed distribution licensee nor a grid connected entity can only provide the following services to its clients:-

i) IT infrastructure for bidding on electronic Exchange platform or skilled personnel

ii) Advisory services related to power prices and the follow on bidding strategy (e.g. weather related information, demand supply position etc.)

iii) Facilitation of procedures on behalf of his client for delivery of power (E.g. State Load Despatch Centre standing clearances, coordination with National Load Despatch Centre etc.)

In no case, such a member shall provide any credit or financing or working capital facility to their clients.

Break-Even Quantum for OA Customer whether to be Client of a Trader or take Membership on Power Exchange

Determination of Threshold Limit above which Proprietary Membership[2] in exchange is beneficial		
Proprietary Member (Full Payment Option-FPO)		
Admission Fee	3500000	Rs
Interest Free Security deposit	2500000	Rs
Processing Fee	10000	Rs
Annual Subscription Fees	500000	Rs
Total	6510000	Rs
Including 12.36 Service Tax	804636	Rs
Grand Total (x)	**7314636**	**Rs**
Through Trader		
Trader margin (y)	0.02	Rs/Kwh
Threshold limit {=(x)/(y)}	365731800	KWh
Threshold limit (MU)	**365.7318**	**MU**

Table 8 Break-Even Analysis

The customer of open access has a choice to whether to go for direct membership in the power exchange or to trade through a trader. Hence, break-even analysis may help to choose an option which results in achieving the threshold limit for trading.

3.4.3.4 Scheduling

The scheduling shall be done by the Nodal Agency (i.e. NLDC) and involves a sequence of events that leads to the scheduling on regular basis. The scheduling is explained below with the help of timeline followed by the major power exchanges:

Time	Actions performed on the day of Trading
10:00 AM-12:00 PM	Participants Submit the bid in the Power Exchange portal for Purchase/Sale of Electricity on next day
11:00 AM	NLDC communicates the list of Interfaces/Control Areas/Regional Transmission System on which Uncontrolled flows are required
1:00 PM	Power Exchange communicates to NLDC the interchange on various Interfaces/Control Areas/Regional Transmission System as intimated by NLDC
2:00 PM	In case of congestion, NLDC communicates to PX regarding the period of congestion & available limit for scheduling on respective Interfaces/Control Areas/Regional Transmission System
3:00 PM	Power Exchange submits applications for scheduling of Collective Transactions
4:00 PM	NLDC sends the details(scheduling request of Collective Transaction) to all the concerned RLDCs
5:30 PM	NLDC /RLDCs shall confirm the accepted schedule to Power Exchange
6:00 PM	RLDC issues schedule

Table 9 Trading through Power Exchange

3.4.3.5 Congestion Management

Market-splitting methodology shall be adopted for congestion management. Grid bottlenecks are relieved by comparison of the calculated contractual flow with the transmission capacity available for spot trading, and if the flow exceeds the capacity, the

prices are adjusted on both sides of the bottleneck so that the flow equals the capacity. If the flow does not exceed the capacity, a common price is established for the whole area.

If the flow exceeds the capacity at the common price for the whole market area, it is split in a surplus part and a deficit part. The price is reduced in the surplus area (sale > purchase) and increased in the deficit area (purchase > sale). This will reduce the sale and increase the purchase in the surplus area. In the same way, it will reduce the purchase and increase the sale in the deficit area. Thus, the needed flow is reduced to match the available. Transfer capability. This method of managing congestion is also known as market-splitting.

Initially, the electrical regions are defined as bid areas since inter-regional links are most likely to be congested, however, each electrical region of the country has been divided in two bid-areas so as to accommodate any exigencies of congestion in intra-regional transmission system.

3.4.3.6 Trend in Existing Power Exchanges

The below given table depicts the total transactions made over and done with power exchanges. Here, IEX is having major proportion out of the total MU's transacted via exchange; holding 97% of the total transactions while PXIL having the remaining transactions.

Month-Year	Power Exchange		Total Through Power Exchange (MU's)
	IEX	PXIL	
Apr-12	1283.86	53.32	1337.18
May-12	1388.39	89.69	1478.08
Jun-12	1535.34	94.03	1629.37
Jul-12	1519.32	52.93	1572.25
Aug-12	1821.02	39.93	1860.95
Sep-12	1878.69	30.92	1909.61
Oct-12	2277.6	23.32	2300.92
Nov-12	2119.01	67.12	2186.13

Dec-12	2242.51	72.1	2314.61
Jan-13	2045.4	53.18	2098.58
Feb-13	1975.42	36.97	2012.39
Mar-13	2259.65	64.7	2324.35
		Total Through PX during FY 2012-13	**23024.42**

Table 10 Monthly Transactions through Power Exchanges

The above data has been shown graphically; and clearly depicts that a large share of the total market share is held by Indian Energy Exchange (IEX). For year 2012-13 total no. of MU's transacted through Power Exchange is 23024.42 MU; however such transactions for the last year were 15034 MU.

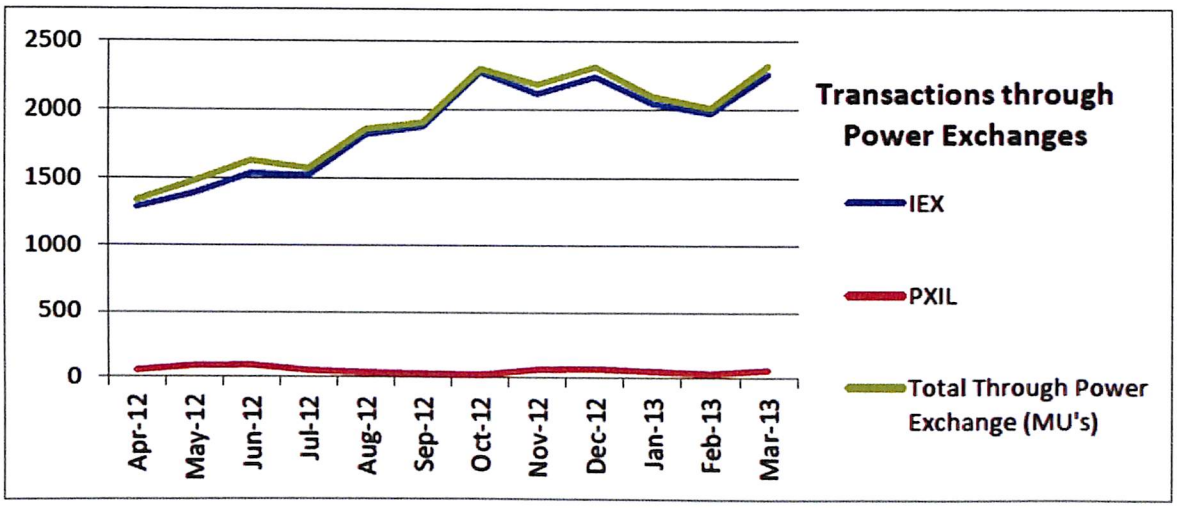

Figure 9 Transactions through Various Power Exchanges

The total volume of short-term transactions has been consistently 11% for this financial year 2012-13 of total electricity generation. It shall be noted that for the last few years it has been increased in a gradual pace of 1%. However, this year such behaviour is not reckoned. This may be due to transmission constraints and to some extent coal shortage. The corridor availability has been a problem in Southern India and Punjab. The total Volume of Short term transactions of electricity w.r.t total generation has been given below:

Total Volume of Short-term Transactions of Electricity w.r.t Total Electricity Generation			
Year	Total Volume of Short-term Transactions of Electricity (BU)	Total Electricity Generation (BU)	Total volume of Short-term Transactions of Electricity as % of Total Electricity Generation
2009-10	65.9	764.03	9%
2010-11	81.56	809.45	10%
2011-12	94.51	874.17	11%
2012-13	98.94	907.49	11%

Table 11 Total Volume of Short-term transactions for various years

Constrained and unconstrained market volumes of IEX

Months	Constrained Market Volume	Unconstrained Market Voume	Volume remain unsold due to congestion
Jan-13	2045.41	2587.02	541.61
Feb-13	1975.42	2513.75	538.33
Mar-13	2259.65	3020.39	760.74
Apr-13	2515.68	3037.09	521.41
May-13	2499.31	2862.21	362.90
Jun-13	2114.56	2419.51	304.94
Jul-13	2264.28	2720.49	456.21
Aug-13	2343.34	2724.68	381.34

Source: Indian Energy Exchange

Table 12 Constrained and unconstrained market volume in IEX

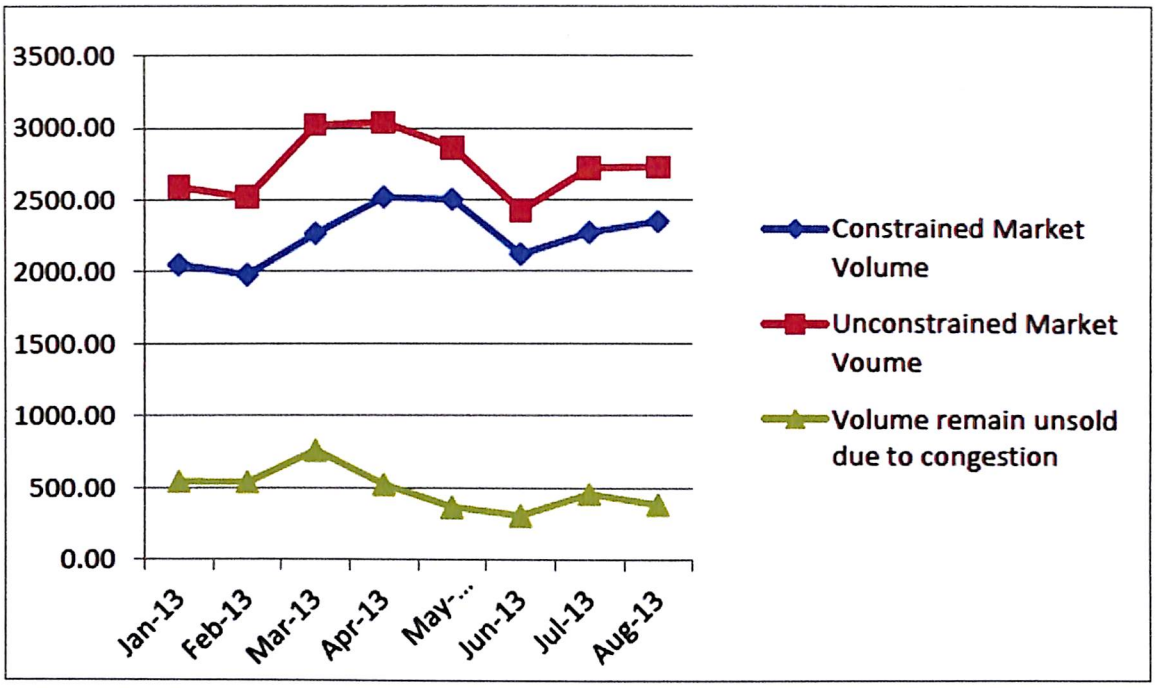

Figure 10 Graphical Representation of Market volume

3.5 Renewable energy certificates

Renewable Energy Certificates (RECs) represent the attributes of electricity generated from renewable energy sources. These attributes are unbundled from the physical electricity and the two products-the attributes embodied in the certificates and the commodity electricity-may is sold or traded separately. In other words, one REC represents that 1MWh of energy is generated from renewable sources. RECs are expected to become the currency of renewable energy markets because of their flexibility and the fact that they are not subject to the geographic and physical limitations of commodity electricity. RECs can be used by the obligated entities to demonstrate compliance with regulatory requirements, such as Renewable Purchase Obligations.

1 REC= 1 MWH of electricity generated from renewable energy source and injected or deemed to be injected (in case of self-consumption by eligible captive power producer) into the grid

3.5.1 Obligated Entities for purchase of REC

The entities mandated to purchase a defined quantum of renewable energy of their overall consumption are obligated entities. Obligated entities may either purchase renewable energy or can purchase RECs to meet their Renewable purchase Obligation (RPO) set under Renewable Purchase Obligation of their respective States. Following entities are

generally obligated in the State:

1. Distribution Licensees
2. Captive Consumers
3. Open Access users

3.5.2 Eligible Entities for Selling REC's

Eligible entities are those renewable generators who meet following criteria.

a) Type of renewable source is approved by MNRE and respective State Commission

b) Not have any Power Purchase Agreement (PPA) for the capacity related to such generation to sell electricity at a preferential tariff determined by the appropriate commission

c) Not having agreement to sell electricity to local distribution company at price not exceeding pooled cost of power purchase of that distribution company

d) Sells electricity to the

- distribution licensee of the area at a price not exceeding the pooled cost of power purchase of such distribution licensee, or
- To any other licensee or to an open access consumer at a mutually agreed price, or through power exchange at market determined price. Selling electricity to any entity other than local distribution company at market driven prices or otherwise.

3.5.3 Categories of Renewable Energy Certificates

There are two categories of certificates:

a. Solar Certificates issued to eligible entities for generation of electricity based on solar as renewable energy source.

Non-solar certificates issued to eligible entities for generation of electricity based on renewable energy sources other than solar.

REC HIGHLIGHTS	
Drivers	▪ Renewable Purchase Obligation specified by State Commissions ▪ Provisions to set RPO targets under EA-2003 ▪ NAPCC ▪ JNNSM ▪ National tariff Policy ▪ National Electricity Policy
Objectives	▪ Effective implementation of RPO obligations across all states ▪ Creating competition among competing RE technologies ▪ Protecting the local distribution licensee selling RE ▪ Overcoming geographical impediments to use RE ▪ Reduce the costs for RE transactions
Floor & Forbearance Price	Non-Solar: ▪ Floor Price: Rs 1500/REC

Table 13 REC Highlights

3.5.4 Step-wise description of the procedure

The basic procedure for accreditation of the RE generation project shall cover following steps:

STEP 1: An application for availing accreditation shall be made by the generating company to the host State Agency, as defined under Clause 2(1) (n) of the CERC REC Regulations. The applicant shall apply for Accreditation on the Web Based Application and shall also submit the same information in physical form with the State Agency. The application for accreditation shall contain:

Owner's details,

- Operator details (in case the owner and operator are different legal entities),
- Generating Station details,
- Connectivity details with concerned licensee (STU/DISCOM), (v)
- Metering details,
- Statutory Clearance details,

- Undertaking of not having entered into PPA on preferential tariff for the capacity for which participation in REC scheme is sought as per the CERC REC Regulations and
- Any other relevant information as per the Application for Accreditation of RE Generation Project).

In case, the Applicant has multiple RE generation projects then, separate Applications will have to be submitted by the Applicant for each RE generation project. Accreditation of each RE generation project shall be carried out separately. The RE Generation Project shall comply with the requirements of Connectivity standards for Grid Connectivity at particular injection voltage/grid interface point as specified by State Transmission Utility or concerned

Distribution Licensee, as the case may be. The Application made for accreditation of RE generation project shall be accompanied by a non-refundable processing fee and accreditation charges (one time and annual, if any) as determined by the Appropriate State Electricity Regulatory Commission from time to time.

STEP 2: The State Agency shall assign a unique acknowledgement number to the Applicant for each application for accreditation of its RE generation project, for any future correspondence.

STEP 3: After receipt of application in physical form for accreditation, the State Agency shall conduct a preliminary scrutiny to ensure Application Form is complete in all respect along with necessary documents and applicable processing fees and accreditation charges. The State Agency shall undertake preliminary scrutiny of the Application within 5 working days from date of receipt of such Application.

STEP 4: After conducting the preliminary scrutiny, the State Agency shall intimate in writing to the Applicant for submission of any further information, if necessary, to further consider the application for accreditation or reject application. The reasons for rejecting the application for accreditation shall be recorded and intimated to Applicant in writing within 2 working days from date of receipt of the completed application by State Agency.

STEP 5: While considering any application for accreditation of RE generation project, the State Agency shall verify and ascertain availability of following information:

1. Undertaking of 'Availability of Land' in possession for setting up generating station
2. Power Evacuation Arrangement permission letter from the host State Transmission Utility or the concerned Distribution Licensee, as the case may be
3. Confirmation of Metering Arrangement and Metering Location
4. Date of Commissioning of RE project for existing eligible RE Project or Proposed Date of Commissioning for new RE for accreditation
5. Undertaking regarding Off-take/Power Purchase Agreement
6. Proposed Model and Make for critical equipment (say, WTG, STG, PV Module) for the RE Project. Confirmation of compliance of critical equipment with relevant applicable IEC or CEA Standards
7. Undertaking for compliance with the usage of fossil fuel criteria as specified by MNRE
8. Details of application processing fees/accreditation charges

STEP 6: The State Agency, after duly inspecting/verifying conditions elaborated in Step 5, shall grant 'Certificate for Accreditation' to the concerned Applicant for the proposed RE Generation project and assign a specific project code number to that effect which shall be used by the such Applicant (Eligible Entities) for all future correspondence with the State Agency. The process of accreditation shall normally be completed within 30 days from date of receipt of complete information by State Agency. In case accreditation is not granted at this stage, the reasons for rejecting the application for accreditation shall be recorded and intimated to Applicant in writing.

STEP 7: If accreditation is granted, the State Agency shall also intimate accreditation of particular RE generation project to the following entities,

1. The Central Agency, as defined under Clause 2(1) (b)
2. The host State Load Despatch Centre

Details	IEX			PXIL		
Type of REC	Non-solar	Solar	Non-solar	Non-solar	Solar	Non-solar
Year	2011-12	2012-13		2011-12	2012-13	
Volume of buy bid	2279406	77277	2435188	272597	12173	655146
volume of sell bid	1284434	14076	9184800	116963	4592	2489921
ratio of buy bid to sell bid	1.77	5.49	0.27	2.33	2.65	0.26
Market clearing volume	951008	10443	1980546	64266	3570	595255
Market clearing price	2829	12782	1731	2676	12615	1564

Table 14 REC exchanged through Power Exchanges in 2012-13

CHAPTER-4

FINDINGS AND ANALYSIS

4.1 Understanding the open access charges

There are major charges to be paid by open access consumers to distribution licensee, transmission licensees and other related entities, other than the power purchase cost paid to the generator or supplying entity. These charges include:

1. ***Wheeling Charges/Distribution Charges*:** - Distribution charges are those charges which are paid to distribution licensee for the use of distribution system and associated facilities by another person for the conveyance of electricity.

The licensees, generating stations, captive generating plants and consumers shall be eligible for open access to distribution system of a distribution licensee on payment of the wheeling charges as may be determined by the Commission.

Applicability: These charges are applicable to generating stations, captive generating plants and consumers who are connected to DISCOMS network i.e., at 11 and 33 kV. (132kV in exceptional states)

2. ***Wheeling Loss or Distribution Loss***- Distribution losses are the technical losses for the distribution system. It is determined by the Commission for various voltage levels for the applicable year, based on prudence check of the submissions of the Distribution Licensee during their Tariff determination process and shall be apportioned in proportion to the actual energy drawl by the Open Access consumers and shall be payable in kind at relevant voltage level.

Applicability: This loss is applicable to generating stations, captive generating plants and consumers who are connected to DISCOMS network i.e., at 11 and 33 kV.

3. ***Transmission Charges or STU Charges***- Transmission charges are those charges which are paid to transmission licensee for the use of transmission system and associated facilities by another person for the conveyance of electricity.

Applicability: These charges are applicable to generating stations, captive generating plants and consumers who are connected to state transmission network i.e., at 66 or 132 kV and DISCOMS network i.e. at 11 and 33 kV.

4. ***Transmission Losses or STU Losses***- Transmission losses are those losses which are there in the transmission system. The buyers and sellers shall absorb apportioned energy losses in the transmission system in accordance with the provisions specified by the Central Commission.

Applicability: This loss is applicable to generating stations, captive generating plants and consumers who are connected to state transmission network i.e., at 66 or 132 kV and DISCOMS network i.e. at 11 and 33 kV.

5. ***POC Charge & POC Losses***- It is a transmission charge pricing methodology introduced for sharing of Inter State Transmission Systems (ISTS) charges and Losses among the Designated ISTS Customers (DICs) depending on their location and sensitive to their distances from load centres (generators) and generation (customers) and the direction of the node in the grid.

Applicability: This charges and losses are applicable to generating stations, captive generating plants and consumers who are connected to central transmission network or to state transmission network i.e. at 66 or 132 kV and DISCOMS network i.e. at 11 and 33 kV.

6. ***Cross Subsidy Surcharge***- If open access facility is availed of by a subsidizing consumer of a distribution licensee of the State, then such consumer, in addition to transmission and/or wheeling charges, shall pay cross subsidy surcharge determined by the Commission. Cross subsidy surcharge determined on Per Unit basis shall be payable, on monthly basis, by the open access customers based on the actual energy drawn during the month through open access. The amount of surcharge shall be paid to the distribution licensee of the area of supply from whom the consumer was availing supply before seeking open access.

Applicability: This charge is paid by open access consumers irrespective of voltage or connectivity level.

7. ***Application Fees***- A person seeking Open Access shall make an application in the prescribed format to the Distribution Licensee to which it is connected. The application fees in general for short term open access consumer is Rs 5000/application.

8. ***SLDC Charge***- A composite operating charge Rs.2000/- per day in general or part of the day shall be payable by a short-term open access customer for each transaction to the SLDC or as determined by the Commission from time to time. The operating charge

includes fee for scheduling and system operation, energy accounting, fee for affecting revisions in schedule on bonafide grounds and collection and disbursement of charges.

Applicability: This charge is payable to both injecting and drawing SLDC.

9. *RLDC Charge-* A composite operating charge @ Rs.2,000/day/RLDC is payable by a short-term open access customer for each transaction to the RLDC or as determined by the Commission from time to time.

Applicability: This charge is payable to all the RLDC whose network is used.

10. *Other Charges-* In addition to above mentioned charges there are some other charges which have a very small impact on the final landed cost of electricity through open access, these charges are:

- ***NLDC Application Fees***: Rs 5000/ (No. of Successful bidders), applicable for power exchange transactions
- ***NLDC Scheduling and Operating Charges***: Rs 5,000.00 x (Regional Entity Buyers + Regional Entity Sellers) / (No. of Successful Portfolios), applicable for power exchange transactions.
- ***Trading Margin***: trading margin exceeding seven (7.0) paisa/kWh in case the sale price is exceeding Rupees three (3.0)/kWh and four (4.0) paisa/kWh where the sale price is less than or equal to Rupees three (3.0)/kWh.
- ***Exchange Charges***: Rs 20/MWH, applicable for power exchange transactions.
- ***Service Tax***: 12.36% of Exchange Charges (Rs/MWH), applicable for power exchange transactions

4.2 Landed Cost from Buyer/Beneficiary's Perspective (for Collective Transactions)

The below given Information shall be considered as the assumptions to Calculate the Monthly/Annual Savings as the case may be:

Information as per Daily Obligation Report (DOR) of Exchange		
Details	**Value**	**Unit**
(1)Bidding Quantum	5.20	MW
(2)Total Cleared Power at exchange as Per DOR	74.07	MWh
(3) Basic Amount as Per DOR	192267.53	Rs.
(4)No. of hrs. of bid / day	14.24	Hrs.
(5)No. of days of bid / month	1.00	Days
(6) Market Clearing Price on the exchange	**2.60**	**Rs/kwh**

Table 15 Assumptions for Collective Transactions

Calculation of scheduled & actual consumption (Losses)		
Details	**132 KV**	**Unit**
(7) Scheduled Drawl during the day (No. of Units)	74065.00	KWh
(8) Losses at Regional Periphery (POC losses)	2%	%

(9) Units Available after Losses at regional Periphery	72583.70	KWh
(10) Losses at State Periphery (STU losses)	3.16%	%
(11) Units Available after Losses at state Periphery	70290.06	KWh
(12) Losses at Distribution Level (Wheeling Losses)		%
(13) Actual Units Available to Consumer		KWh

Calculation of total outlay by the consumer			
Details	**Particulars**	**132 KV**	**Unit**
(14) Regional Transmission charges (CTU)	Rs 0.151/KWh	11183.82	Rs./day
(15)State Transmission charges (STU)	Rs 0.29 /KWh	21478.85	Rs./day
(16) NLDC Operating Charges	Approx. Rs 200-400/day	225.00	Rs./day
(17) SLDC Operating Charges	Rs 2000 /day	2000.00	Rs./day
(18) NLDC Application Fees	Approx. Rs 4-10 /day	4.33	Rs./day
(19) Trading Margin of IEX	Rs 0.02 /KWh	1481.30	Rs./day
(20) Service tax @ 12.36% of Transaction Charges		183.09	Rs./day
(21) Total Amount payable as per Daily Obligation Report		**228823.91**	Rs./day
(22) NOC from SLDC	Rs 10000/month	333.33	Rs./day
(23) IEX Registration fees	Rs 100.000+ 12.36%/ year	307.84	Rs./day
(24) Trading Margin of NETS	Rs 0.02 /KWh	1481.30	Rs./day
(25) REC Purchase Obligation	Rs 0.07/KWh	5184.55	Rs./day
(26) Wheeling Charges	Rs 0.0/KWh	**0.00**	Rs./ kwh
(27) Cross subsidy Surcharge	Rs 0.81/KWh	59992.65	Rs./ kwh
(28) Total Amount		296123.58	Rs./day
(29) Net Landed Cost		**4.21**	**Rs/ Kwh**

MP Revised Tariff		
(30) MP basic Tariff for Industrial Consumers	4.61	Rs/ Kwh
MP Net Tariff	**4.61**	**Rs/ Kwh**

(31) Per Unit Saving	**0.40**	**Rs/ Kwh**
(32) Per Day Saving	70290.06	Rs.
(33)Per Month Saving	2108701.652	Rs.
(34) Per year Savings	25655870.1	Rs.

Table 16 Landed Cost Calculations for OA Customer

4.3 Landed Cost from Seller/Generator's Perspective (for Collective Transactions)

Odisha- Landed Cost Calculation Sheet (For Generator)		
Inputs	**Value**	**Unit**
Total Cleared Power at exchange as Per DOR	74.07	MWh
Basic Amount as Per DOR	192267.53	Rs.
Bidding Quantum	5.20	MW
No. of hrs. of bid / day	14.24	Hrs.
No. of days of bid / month	1.00	Days
Market Clearing Price on the exchange	**2.60**	**Rs/kwh**

Calculation of scheduled & actual consumption (Losses)		
Particulars	**Value**	**Unit**
Scheduled Injection at regional periphery during the day (No. of Units)	74065.00	kwh
Accounting for Eastern Region Loss (Zonal) @1.10%	74888.78	Kwh
Actual generation after accounting for Odisha State transmission loss at 66 kV and above @3.8 %	77846.96	Kwh

Calculation of total outlay by the consumer		
Particulars	**Value**	**Unit**
Eastern Regional Transmission charges (CTU)@ 0.151 Rs/Kwh	11183.82	Rs.
Odisha State Transmission charges (STU)@ 0.25 Rs/Kwh	18516.25	Rs.
ERLDC Operating Charges @ Rs 200-400/day	225.30	Rs./day
SLDC Operating Charges @ Rs 2000/day	2000.00	Rs./day
NLDC Application Fees@ Rs 4-10/day	4.33	Rs./day
Trading Margin of IEX @ Rs 0.02/kwh	1481.30	Rs.
Service tax @ 12.36% of Transaction Charges	183.09	Rs.
Total Amount payable as per Daily Obligation Report	**158673.45**	Rs.
NOC from SLDC @ Rs 10000/month	333.33	Rs./day
IEX Registration fees @ RS 100.000+ 12.36%/ year	307.84	Rs./day
Trading Margin of NETS @ Rs 0.02/kwh	1481.30	Rs.
Total Amount	156550.98	Rs.
Landed Cost	**2.01**	Rs./ kwh
Net Landed Cost	**2.01**	**Rs/ Kwh**

4.4 Landed Cost from Buyer/Beneficiary's Perspective (for Bilateral Transactions)

Landed Cost Calculation for Bilateral Transaction (Buyer's Perspective)		
Seller-Buyer Information		
TRANSACTION	SELLER-BUYER	Units
Generator's Quoted Price	4.00	(Rs./KWh)
Trader's Margin	0.04	(Rs./KWh)
Delivery price	4.04	(Rs./KWh)
Quantum	10	MW
No. of days	30	Days
Supply hours	24	Hrs.
Total no. of hours	720	Hrs.
Total energy	7200000	KWh
Total energy (MWh)	7200	MWh

Table 18 Assumptions for Bilateral Transactions

1) Transmission Charges				
	Transmission system	Rate (Rs/MWh)	MWH	Total (Rs)
A) Intra-State Charges				
Drawl State	HARYANA	190	7200	1368000
Injecting State	HIMACHAL PRADESH	20	7200	144000
B) Inter-State Charges (PoC Charges)				
Drawl Charge	HARYANA	151.3	7200	108936
				0
Injection Charge	H.P.	111.3	7200	801360
	Total transmission Charge			2601360
2) Operating Charges				
		Fees (Rs/day)	No. of Days	Total (Rs)
Drawl State	HARYANA	2000	30	60000
Injecting State	HIMACHAL PRADESH	2000	30	60000
Drawl region	Northern Region	2000	30	60000
Injecting region		0	30	0
		0	30	0
	Total Operating Charges			180000
3) Application Fees				5000
Grand Total (Rs)				2786360

Table 19 Various Open Access Charges

Accounting of Transmission Losses				
	Transmission System		Losses%	Loss (KWh)
Intra state Losses	HARYANA		2.50%	180000
	HIMACHAL PRADESH		2.00%	144000
Inter-state Losses	HARYANA	Northern	1.15%	82800
	H.P.	Northern	1.15%	82800

Table 20 Transmission Losses

Delivery Point	Buyer					
		Final units received	Charges to be paid	Energy Cost	Total Cost	Landed Cost
	Buyer's periphery	7200000	0	29088000	29088000	4.04
	Buyer's state Periphery	7020000	1428000	29088000	30516000	4.35
	Regional Periphery	6939270	2577360	29088000	31665360	4.56
	Seller's state periphery	6859468	2577360	29088000	31665360	4.62
	Seller's periphery	6722279	2786360	29088000	31874360	4.74

Table 21 Net Landed Cost to Buyer

4.5 Comparative Study of OA Charges of states-Comparison of following states regarding OA charges, wheeling losses, wheeling charges etc are as follows

STATES	State Transmission losses	State Transmission Charges	Cross-subsidy Surcharge (Rs/Kwh)	Wheeling Charges (Rs/Kwh)	Wheeling loss for OA customer	Industrial tariff	Landed cost as per method
Gujrat		0.743	0.45	0.147	0%	5.45	4.51
MP	3.16%	0.290	0.81	0.100	20%	4.63	5.40
Rajasthan	4.20%	0.368	0.13	0.110	8%	4.74	4.06
AP	4.02%	0.085	1.72	0.046	3.96%	5.79	5.20
Karnataka	3.94%	0.784	0.31	0.100	4%	6.00	4.46
Tamil Nadu	2.50%	0.123	3.20	0.220	0%	8.5	6.56

Table 22 Comparison of OA charges of 6 States

4.6 SWOT Analysis

SWOT analysis is used as a tool for Power Trading Company's which play a key role as a power trader provides a strategic analysis of the company's businesses frame work, services and operations. The profile shows a comprehensive view of the company's key strengths and weaknesses and the potential opportunities and threats. A SWOT analysis (alternatively SWOT matrix) is a structured planning method used to evaluate the strengths, weaknesses, opportunities and threats involved in a project or in a business venture. A SWOT analysis can be carried out for a product, place, industry or person. It involves specifying the objective of the business venture or project and identifying the internal and external factors that are favourable and unfavourable to achieve that objective. The degree to which the internal environment of the firm matches with the external environment is expressed by the concept of strategic fit.

- Strengths: characteristics of the business or project that give it an advantage over others.
- Weaknesses: characteristics that place the business or project at a disadvantage relative to others.
- Opportunities: elements that the business or project could exploit to its advantage.
- Threats: elements in the environment that could cause trouble for the business or project

CHAPTER-5

INTERPRETATION OF AVAILABLE TRANSMISSION CORRIDOR (ATC) FOR SHORT TERM TRANSACTIONS

5.1 Introduction

Indian power system is continuously evolving and Open access is now playing crucial role in Indian Power sector by giving right to consumer, licensee and utilities to access the distribution and transmission system. Short term power market is increasing every year after implementation of Short term open access (STOA). As per the procedure RLDC approves application in case of STOA application. Customers file their application to RLDC, but they don't know whether their application will be approved or not or partially approved because of the availability of transmission corridor.

Also there is no such mechanism or way to know about the available margin for STOA on Inter-regional links before putting application. We are suggesting method which can be further developed as model to find out Available corridor for STOA. With help of this customer will know about the available inter-regional transmission corridor for STOA, so they can take advantage and analyze this information.

Interstate transmission system of India is divided in five regions NR, ER, WR, NER and SR, in these regions first four regions are synchronized with each other via inter-regional links or transmission system and SR will be synchronized in 2014.These Inter-regional links helps in transferring power from one region to other region or to transfer power from surplus region to deficit region. Transmission system is liable to their transfer capability, so that system will work in reliable manner.

5.2 Transfer Capability

Transfer Capability can be defined as the measure of the ability of interconnected electric systems to reliably move power from one control area to another over all transmission lines (or paths) between those areas under specified system conditions. It is directional in nature and is highly dependent upon the generation, customer demand and transmission system conditions assumed during the time period analyzed Control area means an electrical system bounded by interconnections (tie lines), metering and telemetry, where it controls its generation and/or load to maintain its interchange schedule with other control areas. Whenever required to do so and contributes to frequency regulation of the

synchronously operating system.

Difference between transfer capability and transmission capacity:-

Transfer Capability is different from 'Transmission Capacity', which usually refers to the thermal limit or rating of a particular transmission element or component. The capability to meet load (transfer capability) would however depend on several other factors such as spatial distribution and diversity of generation/load, network configuration (radial or meshed), availability of reactive compensation within that control area. Thus, the individual transmission line capacities or ratings cannot be arithmetically added to determine the transfer capability of a transmission path or interface. Transfer Capability of Inter-regional transmission system in India is declared by NLDC (National Load Despatch Centre) with consultation of SLDC, RLDC and CTU. Transfer Capability has following parts:

Total Transfer Capability (TTC) - means the amount of electric power that can be transferred reliably over the inter-control area transmission system under a given set of operating conditions considering the effect of occurrence of the worst credible contingency.

Transmission Reliability Margin (TRM) - means the amount of margin kept in the total transfer capability necessary to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions.

Available Transfer Capability (ATC) - means the transfer capability of the inter-control area transmission system available for scheduling commercial transactions (through long term access, medium term open access and short term open access) in a specific direction, taking into account the network security.(ATC= TTC-TRM). TTC assessment is required for reliable system operation and to facilitate non-discriminatory open access in transmission as per CERC regulations on Open Access and Power Markets.

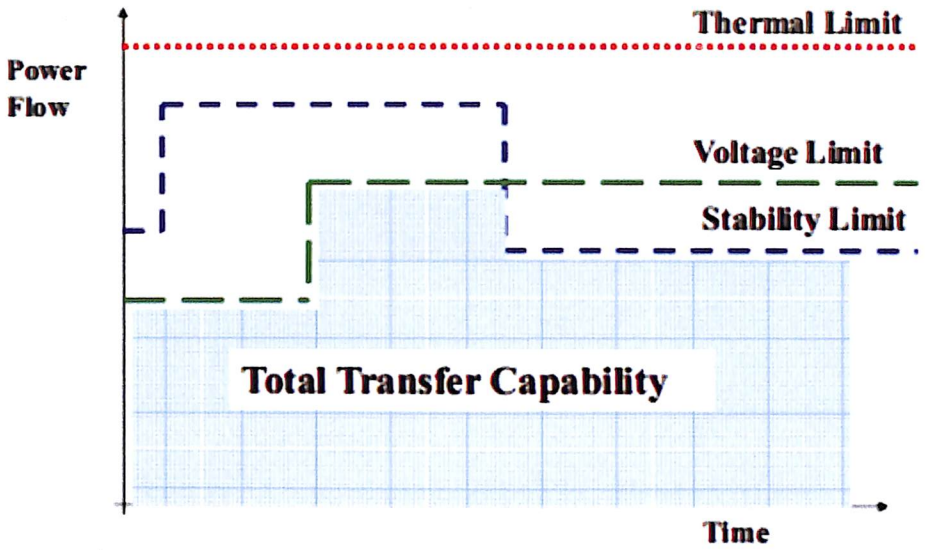

Figure 11 Considering Total Transfer Capability

TTC is dependent upon the network topology, point and quantum of injection/ drawl and power flows in other paths of the interconnected network as well as prevailing voltage profile in the network during the assessment period.

TTC is directional in nature and the transfer capability for import of power in a region or control area from another region or control area may be different from the transfer capability for export of power from that region or control area to the other region or control area. Total Transfer Capability is time variant and there could be different figures for different time of the day/ month/ season/ year.

As per the procedure, NLDC shall assess the TTC, TRM and ATC of inter and intra-regional links/ Corridors respectively for three months in advance for each month up to the fourth month and put this on their website and revise due to change in system condition or inputs received from SLDC/RLDC. In this sheet NLDC provides information about:

(1) TTC

(2) TRM

(3) ATC

(4) Approved Long Term Access & Medium Term Open Access

Margin available for STOA

Corridor	Date	Time Period (hrs)	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	Long Term Access (LTA)/ Medium Term Open Access (MTOA)	Margin Available for Short Term Open Access (STOA)	Changes in TTC w.r.t. Last Revision	Comments
NR-WR	1st August 2013 to 31st August 2013	00-24	2500	500	2000	286	1714		Revised due to commissioning of 765 kV Agra-Jhatikara.
WR-NR[1]	1st August 2013 to 31st August 2013	00-24	5700$^{\Delta}$	500	5200$^{\Delta}$	2787$^{\Delta}$	2413		Revised due to commissioning of 765 kV Agra-Jhatikara.
NR-ER	1st August 2013 to 31st August 2013	00-17	1000	200	800	0	800		
		23-24							
		17-23	1100		900		900		
ER-NR	1st August 2013 to 31st August 2013	00-17	4000	300	3700	2189	1511		
		23-24							
		17-23					1511		

Figure 12 Snapshot of ATC-TTC Sheet of NLDC

Application for LTA and MTOA is already processed and scheduled 3 months before the final delivery, while in case of STOA, application can't be applied prior to 3months before actual delivery. Applications for STOA are processed by Nodal RLDC (in which drawl is taken place).Application comes under following categories:

i. Advanced

ii. First come first serve

iii. Collective (Power Exchange)

iv. Day ahead

v. Intra-day Contingency

Nodal RLDC has to put information regarding their acceptance to the application put by the customers on their website.

5.3 Steps required to determine "Available Inter-regional Corridor"

1. Taking the latest revised "TTC-ATC" data from NLDC website.
2. From above sheet we can get the "Margin available for STOA".

The table-23 which shown revised NLDC schedule of August- 2013 is a part of Appendix.

3. Taking the "STOA approved application" from all the RLDC's website.
4. Where 3 regions are involved breaking that in two separate Inter-regional flows like NR-WR-SR can be taken as NR-WR, WR-SR.

The table-24 which shown accepted STOA application for August-2013 by NRLDC is a part of Appendix.

NERLDC				
Inter-regional link Used	**Acceptance No.**	**Name of customer**	**Quantum**	**Total (MW)**
ER-NER	1256A/03.05.13	PTC	130	150
	1273F/28.06.13	PTC	20	

Table 25 Accepted STOA applications for August 2013 by NERLDC

ERLDC				
Inter-regional link Used	**Acceptance No.**	**Name of customer**	**Quantum**	**Total (MW)**
NR-ER	17667	PTC India Ltd	21	135.65
	17668	PTC India Ltd	106	
	NVVN/OA/8313	N V V N	8.65	
NER-ER	NVVN/OA/8312	N V V N	53.4	53.4
WR-ER	17669	PTC India Ltd	153	153

Table 26 Accepted STOA applications for August 2013by ERLDC

Table-27, 28 which shown accepted STOA application for August-2013 by SRLDC and WRLDC is a part of Appendix.

1. Determining the inter-regional flow of that RLDC's from data obtained in 3rd step.
2. All the inter-regional data is combined together

Short term inter-regional flow as per the respective RLDC's data	
Inter-regional Link	Quantum flow
ER-NER	165
ER-NR	920.17
ER-SR	0
ER-WR	0
NER-ER	230.56
NR-ER	560.43
NR-WR	1667.5
SR-ER	603
SR-WR	0
WR-ER	902.18
WR-NR	439.1
WR-SR	0

Table 29 Flow from various Inter Regional Links

1. This approved "Inter-regional STOA flow" is deducted from the "Margin available for STOA" of 2nd step.
2. By step 7 we can know about the "Margin available for STOA"

Table- 30 which shown NLDC's revised ATC-TTC Schedule is a part of Appendix.

5.4 Methodology to determine TTC, TRM & ATC

The methodology shall be in harmony with the detailed procedure of the Central Transmission Utility (CTU) prepared under the Central Electricity Regulatory Commission (Grant of Connectivity, Long-term access and Medium-term Open Access in inter-State Transmission and related matters) Regulations, 2009 so as not to have different methodology for determination of TTC, TRM and ATC by the CTU in respect of long-term access and medium-term open access and NLDC/ RLDCs in respect of short-term open access.

The CTU shall notify the following on 31st day of March of each year: Total Transfer Capability (TTC) for 4 (four) years i.e. on 31st March, 2010, TTC shall be declared for period 1st April, 2011 to 31st Mar 2015. This may be revised by CTU due to change in

Anticipated network topology or change of anticipated generation or load at any of the nodes, giving reasons for such change.

Available Transfer Capability (ATC) for MTOA will be worked out after allowing the already approved applications for Long-term access, Medium Term Open Access and Transmission reliability margin. The grant of MTOA shall be subject to ATC.

TTC and TRM shall be assessed with the help of simulation studies carried out for a representative scenario to arrive at an initial or base case. Simulation studies may require setting up of a power system model and obtaining a power flow solution. The construction of an accurate base case power system model is a key step in the execution of a meaningful study.

Transmission Reliability Margin (TRM) shall be kept in the total transfer capability to ensure that the interconnected transmission network is secure under a reasonable range of uncertainties in system conditions. Computation of TRM for a region or control area or group of control areas would be based on the consideration of the following:

(a) Two percent (2%) of the total anticipated peak demand met in MW of the control area/group of control area/region (to account for forecasting uncertainties)

(b) Size of largest generating unit in the control area/ group of control area/ Region

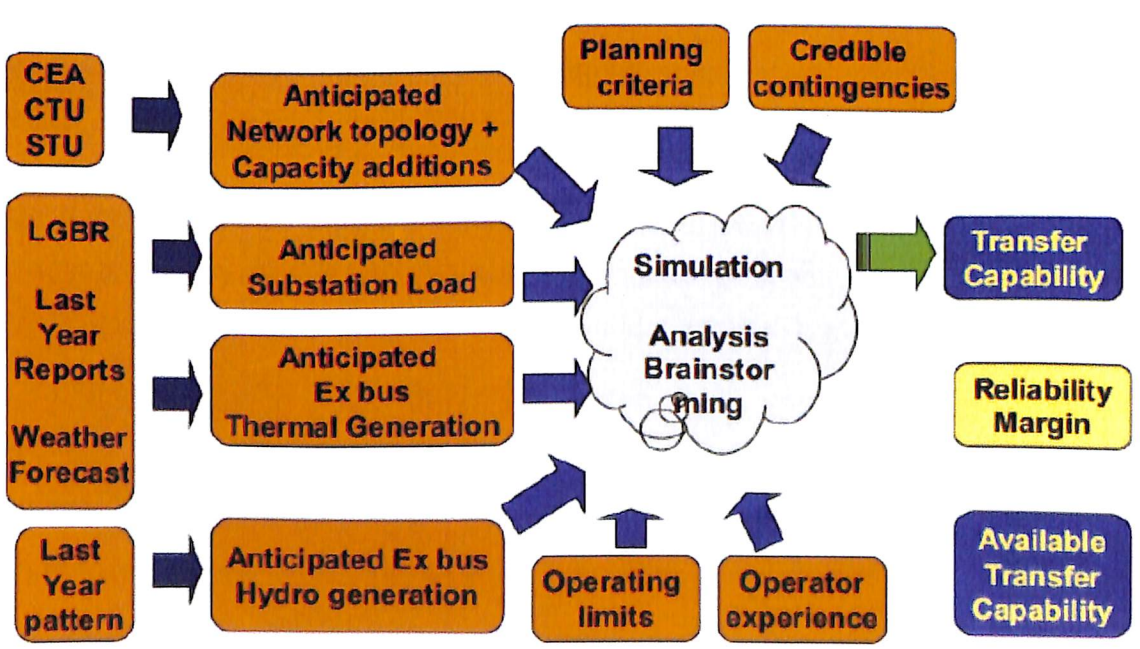

Figure 13 Methodology for Calculating ATC

5.5 Procedure for declaration of TTC, TRM, ATC and anticipated Constraints:

State Load Despatch Centre (SLDC) shall assess the Total Transfer Capability (TTC), Transmission Reliability Margin (TRM) and Available Transfer Capability (ATC) on its inter-State transmission corridor considering the meshed intra State corridors for exchange (import/ export) of power with inter-State Transmission System (ISTS). These figures along with the data considered for assessment of TTC would be forwarded to the respective RLDC for assessment of TTC at the regional level. The details of anticipated transmission constraints in the intra State system shall also be indicated separately.

Regional Load Despatch Centres shall assess TTC, TRM and ATC for inter-regional corridors at respective ends, intra-regional corridors (group of control areas) and for individual control areas within the region (if required) for a period of three months in advance. During assessment of TTC, the RLDCs would duly consider the input provided by the SLDCs. The TTC, TRM and ATC figures for the inter-regional corridors, intra-regional corridors (group of control areas) and for individual control areas within the region (if required) along with all the input data considered shall be forwarded to NLDC. The details of anticipated transmission constraints in the intra-regional system shall also be indicated separately. National Load Despatch Centre (NLDC) shall assess the TTC, TRM and ATC) of inter and intra-regional links/ Corridors respectively for three months in advance for each month up to the fourth month based on:

(a) The inputs received from RLDCs

(b) TTC/ TRM/ ATC notified/ considered by CTU for medium-term open access. NLDC shall inform the TTC/ TRM/ ATC figures along with constraints observed in inter-regional/ intra-regional corridors to the RLDCs. These shall be put on the website of RLDCs as well as NLDC.

NLDC may revise the TTC, TRM and ATC due to change in system conditions (including commissioning of new transmission lines/ generation), vis-à-vis earlier anticipated system conditions which includes change in network topology or change in anticipated active or reactive generation or load, at any of the nodes in the study. Revisions may be done by NLDC based on its own observations or based on inputs received from SLDCs/ RLDCs. Revised TTC, TRM and, ATC shall be published on website of NLDC and RLDCs along with reasons thereof.

CHAPTER- 6

CONCLUSION & SCOPE OF FUTURE WORK

6.1 Conclusion

Making the distribution segment of the power industry efficient and solvent is the key to success of power sector reforms. Implementation of open access in distribution with proper market condition by studying its feasibility is the only solution. Though it has been widely says that Open access in distribution will create a competitive environment but its improper introduction may create huge losses to distribution and also to consumer.

This Report helped us to understand the Status of Open Access, various open access charges and level of cross subsidy in various States. However, cross subsidy surcharge still remains a challenge for many states and also some states have clogged open access. Report provides the brief understanding of the Business Model and Process flow of Power Trading. Also analysis of power trading trend in India and its current scenario is explained in the report.

Major roadblocks which are affecting the power trading business can be summarised as follow:

- ***Cross subsidy surcharge*** -Number of Indian states has very high level of cross subsidy surcharge for Open access consumer. Due to this the power purchase cost for the consumer of a state from other source make it difficult for consumer to opt for this option and thus bound to take power from their respective state.
- ***Financial condition of DISCOMS***- Main customers of Power Traders are DISCOMS and are important source of revenue for them. But most of the DISCOMS are suffering from poor financial condition and they are unable to pay regular payment to trader for which Power trader has to suffer financial loss.
- ***Unscheduled Interchange***- Concept of Unscheduled Interchange was came to penalize and rewarding for over-drawl/under-injection and under-drawl/Over-injection, but it is used as market mechanism which affects the business of power trader. Reason for this is-

UI price is less than the price discovered on exchange and bilateral transaction price of short term power market

- ✓ No advance Payment is required

- ❖ ***Coal linkage issue-*** Generators are unable to deliver power as agreed by them because of improper coal supply within the country and due to change in the coal policy of foreign countries which are affecting the power market of the nation.

- ❖ ***Financial risk-*** Power trader can get the margin up to 4 paisa/KWH for short term buy-sell agreement below than 3 Rs/KWH and 7 paisa/KWH for 3 Rs/KWH & above. But the risk involved is much greater as trader has to submit big amount for CPG (Contract Performance Guarantee) and profit which traders get is very low so risk involve is greater.

- ❖ ***Congestion issue-***Transmission corridor available to power exchanges is facing congestion issue, so because of this around 500 MUs per month remain unsold in power exchanges. In Current scenario many states like Punjab & Tamilnadu are facing power crux. So, proper planning needs to be done in order to elude such a situation.

6.2 Recommendations

- ❖ Grid Bottlenecks shall be removed by enhancing transmission infrastructure in order to develop the Short-term Power Market.

- ❖ An increasing demand of Short-term transactions indicates a need to allocate a separate Corridor for Short Term Open Access Consumers.

- ❖ Real time power market and forward market is needed to boost up the short term power market in the country

- ❖ Central and States' ERCs should be advised by the appropriate governments to comply with the statutory requirements relating to open access in a time bound manner. In particular, they must prescribe the open access surcharge in accordance with the provisions of the Tariff Policy notified by the Central Government under Sec. 3 of the act

- ❖ Cross-subsidy level of states must be reduced to appropriate level

The state authorities should be advised to permit free sale of electricity and not compel generators to sell electricity to the SEB/DISCOM in the state except where a power purchase agreement exists.

- ❖ SERCs should ensure other enabling arrangements such as standby supplies at affordable prices, metering and settlement.
- ❖ IPPs, captive and small generators should be allowed to bring power into the market without any hindrance in grant of open access.
- ❖ A common methodology should be adopted as per National Tariff Policy 2005 to calculate surcharges.

6.3 Limitations

All studies are surrounded by certain limitations and this project is not an exception. Certain

Limitations are listed below.

- ❖ First of all the time duration of 8 weeks was a major constraint in going through the project completely.
- ❖ Majority of information is collected from internet. So trustworthiness of information is wholly relying on adequacy and dependency of the internet
- ❖ Study and assessment of SERCs for distribution open access is done on basis of applicable charges but the other comparative factors like 'reason behind pending applications' is not highlighted.
- ❖ Most the charges and figures involved in project are need to be updated time to time. Since the project report comprises of open access charges and most of SERCs have not declared the applicable charges for the current year 2012-13.
- ❖ Owing to geographical constraints and altogether different prevailing climatic, political, social, economic, legal and cultural scenarios, the comparison of Open access of various states on some parameters was not possible.

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APPENDIX

(a) Table 23 Revised NLDC Schedule for august 2013

Revised ATC-TTC Schedule for August 2013 as per NLDC					
Corridor	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	LTA/MTOA	Margin Available for STOA after LTA/MTOA
ER-NER	580	35	545	230	315
ER-NR	4000	300	3700	2189	1511
ER-SR	1100	0	1100	612	488
ER-WR	1000	300	700	700	0
NER-ER	400	100	300	0	300
NR-ER	1000	200	800	0	800
NR-WR	2500	500	2000	286	1714
SR-ER	800	0	800	197	603
SR-WR	1000	0	1000	0	0
WR-ER	1650	300	1350	0	1350
WR-NR	5700	500	5200	2787	2413
WR-SR	1000	0	1000	1000	0

(b)Table 24 Accepted STOA applications for August 2013 by NRLDC

Short term Open Access Accepted Transmission for August 2013 by RLDC as till				
(1 August-31 August 2013)				
NRLDC				
Inter-regional link Used	**Acceptance No.**	**Name of customer**	**Quantum**	**Total (MW)**
ER-NR	Jul-13/AP-21434-AD	LEUL	49.27	482.69
	Jul-13/AP-21433-AD	STREL-OR	40.02	
	Jun-13/AP-21200-AD	NVVN	25.08	
	Jun-13/AP-21188-AD	JSLS	28.86	
	Jun-13/AP-21187-AD	INSTINCT	21.7	
	Jun-13/AP-21176-AD	INSTINCT	4	
	Jun-13/AP-21168-AD	PTC	31.04	
	Jun-13/AP-21166-AD	TATA	31.04	
	Jun-13/AP-21165-AD	TATA	62.07	
	Jun-13/AP-21161-AD	LEUL	104.63	
	Jun-13/AP-21160-AD	STREL-OR	84.98	
NER-ER-NR	Jun-13/AP-21186-AD	NVVN	31.4	31.4

WR-NR	Jul-13/AP-21432-AD	PTC-HPPC	74	2023.9
	Jun-13/AP-21201-AD	MITTAL	62.07	
	Jun-13/AP-21199-AD	JSWPTCL	313.46	
	Jun-13/AP-21198-AD	PSEB	85.66	
	Jun-13/AP-21197-AD	PTC	300	
	Jun-13/AP-21195-AD	PSEB	310.36	
	Jun-13/AP-21175-AD	MITTAL	50	
	Jun-13/AP-21173-AD	UPPCL	500	
	Jun-13/AP-21167-AD	MITTAL	62.07	
	Jun-13/AP-21159-AD	PTC	155.18	
	Jun-13/AP-21157-AD	GLOBAL	31.04	
	Jun-13/AP-21156-AD	KISPL	31.04	
	Jun-13/AP-21155-AD	Reliance	9.97	
	Jun-13/AP-21154-AD	TATA	25.45	
	Jun-13/AP-21153-AD	KISPL	13.6	

(c)Table 27 Accepted STOA applications for August 2013 by SRLDC

SRLDC				
Inter-regional link Used	Acceptance No.	Name of customer	Quantum	Total (MW)
WR-ER-SR	764	GUVNL	109.24	294.82
	1	ESSARPOWER	32.77	
	PIL3	INSTINCT	9.44	
	234	JPL	62.42	
	233	JPL	39.01	
	1	IDEALEPL	20.57	
	8373	NVVN	7.8	
	8374	NVVN	7.02	
	JPL1	INSTINCT	6.55	
NR-ER-SR	578	SHREECEM	15.61	50.52
	579	SHREECEM	19.51	
	573	SHREECEM	11.7	
	17760	PTC	3.7	
NER-ER-SR	8362	NVVN	7.8	7.8
ER-SR	814	KISPL	8.27	138.55
	17685	PTC	31.21	
	17729	PTC	31.21	
	290513	STERLITE	31.52	
	8363	NVVN	15.61	
	8364	NVVN	15.61	
	36	INSTINCT	5.12	

(c) Table 28 Accepted STOA applications for August2013 by WRLDC

WRLDC				
Inter-regional link Used	Acceptance No.	Name of customer	Quantum	Total (MW)
ER-NR-WR	17693A	PTC LTD	46.5	46.5
WR-ER	4949A	PTC LTD	153	153
WR-ER-SR	9876A	INSTINCT	6.55	294.82
	9875A	NVVNL	7.02	
	9874A	NVVNL	7.8	
	9867A	IEPL MSEB	20.57	
	9863A	JPL	39.01	
	9862A	JPL	62.42	
	9858A	INSTINCT	9.44	
	9857A	ESSAR_MAHAN	32.77	
	9856A	GUVNL	109.24	
WR-NR	21432A	PTC LTD	74	1973.9
	21201A	MPPL	62.07	
	21199A	JSW PTL	313.46	
	21198A	PSEB-NR	85.66	
	21197A	PTC LTD	300	
	21195A	PSEB-NR	310.36	
	21173A	UPPCL	500	
	21167A	MPPL	62.07	
	21159A	PTC LTD	155.18	
	21157A	GEL	31.04	
	21156A	KISPL	31.04	
	21155A	RETL	9.97	
	21154A	TPTCL	25.45	
	21153A	KISPL	13.6	

Revised ATC-TTC Schedule for August 2013 as per NLDC							
Corridor	Total Transfer Capability (TTC)	Reliability Margin	Available Transfer Capability (ATC)	LTA/MTOA	Margin Available for STOA after LTA/MTOA	Approved Applications of STOA by RLDC's Quantum(MW)	Available Corridor
ER-NER	580	35	545	230	315	150	165
ER-NR	4000	300	3700	2189	1511	590.83	920.17
ER-SR	1100	0	1100	612	488	488	0
ER-WR	1000	300	700	700	0	0	0
NER-ER	400	100	300	0	300	69.44	230.56
NR-ER	1000	200	800	0	800	239.57	560.43
NR-WR	2500	500	2000	286	1714	46.5	1667.5
SR-ER	800	0	800	197	603	0	603
SR-WR	1000	0	1000	0	0	0	0
WR-ER	1650	300	1350	0	1350	447.82	902.18
WR-NR	5700	500	5200	2787	2413	1973.9	439.1
WR-SR	1000	0	1000	1000	0	0	0