14

STANDING COMMITTEE ON ENERGY

(2015-16)

SIXTEENTH LOK SABHA

MINISTRY OF POWER

EVALUATION OF ROLE, PERFORMANCE AND FUNCTIONING OF THE POWER EXCHANGES

FOURTEENTH REPORT

LOK SABHA SECRETARIAT
NEW DELHI

April, 2016/Chaitra,1938 (Saka)

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Presented to Lok Sabha on 27.04.2016

Laid in Rajya Sabha on 27.04.2016

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COE NO. 269

Price: **Rs.....**

Published under Rule 382 of the Rules of Procedure and Conduct of Business in Lok Sabha (Fifteenth Edition) and Printed by_____.

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**Ceased to be a member of the Committee consequent upon his demise on 04.03.2016.*

INTRODUCTION

I, the Chairperson, Standing Committee on Energy, having been authorized by the Committee to present the Report on their behalf, present this Fourteenth Report on 'Evaluation of Role, Performance and Functioning of the Power Exchanges' relating to the Ministry of Power.

2. The Committee had a briefing on the subject by the representatives of the Ministry of Power and the Central Electricity Regulatory Commission (CERC) on 4th January, 2016. The Committee, with a view to examining the subject in detail, had further briefing by the representatives of the Ministry of Power and the CERC on 18th February, 2016. The Committee also got valuable inputs from the representatives of the Power Exchange India Limited (PXIL), during the study visit in the month of February, 2016. The Committee wish to express their thanks to the representatives of the Ministry of Power, Government of India, and the CERC for appearing before the Committee and furnishing the desired information in connection with the issues relating to the subject.

3. The Report was considered and adopted by the Committee at their sitting held on 11 April, 2016.

4. The Committee place on record their appreciation of the valuable assistance rendered to them by the officials of the Lok Sabha Secretariat attached to the Committee.

5. For facility of reference and convenience, the observations and recommendations of the Committee have been printed in bold letters in Part-II of the Report.

NEW DELHI
18 April, 2016
Chaitra 29, 1938 (Saka)

DR. KIRIT SOMAIYA
Chairperson,
Standing Committee on Energy

REPORT

PART-I

NARRATION ANALYSIS

I. INTRODUCTORY

Energy is crucial to any country, especially a rapidly developing one such as India, where some regions have energy deficit while others have an energy surplus. In economic terms, electricity is a commodity capable of being bought, sold, and traded. So, the need was felt to come up with some platform where Energy deficit States may improve their power availability in the short term by buying electricity from surplus States during the year. The sporadic demand-supply mismatch at the geographical level also calls for a market place where surpluses can be disposed off efficiently on a real time basis to optimize resource allocation. Accordingly, a transformation was brought in by the Electricity Act of 2003, which entrusts the responsibility of development of Power Market on the Appropriate Commission. The Act aims at promoting inter-State and intra-State power trading within India and envisages development of a competitive power market for promoting efficiency, economy and for mobilization of new investments in the power sector. Thereafter, Power Exchanges in India, conceptualized in 2005, have impacted the way in which the markets have typically been treating electricity.

1.2 Power exchanges are online platforms that help generators and consumers come together and discover prices based on the demand-and-supply mechanism and meet the diverse needs of their consumers nationwide. While retail consumers are largely served by State electricity distribution companies, large consumers with requirement of 1 megawatt and

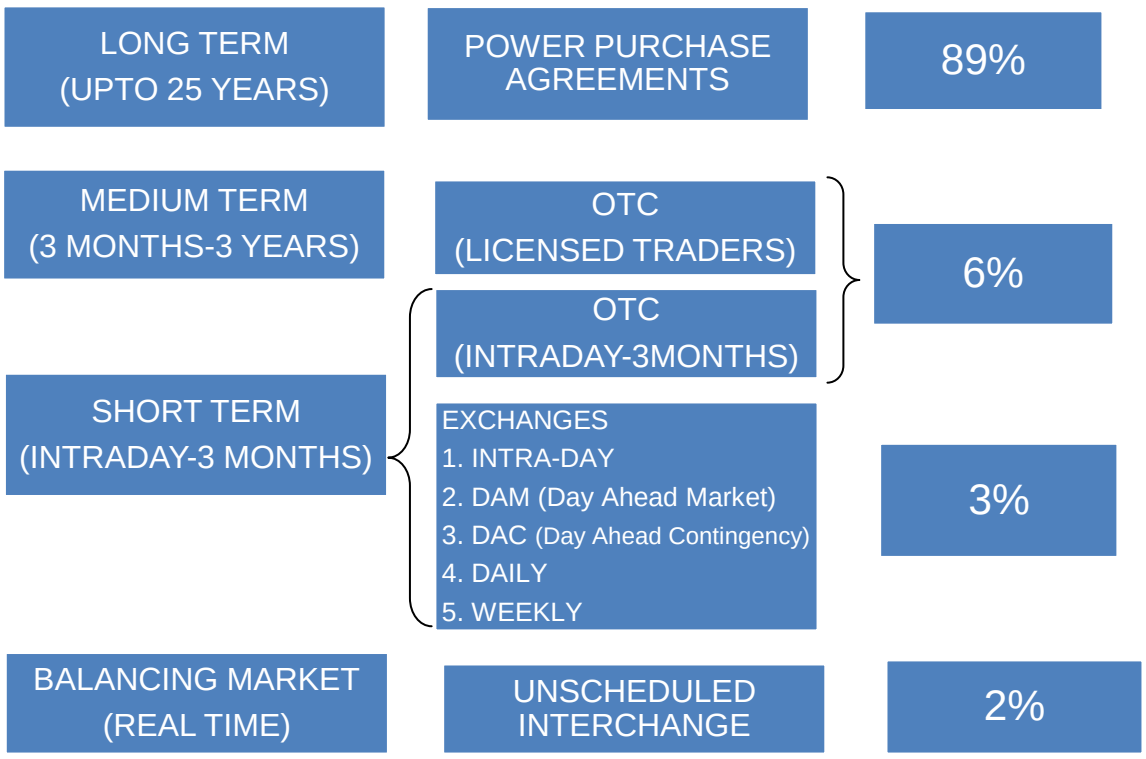
above can approach the Power Exchanges for buying electricity. The prices at exchanges are market-determined. With the market moving from a regulated one to a market-driven regime, more buyers and sellers are opting to trade electricity through the Exchanges. India currently has two Exchanges: Indian Energy Exchange (IEX), Delhi and Power Exchange India Ltd (PXIL), Mumbai, which commenced operations from 27.06.2008 and 22.10.2008, respectively, after approval of the Central Electricity Regulatory Commission (CERC). These Power Exchanges are required to function as per Rules, Bye-Laws and Business Rules approved by the CERC.

1.3 India has adopted a unique multi-exchange model since 2008. The Indian Energy Exchange (IEX), promoted by Financial Technologies (India) Limited and PTC India Financial Services Limited, owns about 96% market share while Power Exchange India Ltd (PXIL), promoted by the National Stock Exchange (NSE) and National Commodities & Derivatives Exchange (NCDEX), owns rest of the market share. The two exchanges trade about 3% of the total Power generation in the country.

1.4 The Power Market has been predominantly dominated by the long term Power Purchase Agreements (PPAs). Generally, the Base load is met through long term PPAs of upto 25 years. However, the long term contracts create problems of peak demand - either the buyer is stuck with excess capacity or there is a short fall; as of today, the storage capacity is also limited. So, to address these broad shortcomings of the Power Market, there is a need to emphasize upon short term, medium term and day ahead market. Before induction of Exchanges, short term contracts were mainly driven by either direct contract between parties or through power

traders. The Exchanges have re-structured the unorganized short term market, especially Day Ahead Contracts. The new market structure which has evolved over the last few years, provides the distribution utilities with the avenue to optimize their power purchase portfolios and reduce their overall power purchase cost.

Below is a diagram showing the share of different types of Power Purchasing Instruments in the Indian Power Market:



II. ROLE OF THE POWER EXCHANGES

2.1 The Committee were informed that the Power Exchanges were set up to mitigate the volatility in power supply and to facilitate the flow of power from the surplus region to the deficit ones by bringing about equilibrium in pricing as well as demand/supply through their platforms, ensuring low transaction cost and efficiency gains. The CERC had notified the Central Electricity Regulatory Commission (Power Market) Regulations, 2010, which deal with the creation of a comprehensive market structure and enabling the transaction, execution and contracting of all types of possible products in the electricity markets. The Power Market Regulations state the objectives of the Power Exchanges as below:

(i) Ensure fair, neutral, efficient and robust price discovery;

- Double Side Closed Bid Auction Mechanism
- Both Buyers and Sellers compete anonymously

(ii) Provide extensive and quick price dissemination;

- Price is disseminated to the participants and published on Power Exchange's Websites.
- Aggregate Demand & Aggregate Supply Curves displayed on Power Exchange's Websites.

(iii) Design standardized contracts and work towards increasing liquidity in such contracts.

- Standardized contracts provide certainty of terms and conditions
- Pooling of Volumes aids liquidity.

2.2 When asked by the Committee as to how far the Indian Energy Exchange (IEX) and Power Exchange India Ltd (PXIL) have been able to fulfill the abovementioned objectives, the Ministry gave the following reply:

"Out of the total electricity procured in India in 2014-15, 91% of the generation was procured mainly by distribution companies through long term contracts and short term intra-State transactions. The residual procurement is met through short term transactions, particularly through the power exchanges. Any gaps in the demand supply are met through trading in the Day Ahead Market (DAM) in the power exchange. Price discovery on the power exchanges is done on the basis of the demand and supply bids submitted by the participants. In Day Ahead Market, the prices are discovered for every 15 minutes for next day delivery. In case of congestion, market splitting mechanism is adopted."

2.3 In response to the query of the Committee whether the Power Exchanges have helped in improving market efficiencies, the Ministry stated that:

"For Price discovery, the buy and sell volumes are pooled and prices are discovered on the principle of demand and supply. The purchase bid and the sell bid are matched every 15 minutes to arrive at a Market Clearing Volume (MCV) and a Market Clearing Price (MCP). Prices of electricity traded in the power exchanges have decreased over the years. Price discovered in the day ahead market are now considered benchmark power prices and are closely watched by all power sector stakeholders. Different prices in different regions provide information about demand and supply in different areas, generation capacity and transmission capacity."

2.4 The Ministry furnished the following information in regard to the key role played by the Power Exchanges:

"a) **Fair, Transparent and Neutral Platform:**

Power Exchanges have offered a fair, transparent and neutral platform at the national level which has resulted in efficient price discovery of electricity. The prices have not only brought up the "time of delivery" aspect (peak, day, night hours) but also the "locational" component of electricity.

Moreover, the temporal natures of prices, seasonality of the supply and demand dynamics have also been captured. Lastly, the prices have been able to identify congestion, its severity, its trajectory which has resulted in identification of the need to augment, strengthen, and up grade the transmission network in the country. It is worthwhile to mention that prior to the Exchanges becoming operational, it was assumed that the network in India will remain congestion free.

b) **Matching Algorithm**

Matching Engine is based on the principle of social welfare maximization, wherein the consumer surplus and the producer surplus is distributed/allocated in prices, such that competition amongst buyers, amongst sellers and in between them is ensured. Power Exchanges have adopted a step curve methodology for price discovery which minimizes a participant's ability to influence prices without being affected.

c) **Scheduling**

Scheduling power through merit order dispatch across surplus and deficit zones.

d) **Splitting of Market**

Market splitting has been utilized as the methodology to alleviate congestion/adhere to system constraints for delivery of power, and at the same time balancing the deficit and surplus zones, by higher and lower prices respectively.

e) **Access**

Provide access to smaller consumers located even in remote corners to meet their demands.

f) **Robust Clearing & Settlement Mechanism**

The settlement cycle (pay in and payouts) coupled with prudent risk management has helped participants to effectively and efficiently manage their cash flows by introducing capital efficiency.

g) **Round the clock Access**

With introduction of contracts which operate as close as 3 hours to the actual delivery and operationalization of 24X7 intraday contract, Power Exchanges have provided an option for market participants to meet their contingent requirements.

h) **Renewable Segment**

Successful operation of monthly REC market where prices have been responsive to the supply and demand dynamics. REC, as an instrument, has brought in awareness and expansion in the renewable space.

i) **Information Dissemination**

Information dissemination of the prices discovered for the next day across zones has resulted in market participants taking judicious and prudent call on prices. Also, the information has played out on the prices discovered in the OTC segment.

j) **Providing Pan India Electronic Platform**

- Facilitates buyers and sellers to bid anonymously during the bid call session.
- Uniform Price Matching, i.e. Price discovery
- Marketplace is available 24x7.

k) **Market place available 24X 7, i.e. Extended market sessions**

- In case of same day delivery, the trading window is now opened round the clock for delivery of power on the same day (minimum delivery period - 3 hours after contract execution, subject to corridor availability).
- Extended market for round-the-clock transactions is one of the key developments in the past five years. It is aimed at helping the distribution companies and generators manage and balance their systems better. This would also help large-scale integration of wind and solar capacities as envisaged by the government. The 24x7 product would help in a great way to manage the contingency requirements of market players under strict demand side management. This product is on a bilateral basis wherein the sellers and buyers will come on the exchange platform and meet their needs.

l) **Portfolio Optimization by Discoms (On a Day Ahead Basis)**

DISCOM may go through an unscheduled shut down of generation assets, due to disruption or unfavorable weather, etc. During such a situation, DISCOMs can manage their power demands by buying power from the power exchanges.

m) **Facilitating Open Access (OA)**

- More than 3000 Open Access Consumers participated in 2014-15
- As envisaged in the Electricity Act 2003 as well as National Electricity Policy (NEP), open access is a key requirement for facilitating competition in wholesale as well as retail electricity markets. The Act also authorizes respective regulatory commissions to specify various norms and charges, including cross subsidy surcharges, for availing of open access. Generation companies may sell energy to any potential buyer in the country and vice versa.

n) **Ensuring a robust payment security mechanism**

- Power Exchanges provide the desired payment security for sellers.
- 100% Margining before Bidding."

III. PERFORMANCE AND FUNCTIONING OF THE POWER EXCHANGES

3.1 The Committee were informed that the Power Exchanges offer the following Contracts:

i) Day Ahead Market:

The Day-Ahead-Market (DAM) is the electricity trading market for delivery on the following day. The prices and quantum of electricity to be transacted is determined through a double-sided closed auction bidding process. Following are the main features of DAM:

- 15 minute time block wise bidding for next day
- Trading is on all days, irrespective of holidays
- Order entry / revision /cancelation can be done on D-1 (a day before delivery) from 10:00 hrs to 12:00 hrs related to Delivery Day (D day)
- Contract Features
    - Area Clearance Price (ACP) is used for settlement of the contracts.
    - Cleared Volume
    - Total Contract Value: Cleared Volume multiplied by ACP
    - Final settlement adjusted for any *force majeure* deviations.
- Delivery Point
    - Periphery of Regional Transmission System in which the grid-connected entity is located
- The Market Clearing Price and the Market Clearing Volume are determined on the intersection of the aggregate supply and aggregate demand curves. The contract is

being traded since June 2008. This is the most liquid product constituting more than 95% of the total volume traded on the power exchanges.

ii) Term Ahead Market:

Term-Ahead-Market (TAM) includes products allowing participants to transact for delivery of electricity for duration up to 11 days. It enables participants to purchase electricity for same day through intra-day contracts, for next day through day-ahead contingency, on daily basis for rolling seven days and on weekly basis to manage their electricity portfolios for different durations in a better way. The contracts are being traded since September 2009.

Contract	Trading
Intra-day Contracts	Trading on delivery day few hours before delivery.
Day-ahead Contingency Contracts	Trading to a day before delivery and after DAM auction.
Daily Contracts	Trading up to 1 Week in advance for any calendar day.
Weekly Contracts	Trading up to 11 days in advance.

The Volume contracted on the Power Exchanges Platforms through Day Ahead and Term Ahead Markets and its percentage to total generation are as below:

Year	Day Ahead Market (BU)	Term Ahead Market (BU)	Total Volume (BU)	Total Volume as percentage of Total Generation
2009-10	7.09	0.10	7.19	0.94%
2010-11	13.54	1.98	15.52	1.92%
2011-12	14.82	0.73	15.55	1.78%
2012-13	23.03	0.52	23.55	2.60%
2013-14	30.03	0.64	30.67	3.19%
2014-15	28.46	0.94	29.40	2.81%
2015-16 Upto Oct.	19.63	0.64	20.27	3.11%

iii) Renewable Energy Certificates (RECs):

RECs represent green attributes of electricity and are traded between 13:00 Hrs and 15:00 Hrs on the last Wednesday of every month. 1 REC is equivalent to 1 MWh. This contract is being traded since March 2011.

There are two types of certificates:

- Solar certificates for generation through solar,
- Non-solar certificates for generation through all renewable sources other than solar.

The CERC has recognized some obligated entities such as: distribution utility, open access consumer and captive power consumer, to mandatorily purchase some percentage of their consumption either from renewable power or the renewable energy certificate. Others can also purchase RECs voluntarily to offset the carbon footprints of their business activities or for CSR activities.

The CERC, in its order dated 30th December, 2014, revised the floor & forbearance price for the control period April, 2012 to March, 2017. The revised prices are as follows:

	Non-solar REC (Rs/MWh)	Solar REC (Rs/MWh)
Floor Price	1,500	3,500
Forbearance Price	3,300	5,800

3.2 When asked by the Committee as to which all agencies are involved in coordinating, dispatching and scheduling of electricity for fulfilling the above mentioned contracts, the Ministry furnished the following details:

"The details of agencies involved in coordinating, dispatching and scheduling of electricity are as under-

- Agencies involved with respect to Day Ahead Market are:
    - National Load Despatch Centre (NLDC)
    - Regional Load Despatch Centres (RLDCs)
    - State Load Dispatch Centres (SLDCs)

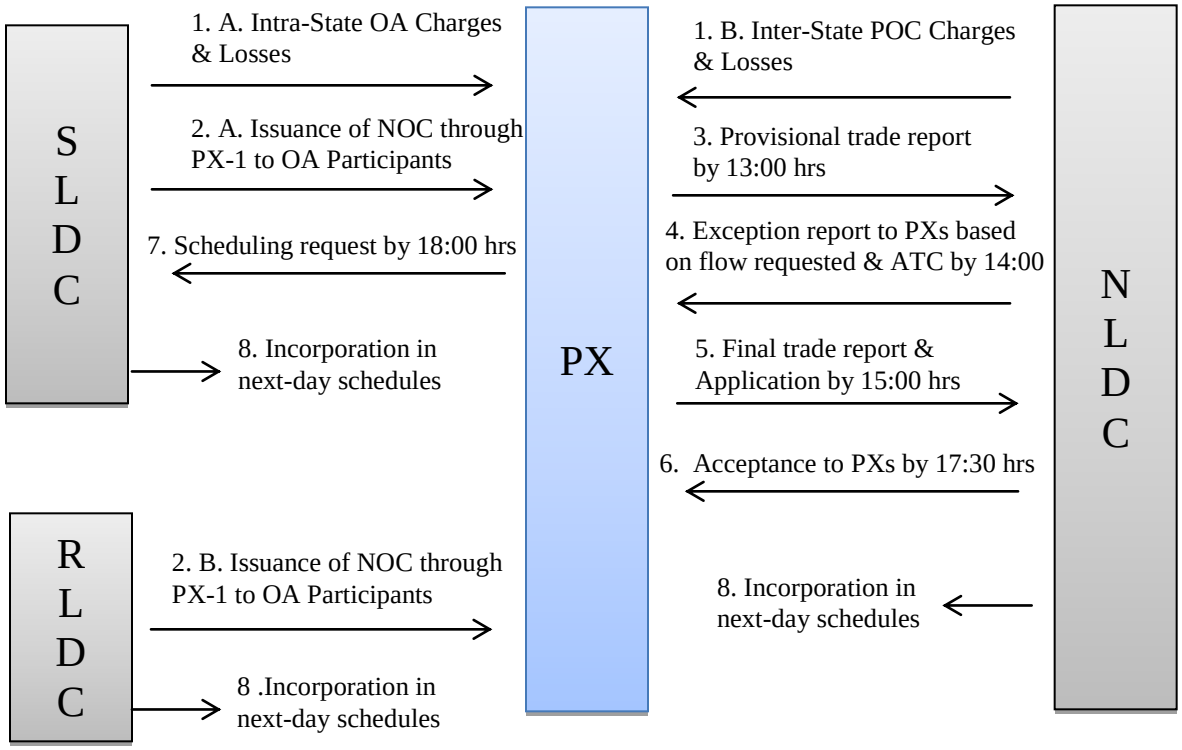
The relevant activities of the above agencies are:

Agency Name	**Activities Performed**
NLDC	• Informing Point of Connection (POC) losses and charges to exchanges • To collate all inter-regional flows from all RLDCs and to work out permissible capacity to respective exchanges based on their requisition • To provide confirmation of application to exchanges • To receive schedule from exchange and inform to RLDCs • Collation of funds received towards transmission charges and congestion revenue and its reconciliation thereof • Coordinating with RLDCs for power schedule monitoring and real time monitoring
RLDCs	• Issuance of No Objection Certificates(NOC) for Regional Entities • To specify available inter-regional corridor to NLDC • To take regional entity wise details from NLDC, inform regional entities and incorporate the same in day ahead schedule • Monitoring inter-State schedule on real time basis and issuing any revisions if required

SLDCs	• Issuance of No Objection Certificates(NOC) to Open Access (OA) participants which includes information on charges and losses to be levied • Scheduling of DAM transactions based on scheduling request sent by the exchanges which includes Open Access entity wise schedule • Reconciliation of schedule with respective RLDC • Collection of OA charges from exchanges and reconciliation thereof • Reconciliation of schedule and charges with respective OA entities and Discoms • Energy Accounting with respective OA participants and Discoms • Monitoring intra-State schedule on real time basis and issuing any revisions if required."

3.3 In response to a query about the steps involved in this exercise of coordinating, dispatching and scheduling of electricity, the Ministry furnished information as under:

➢ "<u>Steps Involved:</u>



Price Discovery

3.4 The price of the electricity so traded at the Exchanges is determined by the Price Discovery Mechanism. Price discovery mechanism is the process of determining a price which the buyers and sellers at the power exchange have to pay for purchasing or for selling electricity in a specific product category. Price discovery in the context of Day Ahead Market in the power exchanges, involves the following:-

- Day-Ahead auction for all the 24 hours is subdivided into 15 minutes contracts and has the following characteristics:-
    - It allows simultaneous Buy and Sell bids.
    - Demand -Supply curves are formed.
    - Intersection of the two curves is the price for the market (referred as Market Clearing Price- MCP).
    - Bids matched are included in the day-ahead schedules.
- Buy trades are settled at or below the quoted price and Sell trades are settled at or above the quoted price, ensuring maximum benefits to both buyers and sellers of electricity.
    - There is complete anonymity of the bids between members.
    - Congestion management is done through market splitting.
    - Financial settlement and clearing is done by the exchange.

The price discovery mechanism for Day Ahead Market (DAM) is governed by Regulation 11 of the Power Market Regulations, 2010. The regulation 11 is excerpted below:-

"11. A Power Exchange shall adopt the following market design in case of day ahead markets:-

A. Price Discovery

(i) The economic principle of social welfare maximization and to create buyer and seller surplus simultaneously during price discovery.

(ii) The bidding mechanism shall be double sided closed bid auction on a day ahead basis.

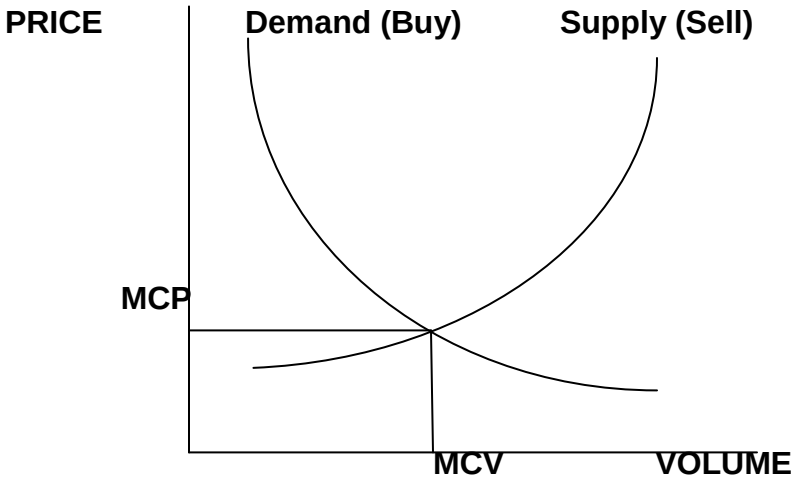
(iii) The price discovered for the unconstrained market shall be a uniform market clearing price for all buyers and sellers who are cleared

(iv) In case of congestion in transmission corridor, market splitting mechanism shall be adopted.

(v) The delivery / drawl of power shall be considered at the regional periphery."

This regulation has not been changed since it was first introduced in 2010 and the power exchanges have to comply with the same.

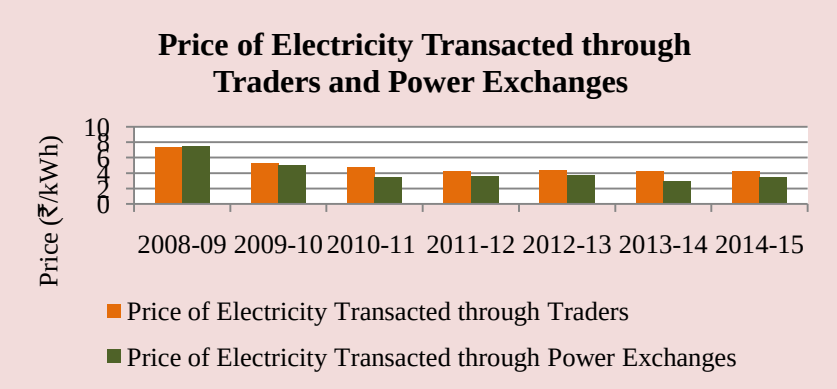
Shown below is a Demand-Supply curve which is used to discover prices. Intersection of the two curves is the price for the market referred to as Market Clearing Price (MCP).



3.5 It was submitted before the Committee that Prices of electricity traded in the power exchanges have decreased over the years. Prices discovered in the Day Ahead Market are now considered benchmark power prices and are closely watched by all power sector stakeholders. The Secretary, Power, also added,

"*There has been a time when the rates in the power exchanges were pretty high. Today it is hovering at an average of around Rs. 3. But if the trend throughout the day is monitored, late night the power rate goes to sub-rupee level.*"

Given below is a graph showing Price of electricity transacted through power exchanges and the price of electricity transacted through traders over the years:



The price analysis is mainly based on the weighted average price of other short-term transactions of electricity. The price of bilateral trader transactions represents the price of electricity transacted through traders.

3.6 Below is a table showing the Price of Electricity transacted through Power Exchanges:

Year	Price (Rs./kWh)
2009-10	5.0
2010-11	3.5
2011-12	3.6
2012-13	3.7
2013-14	2.9
2014-15	3.5

3.7 It has been reported that the regulator has fixed the price of power at Rs. 7.90. The Committee felt that when we are going in for an open market economy and competitive economy, there can be no rationale behind price fixation by the regulator. When the Committee asked that when, in the market, power is available at Rs. 3, why the customer should pay Rs. 7.90/-, the Ministry, in their reply, stated as under:

> "Section 62 of the Electricity Act, 2003 provides for determination of tariff by the Electricity Regulatory Commissions. While determining tariff, the Appropriate Commission is guided by the provisions specified in Section 61 of the Act. Further, as per Section 63 of the Act, the Appropriate Commission shall adopt the tariff, if such tariff is determined though transparent process of bidding. The Electricity Act, 2003 does not provide for determination of tariff for short-term power transaction. The tariffs of long-term / medium-term power as determined under Section 62 and Section 63 of the Act vary from the price discovered in the short-term market (including in the Power Exchanges), because of the inherent differences in these products in terms of duration and certainty of contract, need for hedging against market risks, etc."

3.8 On being queried by the Committee as to where the Regulator derives this price and the methodology that is used to arrive at this price, the Ministry furnished the following information:

> "The CERC, as per provisions contained in Section 62 of the EA, 2003 determines tariff for various renewable energy technologies (including Waste to Energy projects). The CERC, considering specifications shared by MNRE and MoUD and the norms already

specified by various State Electricity Regulatory Commissions (SERCs), determined tariff for "Refuse Derived Fuel" based "Waste to Energy" plants @ Rs. 7.90/- per unit. This was done after due stakeholder consultations and public hearing." The details, as provided, are at **Annexure-I**.

3.9 The Committee also queried about the Price at which the maximum amount of power was being traded on day to day basis. In their reply, the Ministry furnished the following information:

"During the month of December, 2015, the maximum amount of electricity traded on IEX on a single day (25.12.2015) was 111.64 MUs. On this day, the maximum volume of electricity cleared in a single time block (of fifteen minutes) is 1.37 MUs at the clearing price of Rs. 2.84.

The maximum amount of electricity traded on PXIL, on the other hand, on a single day (6.12.2015) was 0.297 MUs. The maximum volume of electricity cleared in a single time block (of fifteen minutes) on this day was 0.009 MUs at the clearing price of Rs. 3."

Details regarding prices at the Exchanges during the day, i.e. for all the days in December 2015, have been provided at **Annexure-II.**

Volume at Power Exchanges

3.10 From an insignificant volume in 2008, the traded volumes on the Power Exchanges have grown multifold in the last seven years to reach about 30 BUs in 2014-15. These volumes constitute around 3% of the total generation in the country. In terms of the short term market, the volumes at Exchanges constitute around 33% of the total traded volumes.

The average amount of electricity traded at the Indian Energy Exchange (IEX) and Power Exchange India Ltd (PXIL) on a daily basis for the period from 2009-10 to 2015-16 (April to October), as furnished by the Ministry, is given below:

VOLUME OF ELECTRICITY TRANSACTED ON THE POWER EXCHANGES				
YEAR	TOTAL VOLUME TRANSACTED IN DAM AND TAM(BUs)		AVERAGE AMOUNT OF ELECTRICITY TRADED ON A DAILY BASIS (MUs)	
	IEX	PXIL	IEX	PXIL
2009-10	6.27	0.92	17.16	2.53
2010-11	12.71	2.81	34.82	7.70
2011-12	14.41	1.13	39.48	3.11
2012-13	22.83	0.72	62.54	1.96
2013-14	29.27	1.40	80.18	3.84
2014-15	28.35	1.06	77.66	2.89
2015-16 (Apr.-Oct.)	19.74	0.53	92.23	2.50

(Source: CERC, Report on Short-term Power Market in India, 2014-15)

3.11 The percentage of electricity traded at the power exchanges out of the total electricity generation for the period from 2009-10 to 2015-16 (Apr. to Oct.) varied from 0.82% to 3.04% at IEX and from 0.08% to 0.35% at PXIL. The volume at both the power exchanges as a percentage to total electricity generation varied from 0.94% to 3.19% during the period.

The details, as furnished by the Ministry, are given below:

PERCENTAGE OF TOTAL ENERGY TRADED ON POWER EXCHANGES							
YEAR	Total Short-term Volume Transacted through PXs(BUs)		Total Volume of both power exchanges (BUs)	Total Electricity Generation (BUs)	Electricity transacted through PXs as % to Total Electricity Generation		Total Volume of both power exchanges as % to total Electricity Generation
	IEX	PXIL			IEX	PXIL	
2009-10	6.27	0.92	7.19	764.03	0.82%	0.12%	0.94%
2010-11	12.71	2.81	15.52	809.45	1.57%	0.35%	1.92%
2011-12	14.41	1.13	15.54	874.17	1.65%	0.13%	1.78%
2012-13	22.83	0.72	23.54	907.49	2.52%	0.08%	2.59%

2013-14	29.27	1.40	30.67	962.90	3.04%	0.15%	3.19%
2014-15	28.35	1.06	29.40	1045.09	2.71%	0.10%	2.81%
2015-16 Apr-Oct	19.74	0.53	20.27	652.06	3.03%	0.08%	3.11%

(Source: CERC, Report on Short-term Power Market in India, 2014-15)

3.12 The quantum of energy purchased at Power Exchanges has been segregated into the following five categories:

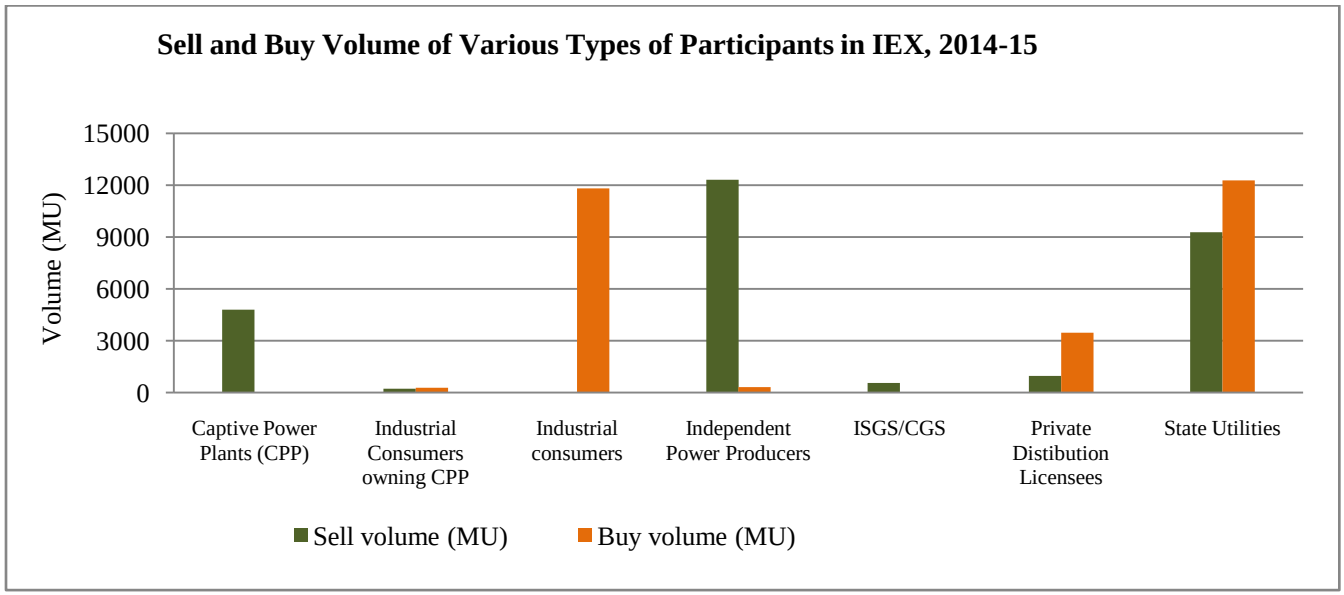
- Industrial consumers (Captive Power Plants),
- Industrial consumers,
- Independent power producers,
- Private distribution licensees and
- State utilities.

The category-wise quantum of buy-volume, as furnished by the Ministry, has been provided for the year 2014-15 below:

Category of Buyers and their buy volume at Power Exchanges, 2014-15			
Sr. No.	**Category of Buyers**	**Buy Volume at IEX (MWhr)**	**Buy Volume at PXIL (MWhr)**
1	Industrial Consumer (Captive Power Plant)	270,598.76	38,939.52
2	Industrial consumer	11,813,592.24	102,945.87
3	Independent Power Producer	306,853.02	-
4	Private Distribution Licensee	3,465,208.43	322.42
5	State Utility	12,284,460.39	198,558.13
	Total	**28,140,712.84**	**340,765.95**

3.13 The Committee were informed that during 2014-15, the major sellers of electricity at IEX were independent private producers followed by State utilities, and captive power plants, whereas major buyers of electricity at IEX were State utilities followed by industrial consumers, and private distribution licensees. Some of the Major Sellers at IEX, as submitted by the Ministry, are GOHP (H.P.), Sesa Sterlite Ltd., Jindal Power, Jindal Steel & Power Ltd., MPPMCL (MP), etc. and some of the Major buyers at IEX are Essar Steel India Ltd. (Guj.), MSEDCL GEPL (MH), UPPCL (UP), UPCL (Uttarakhand), BSPHCL (BH), etc.

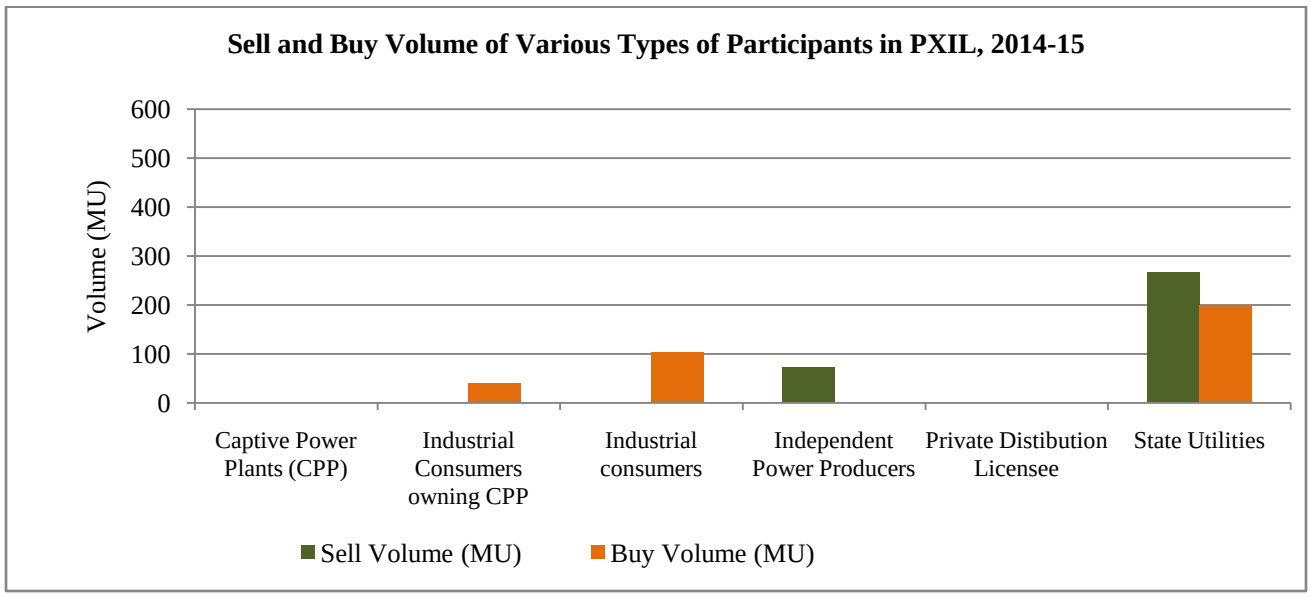
Given below is a figure showing the Sell and Buy Volume of Various Types of Participants at IEX:



3.14 The Committee were also informed that during 2014-15, the major sellers of electricity at PXIL, were State utilities followed by independent private producers, whereas major buyers of electricity at PXIL were state utilities followed by industrial consumers. At PXIL, some of the Major Sellers are NDMC (Delhi), GUVNL (Guj.), Jindal Steel Plant (CG), Sterlite Energy Ltd.

(Odisha), Gridco Ltd. (Odisha), etc. and some of the Major Buyers are UPCL (Uttarakhand), UPPCL (UP), Essar Steel India Ltd. (Guj.), Bodal Chemical Ltd. (Guj.), KSEB (Kerala), etc.

Given below is a figure showing the Sell and Buy Volume of Various Types of Participants at PXIL:



3.15 As per the information made available by CERC, the number of buyers at IEX were 1541 in 2012-13, 2024 in 2013-14, 1736 in 2014-15 and the number of buyers at PXIL were 160 in 2012-13, 105 in 2013-14 and 61 in 2014-15. The details of buyers for the last three years from 2012-13 to 2014-15 of both the power exchanges, IEX and PXIL, have been given in **Annexure-III** and **Annexure-IV,** respectively. Also, the number of sellers at IEX were 137 in 2012-13, 218 in 2013-14, 246 in 2014-15 and the number of sellers at PXIL were 36 in 2012-13, 29 in 2013-14 and 19 in 2014-15. The details of sellers who sold energy to the power exchanges, IEX and PXIL, in the last three years from 2012-13 to 2014-15 are given at **Annexure-V** and **Annexure-VI,** respectively**.**

3.16 The Committee were also informed that as per the Electricity Act 2003, electricity consumers now have the right to procure power from the supplier of their choice other than their distribution company. They can make use of the existing transmission and distribution infrastructure after paying appropriate charges determined by their respective State Electricity Regulatory Commissions (SERCs). Open Access was introduced in the Electricity Act to bring in competition into the sector, thereby benefitting the end consumer. Over the years, it has acted as a catalyst in bringing reforms into the sector by benefitting the players across the spectrum of value-chain from generators to suppliers to electricity traders to the end consumers. There are more than 3000 Open Access Consumers procuring part of their power requirements through Power Exchanges at the end of March 2015.

3.17 As per the submission of the Ministry and CERC, one of the Exchanges has control over 96% of the Power Market, while the other has control over the remaining. So, the Committee queried about this distortion of the Market and asked the Ministry as to what has been done at their end to rectify this anomaly. The Ministry, in their reply, furnished the information as under:

> "CERC evolved an enabling framework for operation of power exchanges through its Power Market Regulations, 2010. The framework at its inception addressed the issues around monopoly of a single power exchange. The relevant extracts of the Power Market Regulations, 2010, the Explanatory Memorandum and the Statement of Reasons to the said Regulations are reproduced below:-
>
> *"**CERC (Power Market) Regulations, 2010***
> *35. A Power Exchange which has less than 20 % market share for continuously two financial years falling after a period of two years of commencement of its operations shall close operations or merge with an existing Power Exchange with in a period of next six months. (For this purpose Market size is defined as the total Annual Turnover in Million Units of all contracts transacted in all the Power Exchanges in each financial year)*

Provided that this regulation shall not apply if there are only two Power Exchanges in operation."

"Explanatory Memorandum – Power Market Regulations
9. After two years of operations, any exchange with a market share less than 20 % for a continuous period of 2 years shall need to close or merge with other exchange. This will not be applicable in case there are only of two exchanges operational. The rationale behind this stipulation is to concentrate liquidity for improved pricing of contracts while at the same time avoiding monopoly of a single exchange."

*"**Statement of Objects and Reasons – CERC (Power Market) Regulations, 2010***
8.19.2. The rationale behind this provision in the regulations is to concentrate liquidity in Power Exchanges for improved pricing of standardised contracts. Numerous spot prices with low volume will provide confusing signals and not serve the intended purpose of Power Exchange providing investment signals. It shall also complicate corridor allocation process adopted by National Load Dispatch Centre (NLDC) and have a negative impact on social welfare maximisation. Sufficient care has been taken to ensure that a situation where monopoly of a single Power Exchange occur does not happen by allowing two Exchanges to always co exist…..".

The CERC issued the Second Amendment to the Open Access Regulations on 11.09.2013, wherein State Load Dispatch Centres (SLDCs) were asked to provide an exchange neutral NOC to the market participants to help creating a level playing field between the two power exchanges.

The CERC notified the Third Amendment to the Open Access Regulations on 12.05.2015 reducing the NLDC operating charges payable by the participants of power exchanges from Rs. 5000 to Rs. 2000.This was also done to create a level playing field between the two power exchanges.

In petition no. 158/MP/2013, the CERC set up an Expert Group on transmission corridor allocation methodology adopted for allocating corridor between two power exchanges.

The National Power Exchange Limited (NPEX) was accorded approval by the Commission to establish and operate a Power Exchange vide order dated 1.7.2009. Subsequently, the Commission by order dated 24.4.2012 granted permission to start operation of the Order in Petition No. 262/SM/2012 from a date to be announced by NPEX in advance under intimation to the Commission. However, this exchange did not come to fruition as the promoters decided not to seek extension of the license for operating a power exchange."

Shareholding Pattern of the Power Exchanges

3.18 Regulation 22 of the Power Market Regulations, 2010 governs the board structure of the Power Exchanges. The relevant details of the regulation are excerpted below:-

"Ownership and Governance structure of Power Exchange

(i) There shall be a clear demarcation between ownership, management / operations and participation in trading.

(ii) Independent Directors – At least one third of the members of the Board or a minimum of two directors, whichever is higher, shall be independent directors selected from a panel constituted by the Power Exchange and approved by the Commission out of which one person will have professional qualification and experience in finance. The panel shall be constituted of persons of repute and integrity from academics, professionals, industry representatives, public figures none of whom should have any interest in any Member of Power Exchange and any fiduciary relationship with any shareholder of Power Exchange

(iii) The total strength of the Board shall be in accordance with the provisions of the Companies Act 1956.

(iv) Not more than one fourth of the Board of directors shall represent Members of Power Exchange.

(v) The Board shall appoint a CEO cum Managing Director who shall be solely responsible for running the day to day operations of the Power Exchange. The Managing Director shall be a professional with adequate qualification and at least 10 years of experience in the relevant field.

(vi) The Managing Director, the Chief Executive or the Director in charge of day-today operations or any employee, of the power Exchange shall not be directly or indirectly associated with any Member of the Power Exchange or client or participant of the Power Exchange or with a holding or subsidiary company thereof…"

3.19 Regulation 19 of the Power Market Regulations, 2010 specifies the shareholding pattern of the power exchanges. It is specified therein, that any shareholder other than a member of the power exchange can have a maximum of 25% shareholding. For a member the limit has been fixed at 5%. The relevant extract is excerpted below:-

"19. Shareholding Pattern of Power Exchange

The shareholding pattern for equity holders in the Power Exchange shall be as follows:

- *Any shareholder other than a Member of the Power Exchange can have a maximum (whether directly or indirectly) of 25% shareholding in the Power Exchange.*
- *A Member of the Power Exchange can have a maximum (whether directly or indirectly) of 5 % shareholding in the Power Exchange.*
- *In total, a Power Exchange can have a maximum of 49% of its total shareholding owned by entities (whether directly or indirectly) which are Members of the Power Exchange…."*

3.20 The statement of reasons for Power Market Regulations, 2010 provides the rationale for these limits. It is reproduced below:

"8.5.2. Decision and rationale

The Commission has considered the views of all stakeholders. The Commission maintains the view that Power Exchange is market based institution and hence should be a widely held organisation. The commission is also of the view that Power Exchange should be fully demutualised and ringfenced organization and hence a power sector participant may have equity stake in the Power Exchange (as is an internationally practice) but limited to 5 % of total shareholding….

8.5.3. In view of the reasons given in the above paragraphs, the shareholding pattern in the final version of the regulations is as briefly described below:-

(i) Any shareholder (in case of a corporate this is including its subsidiaries and cross holding in other companies and associate companies) other than member of the Power Exchange can have a maximum of 25% shareholding in the Power Exchange….

(ii) A member of the Power Exchange can have maximum of 5 % shareholding in the Power Exchange……"

The CERC has fixed these limits in Power Market Regulations, 2010, after due consultation with stakeholders and conducting a public hearing.

Power Shortage in Southern India

3.21 The Committee were informed that the Power Exchanges function as a platform where Energy deficit States may improve their power availability in the short term by buying electricity from surplus States. However, it has been reported that even the synchronization of the

southern power grid to the national grid has not benefited Tamil Nadu and Kerala for power purchase from other States. The Southern States have been reeling under severe power cuts with many parts facing over 12 hours of scheduled power cuts, leading several industries to shut shop. So, the Committee queried about the reasons for the Southern Grid not becoming synchronous in the real sense and if Power Exchanges could play any role to mitigate the situation. The Ministry, in reply stated as under:

"Yes, Power Exchanges are playing a vital role in mitigating the situation. Southern Grid has been synchronized with the rest of the country on the 31st Dec 2013 with the commissioning of the 765 kV Raichur – Sholapur Ckt. 1. Subsequently, 765 kV Raichur – Sholapur Ckt. 2 was commissioned in June 2014. Thus, the Southern Grid is functioning synchronously with the rest of the country. Further strengthening of the Southern Region is being done and following transmission lines are expected in future:

1. 765 kV Angul-Srikakulam-Vemagiri D/C,
2. 765 kV Wardha-Nizamabad-Hyderabad D/C,
3. 765 kV Warora-Warangal,
4. 800 kV HVDC Raigarh-Pugalur."

"Over the past two years there has been a considerable increase in power transfer towards Southern Region due to addition of both ckts of 765 kV Raichur-Sholapur, 765 kV Pune-Sholapur S/C, 765 kV Aurangabad-Sholapur Ckt 1 & 2 and both ckts of 400 kV Kolhapur – Kudigi-Narendra D/C. The addition of these transmission lines strengthened the synchronous interconnection of Southern Region (SR) with rest of the country thereby facilitating reliable operation of single frequency National Grid. The Energy export from NEW Grid to SR grid has increased from 85 MU/day in 2014 to 115

MU/day in 2015 (30 % increase from 2014 through 2015). The Total Transfer Capability towards SR has increased from 3650 MW to 6650 MW (82 % increase from 2014 through 2015)".

3.22 It was also said that after the grid connectivity of southern region with the national grid, cheaper power will be available to the region. So, the Committee desired to know at what rate users as of now buy power from the exchanges. The Ministry, in their reply, stated as under:

"During 2015-16, the average prices in the Power Exchanges have come to around Rs. 2.80 per kWh as compared to Rs. 3.50 during 2014-15. The average prices in Southern Region (S1) witnessed a downwards trend, i.e. Rs. 5.1 per kWh during the year 2014-2015 as compared to Rs. 4 per kWh in 2015-2016. This is because of the strengthening of Inter-State Transmission System network (ISTS) towards Southern Region and increase in generation within the region, leading to easing of congestion on ISTS."

3.23 As the power exchanges are not of much use for an area which is not connected to the grid and where transmission lines are not adequately developed, so the Transmission Sector must be strengthened to mitigate the problem of Power deficit States and to help Power Exchanges to cater to the requirement of the people from all over India through Open Access or otherwise. The Committee raised this issue regarding shortage of transmission lines and the Ministry assured the Committee that the transmission planning is a continuous process which is carried out considering generation capacity addition programme and the load growth in the country. At the end of the 11^{th} Plan (i.e. March 2012), the total transmission line circuit kilometers (of 220 KV and above voltage levels) was about 257 thousand circuit kilometers and

the substation capacity was about 400,000 MVA. This transmission capacity was planned to be increased to about 360 thousand circuit kilometers and 670,000 MVA, respectively, by the end of the 12th Plan (i.e. March 2017). For the period of the 13th Plan (i.e. 2017-22), the load forecast and generation addition programme along with additional transmission system requirement are being worked out by the Central Electricity Authority (CEA) under National Electricity Plan which is being prepared in accordance with sub-section 4 of section 3 of the Electricity Act, 2003.

IV. CROSS BORDER ELECTRICITY TRADE

4.1 It has been reported that IEX has been trying to venture into foreign Markets with the short-term cross-border trading of electricity with three nations, viz. Bangladesh, Nepal and Bhutan. When the Committee desired to know about these cross border tradings, their expected size and implications these tradings may have for India, the Ministry came up with the following reply:

- "Government of India has set up an Inter-Ministerial Working Group (IMWG) to decide on the policy for transmission/supply of electricity from Nepal and Bhutan to Bangladesh through Indian Territory.
- A meeting of Inter Ministerial Working Group (IMWG) was held under the chairmanship of Secretary(Power) on 06.10.2015 to discuss transmission/supply of electricity from Nepal and Bhutan to Bangladesh through Indian Territory and to develop a draft umbrella regulatory policy guiding trans –national sale purchase of power by two countries through Indian territory.
- Subsequently, in the Committee of Secretaries (CoS) meeting held on 18.12.2015, it has been stated that the Ministry of Power may accelerate efforts for requisite regulations to facilitate surplus power transfer through Indian exchange.
- As directed by Ministry of Power, CERC initiated the regulatory process in consultation with all stakeholders, including CEA and Ministry of Power for framing draft regulation to facilitate development and regulate such cross border electricity trade.

- IEX in its petition 483/MP/2014 has provided the following expected size of trade with the neighboring countries, viz. Nepal, Bangladesh and Bhutan.
    - Out of 500 MW of inter connectivity with Bangladesh only 50 MW can flow on exchange as 450 MW is already tied up.
    - With Nepal, one line is being strengthened which can have maximum 50 MW of transaction.
    - With Bhutan, maximum 120 MW can come on exchange.
- Optimal utilization of resources is the potential gain of cross border transactions. Hydro resources of the neighbouring countries, for instance, could be optimally utilized to balance load / generation variation as also for handling variability of intermittent RE sources in India. In the context of the petition filed by IEX, the stakeholders have raised certain implementation related issues which are under consideration in the Commission."

V. RENEWABLE ENERGY CERTIFICATES

5.1 The Renewable Energy Certificate (REC) mechanism is a market based instrument to promote renewable energy and facilitate compliance of renewable purchase obligations (RPO). The developers generate revenue through sale of Renewable Power to the utilities at the pooled cost of power purchase of such utility as determined by the Appropriate Commission or to any other licensee or to an open access consumer at a mutually agreed price, or through power exchange at market determined price. The developers also generate revenue from the sale of environmental credits in the form of Renewable Energy Certificates issued to them as per the terms and conditions provided for in the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 (and amendments notified from time to time).

5.2 The Committee were informed that the following entities are involved in the REC mechanism:

- Obligated entities, such as DISCOMs, Open Access & captive users;
- Generators, that generate power from renewable sources of energy;
- State Agency, such as State Load Dispatch Centre;
- Central Agency, such as POSOCO;
- Power exchanges, where the transactions take place.

5.3 The Committee were apprised that the trading of Renewable Energy Certificates is done at Power Exchanges in the following manner-

a) The Eligible Entity shall place for dealing of renewable energy certificates, both 'Solar' and 'Non-Solar' Certificates, on any Power Exchange authorized to deal in renewable energy certificates by CERC. At present trading takes place on both the Power Exchanges.

b) The total quantity of Certificates ('Solar' and 'Non-Solar' separately) placed for dealing on the Power Exchange(s) by the eligible entity shall be less than or equal to the total quantity of valid Certificates held by the eligible entity as per the records of the Central Agency, i.e. NLDC.

c) The renewable energy certificates shall be dealt in the Power Exchange within the price band as specified by CERC from time to time. The present price band is Rs. 1500- 3300/- non-solar REC, and Rs. 2500-5800/- solar REC.

d) During the time the bidding window opens in the Power Exchange, the eligible entities shall place their offers and the buyers shall place their bids through the trading platform of the respective Power Exchanges.

e) On closure of the trading window, the Power Exchanges shall send the maximum bid volumes for each of the eligible entity, which has placed offers on that Power Exchange, to the Central Agency for verification of the quantity of valid RECs available with the concerned eligible entity for dealing on the Power Exchanges.

f) The Central Agency shall check the combined maximum bid volume in the Power Exchanges for each eligible entity against the quantity of valid RECs for that entity for both 'Solar' and 'Non-Solar' Certificates.

g) The Central Agency shall send a report to Power Exchanges confirming the availability of the valid RECs with the eligible entity.

h) In case the combined maximum bid volume placed for dealing in the Power Exchanges exceeds the quantity of valid RECs held by the eligible entity as per the records of the Central Agency, then the Central Agency shall advise the Power Exchanges to exclude such bids while working out the Market Clearing Price and the Market Clearing Volume.

i) The Power Exchanges shall work out the Market Clearing Price and the Market Clearing Volume taking into account the advice received from the Central Agency and send the final cleared trades to the Central Agency for extinguishing of the RECs sold in the records of the Central Agency.

The certificates will be extinguished by the Central Agency in the 'First-in-First-out' order.

5.4 The volumes transacted in Renewable Energy Certificates are as below.

Year	Non-Solar (Nos.)	Solar (Nos.)	Total(Nos.)
2011-12	1015274	0	1015274
2012-13	2575801	14013	2589814
2013-14	2682014	66680	2748694
2014-15	2898422	163500	3061922
Up to November 2015-16	2030068	260712	2290780

5.5 When the Committee desired to know about the quantum of Renewable Energy generated, traded and the number of Renewable Energy Certificates issued till date on these Exchanges, the Ministry furnished the following information:

"As per latest CEA Monthly Executive Summary on Power Sector:-

- Renewable energy generation in November 2015 - 4,185 MUs
- Renewable energy generation upto November 2015 (YTD) - 46,201 MUs
- As per latest information (dated 2.3.2016) of the REC Registry of India, 1,31,04,896 RECs (Solar – 7,40,328, Non-Solar – 1,23,64,568) have been traded / redeemed through power exchanges.
- As per latest information (dated 2.3.2016) of the REC Registry of India, 3,06,92,033 RECs (Solar – 40,50,877, Non-Solar – 2,66,41,156) have been issued."

5.6 It was submitted before the Committee that some States regularly fulfill their Renewable Purchase Obligation (RPO), whereas some lag behind.

A statement showing the Renewable Purchase Obligation determined by the Appropriate Commission and the status of compliance as contained in the Report No. 34 of 2015 - Performance Audit on Renewable Energy Sector in India Union Government, Ministry of New and Renewable Energy, issued by the Comptroller and Auditor General of India, is given below:

Targets for Renewable Purchase Obligation (RPO) set by the State Electricity Regulatory Commissions from 2010-11 to 2019-20

(Source: Report No. 34 of 2015 - Performance Audit on Renewable Energy Sector in India Union Government, Ministry of New and Renewable Energy, issued by the Comptroller and Auditor General of India)

(in per cent)

Sl. No.	State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
	NAPCC Target	**6.00**	**7.00**	**8.00**	**9.00**	**10.00**	**11.00**	**12.00**	**13.00**	**14.00**	**15.00**
1	Andhra Pradesh		5.00	5.00	5.00	5.00	5.00	5.00			
2	Arunachal Pradesh			4.20	5.60	7.00					
3	Assam		2.80	4.20	5.60	7.00					
4	Bihar	1.50	3.00	4.00	4.50	5.00	1.00	1.25	1.50	1.75	2.00
5	Chhattisgarh	5.00	5.25	5.75	5.75	5.75					
6	Gujarat	5.00	6.00	7.00	7.00	8.00	9.00	10.00			
7	Haryana	1.50	1.50	2.05	3.10						

8	Himachal Pradesh	10.00	10.01	10.25	10.25	10.25	11.25	12.25	13.50	14.75	16.00
9	Jammu & Kashmir		3.00	5.00	5.00	6.00	7.50	9.00			
10	Jharkhand	2.00	3.00	4.00	4.00	4.00	4.00				
11	Karnataka		7.25	7.25	7.25						
12	Kerala	3.30	3.60	3.90	4.20	4.50	4.80	5.10	5.40	5.70	6.00
13	Madhya Pradesh		2.50	4.00	5.50	7.00					
14	Maharashtra	6.00	7.00	8.00	9.00	9.00	9.00				
15	Meghalaya	0.50	0.75	1.00	1.00						
16	Mizoram	5.00	6.00	7.00							
17	Nagaland	5.00	7.00	8.00							
18	Odisha		5.00	5.50	6.00	6.50	7.00				
19	Punjab		2.40	2.90	3.50	4.00					
20	Rajasthan	8.50	6.00	7.10	8.20						
21	Tamil Nadu		9.00	9.00	9.00	11.00	11.00				
22	Uttar Pradesh	3.75	5.00	6.00	6.00						
23	Uttarakhand		4.53	5.05	6.05	7.08	8.10	9.30	11.50		
24	West Bengal				4.00	5.00	6.00	7.00	8.00		

5.7 A Table showing the Status of Renewable Purchase Obligation (RPO) compliance by all States between 2010-11 and 2013-14, is presented below:

Status of Renewable Purchase Obligation (RPO) compliance between 2010-11 and 2013-14
(Source: Report No. 34 of 2015 – Performance Audit on Renewable Energy Sector in India Union Government, Ministry of New and Renewable Energy, issued by the Comptroller and Auditor General of India)
RPO Notified / Achievement (in per cent)

Sl. No.	State	2010-11	2011-12	2012-13	2013-14
	NAPCC Target	**6.00**	**7.00**	**8.00**	**9.00**
1	Andhra Pradesh		5.00/NA	5.00/1.75	5.00/NA
2	Arunachal Pradesh			4.20/8.41	5.60/8.87
3	Assam	0/8.40	2.80/4.02	4.20/3.44	5.60/NA
4	Bihar	1.50/1.00	2.50/2.10	4.00/2.90	4.50/1.89
5	Chhattisgarh	5.00/0	5.25/2.76	5.75/2.96	6.25/NA
6	Gujarat	5.00/2.76	6.00/4.73	7.00/6.50	7.00/6.72
7	Haryana	1.50/1.06	1.50/1.07	2.05/0.97	3.10/0.94
8	Himachal Pradesh	10.00/12.00	10.01/15.73	10.25/17.26	10.25/16.69
9	Jammu & Kashmir		3.00/Nil	5.00/Nil	5.00/Nil
10	Jharkhand	2.00/0.19	3.00/0.28	4.00/0.39	4.00/0.42
11	Karnataka	0/10.70	7.25/10.73	7.25/9.93	7.25/10.97
12	Kerala	3.00/3.38	3.30/2.85	3.60/2.47	3.90/NA
13	Madhya Pradesh		2.50/NA	4.00/NA	5.50/NA
14	Maharashtra	6.00/5.77	7.00/7.15	8.00/7.05	9.00/7.66
15	Meghalaya	0.50/4.14	0.75/3.41	1.00/5.00	1.00/3.80
16	Mizoram	5.00/5.14	6.00/7.76	7.00/14.45	9.00/11.99
17	Nagaland	5.00/Nil	5.00/Nil	5.00/Nil	5.00/Nil
18	Odisha		5.00/NA	5.50/NA	6.00/NA
19	Punjab		2.40/1.69	2.90/2.59	3.50/3.08
20	Rajasthan	8.50/3.55	6.00/5.16	7.10/6.30	8.20/7.25
21	Tamil Nadu	0/17.27	9.00/20.09	9.00/26.13	9.00/20.04

22	Uttar Pradesh	3.75/4.56	5.00/6.19	6.00/4.68	6.00/4.45
23	Uttarakhand		4.53/NA	5.05/3.78	6.05/3.15
24	West Bengal		2.00/NA	3.00/1.47	4.00/2.54

5.8 A Table showing the State-wise Renewable Purchase Obligation (RPO) achievement is presented below:

State-wise Renewable Purchase Obligation (RPO) achievement
(Source: Report No. 34 of 2015 – Performance Audit on Renewable Energy Sector in India Union Government, Ministry of New and Renewable Energy, issued by the Comptroller and Auditor General of India)

Sl. No.	State	Total Electricity Purchased during 2010-14	RPO Targets for 2010-14	RPO achieved through Renewable Energy Purchase		RPO achieved through Renewable Energy Certificate mode		Total RPO Achievement	Shortfall
		(BU)	(MU)	(MU)	Percentage	(MU)	Percentage	(MU)	(MU)
1	Andhra Pradesh	76	3800	1330	100	Nil	Nil	1330	2470
2	Arunachal Pradesh	2.36	58.31	102.78	100	Nil	Nil	102.78	Nil
3	Assam	12.64	434.79	17.09	100	Nil	Nil	17.09	417.70
4	Bihar	24.21	793.32	488.72	100	Nil	Nil	488.72	304.60
5	Chhattisgarh	41.09	2266.82	1090	92.37	90	7.63	1180	1086.82
6	Gujarat	287.04	18990	8620	56.89	6530	43.11	15150	3840
7	Haryana	144.56	2981	1452	100	Nil	Nil	1452	1529
8	Himachal Pradesh	30.02	5000	4620	100	Nil	Nil	4620	380
9	Jammu & Kashmir	NA	NA	NA	NA	NA	NA	NA	NA
10	Jharkhand	39.96	1319.36	39.36	100	Nil	Nil	39.36	1280
11	Karnataka	214.70	15020	22712	100	Nil	Nil	22712	Nil
12	Kerala	45.95	1490	1320	100	Nil	Nil	1320	170
13	Madhya Pradesh	181.94	6350	2480	100	Nil	Nil	2480	3870
14	Maharashtra	373.84	28252.59	25675.09	98.86	296.49	1.14	25971.58	2281.01
15	Meghalaya	6.96	57.20	290	100	Nil	Nil	290	Nil
16	Mizoram	1.62	110.81	161.27	100	Nil	Nil	161.27	Nil
17	Nagaland	1.98	99.09	99.09	100	Nil	Nil	99.09	Nil
18	Odisha	NA	2469	1706	100	Nil	Nil	1706	763
19	Punjab	131.68	3888	2900	89	368	11	3268	620
20	Rajasthan	210.03	15621	11949	100	Nil	Nil	11949	3672
21	Tamil Nadu	203.15	13740	42359	100	Nil	Nil	42359	Nil
22	Uttar Pradesh	291.05	17738.84	15053.26	100	Nil	Nil	15053.26	2685.58
23	Uttarakhand	32.87	1714.52	1219.29	90.76	124.12	9.24	1343.41	371.11
24	West Bengal	154.69	5030.06	2536.19	99.99	2.81	0.10	2539	2491.06
	Total			148220.14	95.23	7411.42	4.77	155631.56	28231.88

5.9 On being asked by the Committee whether the Government gives any incentive to encourage States to fulfil their RPO targets and what measures are taken to boost the compliance of RPO, the Ministry, in their reply stated that:

"As per information made available by Ministry of New and Renewable Energy, on 16th March, 2015, the Ministry of Finance has released an incentive grant of around Rs. 5000 crore for incentivizing RPO compliance by way of incentive grant to the States.

Further, in order to incentivize the Distribution Companies to procure power from renewable sources of energy, suitable provisions have been made in the revised Tariff Policy notified on 28.1.2016. For this purpose, the Central Government may notify, from time to time, an appropriate bid-based tariff framework for renewable energy, allowing the tariff to be increased progressively in a back-loaded or any other manner in the public interest during the period of PPA, over the life cycle of such a generating plant. Correspondingly, the procurer of such bid-based renewable energy shall comply with the obligations for payment of tariff so determined.

In addition, for compliance of RPO by the obligated entity, penal provisions have been proposed in the proposed amendments in the Electricity Act, 2003."

"Further, the CERC has informed that the Forum of Regulators carried out a study in 2012 on "Incentive Structure for States for fulfilling Renewable Purchase Obligation Targets".

A Summary of the Recommendations of the Study is as follows:

a) National Clean Energy Fund (NCEF) should be made available for development of renewable energy and incentivizing RPO compliance in an effective manner

b) Significant portion of the Grant recommended by the Thirteenth Finance Commission should be channelized for removing barriers to RE deployment and increase RPO levels and compliance.

c) State Commission may entrust the State Agency with the responsibility to devise suitable mechanism for RPO compliance monitoring and the enforcement

d) To bring down the cost of balancing power and reduce the variability, creation of larger balancing areas should be facilitated. For this, it is important that the visibility of system operators is increased.

e) Better scheduling and forecasting procedures should be adopted. Intra-day forecasting of resource will help reduce schedule deviations and bring down the cost to the system.

f) Forecasting of resource and generation and power system management in a Renewable Energy (RE) heavy system are a key to establishment of reasonable RPO levels and effective compliance. Incentives need to be provided in this so as to send a clear signal to generators and utilities on the emphasis placed on these subjects. A separate fund can be established for creation of tools and techniques for accurate resource assessment and generation forecasting.

Incentives during the transition period would help resource deficit States to institute and comply with reasonable RPO requirements. The graded incentive scheme aimed at supporting licensees to procure RE may be more cost efficient than across the board Generation Based Incentives (GBI) for RE resources since it would raise the RE penetration levels and support superior compliance."

VI. ROLE OF REGULATORS IN EFFICIENT FUNCTIONING OF THE POWER EXCHANGES

6.1 The Electricity Act, 2003 entrusts the responsibility of development of Power Market on the appropriate commission as under:

"*The Appropriate Commission shall endeavor to promote the development of a market (including trading) in power in such manner as may be specified and shall be guided by the National Electricity Policy, referred to in Section 3 in this regard." (Section 66 of EA, 2003)*

Also, the National Electricity Policy, 2005 enjoins the Appropriate Commission to undertake consultation for development of the market and to provide regulations on Power Exchanges.

6.2 Accordingly, the CERC, vide its order dated 6.2.2007, laid down the Guidelines for Grant of permission for setting up and operation of the Power Exchanges. Further, the CERC notified the Power Market Regulations, 2010 in January 2010. These Regulations deal with the creation of a comprehensive market structure and enabling the transaction, execution and contracting of all types of possible products in the electricity markets. These regulations were amended in April 2014 providing regulations on Qualifications and Disqualifications for appointment of Director in the Board of Power Exchange.

6.3 The Committee were informed that the CERC, through its regulations, specified:

(i) Norms for net worth requirement;

(ii) Shareholding criteria;

(iii) Norm for composition of Board of Directors;

(iv) Specification requirement for contracts including Price discovery mechanism;

(v) Risk Management Mechanism requirement;

(vi) Framework for Market Oversight and Surveillance.

6.4 On being queried by the Committee about the steps that the CERC have been taking, from time to time, to ensure proper and efficient functioning of the Power Exchanges, the following information was furnished by the Ministry:

"The CERC has taken a number of initiatives to strengthen the power markets in India.

- CERC regulates the power exchanges through its Power Market Regulations, 2010. The regulations are extended to the following kinds of contracts:
    1. Day Ahead Markets
    2. Term Ahead Markets
        a. Weekly Contracts
        b. Intra Day Contracts
        c. Day Ahead Contingency Contracts
        d. Daily Contracts / Any Day Contracts
    3. Renewable Energy Certificates.
- The above mentioned regulations have ensured that the market functions in a fair and transparent manner. The market intermediaries like electricity traders, market infrastructure like power exchanges are regulated through these regulations. The market rules, risk management are defined through these regulations. A well functioning market ensures that the confidence of participants

in market is built. Short term power trading has helped in resource optimization by facilitating the transfer of surplus power to deficit regions in the country.

- In all, the CERC has notified a series of enabling Regulations as per the Electricity Act, 2003 for development of power market and promote power trading:
    - Terms and Conditions for Trading License Regulations, 2009,
    - Trading Margin Regulations, 2010,
    - Power Market Regulations, 2010,
    - Open Access Regulations, 2008,
    - Grant of Connectivity, Long-Term Access and Medium-Term Open Access in Inter-State Transmission on 7th August 2009 separated connectivity from open access,
    - Sharing of Inter-State Transmission Charges and Losses Regulations, 2010, and
    - IEGC & Deviation Settlement Mechanism Regulations.

- Absence of market access for buyers and sellers of electricity, evacuation infrastructure for seamless flow of electricity, safe and secure operation of the grid were some of the major bottlenecks that were hindering growth of the electricity sector. The CERC has taken initiatives to address these and related issues through various Regulations. Open access has helped make the market more competitive and has provided choice to Discoms as well as open access consumers. Over 3000 open access consumers are buying power through Power Exchanges.

- Short-term open access in transmission has been in place for the last many years. The CERC has provided for deemed concurrence of SLDCs for open access if their decision is not given within a specified timeframe.
- CERC has notified regulations for Connectivity, Medium-term Open Access and Long-term access.
- The Regulations of "Grant of Connectivity, Long-Term Access and Medium-Term Open Access in inter-State Transmission" aim at providing transmission products of different varieties, standardization of procedures, defining timelines and ensuring a level-playing field among different categories of market players. With Regulations on Medium-term open access, transmission corridors can be availed for a period of three months to three years.
- **Deviation Settlement Mechanism:**

  CERC introduced Grid Code and Deviation Settlement Mechanism Regulations for maintaining grid discipline measure. The Commission's initiatives in regard to Grid Discipline, DSM mechanism and Grid Security have resulted in improved reliability of power supply. The frequency norms have been tightened over the period, which has resulted in marked improvement in grid frequency over the years.
- **Ancillary Services:**

  The CERC notified regulations for ancillary services on 13.08.2015 called (Ancillary Services Operations) Regulations, 2015. Ancillary Services are support services which are required for improving and enhancing the reliability and security of the electrical power system.

- **Aggregate Demand and Supply Day Ahead curves by Power Exchanges**

  The display of aggregate demand and supply curve for day ahead markets on the website of the power exchanges is a positive step towards development of power markets. This has significantly contributed towards information dissemination, bring transparency in the markets and help market participants to take informed price decisions.

- The CERC, vide order dated 15.7.2015, directed the Power Exchanges to operate the market on 24x7 basis. The market became operational on 20.7.2015.

- In a separate development, the CERC, taking cognizance of the orders of the Securities & Exchange Board of India and Forward Markets Commission which declared Financial Technologies India Ltd ('FTIL') as 'not fit and proper', vide order dated 13.5.2014, directed IEX to ensure that FTIL divests its entire shareholding from IEX. FTIL challenged the decision in Hon'ble Appellate Tribunal for Electricity which affirmed the decision of the CERC vide order dated 4.2.2015. Later the CERC was, *inter alia,* informed that due to non-execution of certain conditions, the Share Purchase Agreement could not be executed. The CERC, vide order dated 26.6.2015, directed FTIL to transfer its entire shareholding in Trust and Demat Account. FTIL challenged CERC's order dated 26.6.2015 in Hon'ble Supreme Court which vide order dated 17.8.2015 directed FTIL to put its entire shareholding in IEX in an escrow account with Axis Bank and directed that FTIL will not be entitled to any voting rights and corporate benefits.

- IEX, vide its affidavit dated 27.11.2015, informed that FTIL, vide its letter dated 19.11.2015, has informed that it has completed the sale of its 25.64% stake in IEX on fully diluted basis.
- The CERC, in parallel, has initiated process to review the power exchanges. The purpose of the review is to check overall regulatory compliance to the relevant Regulations, the robustness of operational processes, the control and checks placed by the power exchanges to ensure business continuity, safeguarding the public interest and absence of any untoward systemic risk. In this regard, the CERC has assigned the review of IEX and PXIL to M/s Deloitte and M/s KPMG respectively. Both the reviews are under progress.
- The CERC has also initiated some Governance Control Mechanisms at Power Exchanges, like:
    - **Risk Management Committee** - This Committee is headed by an Independent Director and it reports to the CERC every six months.
    - **Market Surveillance Committee**
    - **Annual IT System Audit for Data Security, Data Integrity and Operational Efficiency.**
    - **Annual Report along with Audited Balance Sheets** - This Report is submitted to the CERC by 30th September every year.
    - **Monthly Report on Data on Prices and Volumes.**
    - **Review of Power Exchanges has been initiated -** Reports of Deloitte (IEX) and KPMG (PXIL) are awaited.

- The power exchanges have been running for more than seven years now. One of the most important aspects of the market institutions is their transparency and credibility. These two factors are very important for ensuring the future growth of power exchanges as well. Therefore, the CERC will review the experiences and learning of the last seven years and ensure that greater transparency is brought in the running of power exchanges by ensuring stricter compliance with the Power Market Regulations. To further strengthen the functioning of the power exchanges the CERC is planning to conduct periodic reviews of the power exchanges.
- The Government of India has permitted Foreign Investment up to 49% in Power Exchanges subject to Foreign Direct Investment (FDI) limit of 26% and Foreign Institutional Investor Investment (FII) limit of 23% of the paid up capital.
- One of the many ways of bringing transparency in market institutions is through competition. Healthy competition between power exchanges will be very useful to the participants and the power sector. Therefore, one of the goals of the CERC has been and will continue to be to promote healthy competition in the power markets space."

VII. CHALLENGES TO FUTURE GROWTH OF THE POWER MARKET

7.1 Certain challenges to future growth of power markets in India are enumerated below:

a) Poor health of DISCOMs:

The poor financial health of India's power distribution companies (DISCOMs) is deemed to be the weakest link in the Indian power sector.

b) Open Access:

The Challenges faced to implement Open Access include

- High level of cross subsidy surcharge,
- Delay in granting open access,
- Transmission constraints and congestion,
- Transmission losses.

c) Limit on number of days for contract design in trading of electricity contracts

Currently Power exchanges are allowed to offer delivery contracts upto 11 days only.

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Part – II

Observations/ Recommendations of the Committee

A). INTRODUCTORY

Need for the Power Exchanges

1. The Committee note that the Energy Sector in the country is beset with multiple problems varying from disparity among electricity surplus-deficit regions, demand-supply mismatch, varied tariff for diverse nature of consumers coming from different categories, etc. To bring in some sort of uniformity and also for ensuring availability of electricity on demand at competitive price, it was felt that there should be some mechanism available to the stake holders of the power sector which would adequately cater to the requirements of persons/agencies concerned. In line with this, the Electricity Act, 2003 introduced the concept of the Power Market for the electricity sector. The appropriate Commission (Regulatory Commission) was entrusted with the responsibility of development of the Power Market. The primary objective of the Act was to promote inter-State and intra-State power trading within the country and ensuring the development of a competitive market with efficiency and economy, while attracting new investments. Consequently, the Power Exchanges came into being and commenced their operations in the year 2008. However, the experience of the performance of the Power Exchanges in the country since then calls for proper scrutiny and appropriate modifications. It has neither revolutionized or galvanized the sector, nor has there

been any indication that the Power Exchanges will usher in an era of competition, efficiency and growth of the Power Market. **The Committee, therefore, recommend that:**

(i) The concept of the Power Exchanges having a lead role in the development of the robust power market needs to be revisited.

(ii) The experience gained from the functioning of the Power Exchanges hitherto should be analyzed in an objective manner to assess as to how the Power Exchanges have helped in the development of the market.

(iii) **The provisions of the Electricity Act, 2003 regarding the Power Market also require to be reviewed in the proper perspective.**

Competition in the Power Market

2. The Committee were informed that one of the objectives behind the setting up of the Power Exchanges was to promote competition in the power market. The Electricity Act, 2003 envisages development of a competitive power market for promoting efficiency, economy and for mobilization of new investments in the Power Sector. However, the Committee note that there are only two Power Exchanges in the country of which one has monopoly in the Power Trading, which according to the Committee, is not in the interest of the sector. 96 per cent of the Power Market is owned by one Exchange i.e. IEX, and the owner of this very Exchange has been debarred from the Commodity Exchanges. This is undoubtedly a very anomalous situation as the Exchange against which action has to be taken is, in fact, running the whole Power Market.

The Committee find that the objective of ensuring competition in the Power Market has not been followed scrupulously. Rather, consciously or otherwise, one Exchange has been allowed to monopolize the Market. This has led to perception that the Regulations, Contracts and other Guidelines have been tailor-made to suit the requirements of one Power Exchange.

With a view to addressing the need for elimination of this anomaly in the Power Market which is not conducive to the concept of competitive economy, **the Committee recommend that:**

(i) The Ministry and the CERC must come up with clear and effective Guidelines so as to ensure healthy competition in the Power Market and also to eliminate the monopoly of one Power Exchange so that the diminishing trust of the stakeholders in the system can be restored.

(ii) The Ministry should work out an Action Plan on setting up of the Power Exchanges in every zone (North Zone, South Zone, East Zone, West Zone, Central Zone and North East Zone) of India, to facilitate competition in the Market which will benefit the consumer.

3. The Committee observe that the Power Exchanges are an online platform that help generators and consumers to come together and discover prices of electricity, based on the demand-supply mechanism. It also fulfills the diverse needs of electricity consumers in the country. Large consumers with a requirement of 1 MW and above are primarily served by the Power Exchanges for buying electricity. The Power Market is now moving from a regulated one to a market driven regime and hence more and more buyers and sellers are opting to trade electricity through these Exchanges. However, the existence of only two Power Exchanges has

been restricting the effective functioning of the sector. The monopoly of one Exchange has further eroded the spirit of the Electricity Act, 2003 and is impinging upon hassle-free trading activities in the electricity market. This has hampered alternative mechanisms to evolve and hindered further improvement in the performance of the Exchanges. It has also led to problems of power liquidity, non-transparent peak management, under-utilization of transmission capacity and optimal functioning of the market. **The Committee, therefore, recommend that:**

(i) Power Exchanges need to be made effective paving the way for a level playing field among themselves.

(ii) Power liquidity in the market should be in the public domain, leading to transparency.

(iii) Peak management of power should be overhauled and streamlined in an objective manner.

(iv) **There should be real time declaration of transmission capacity so as to minimize any manipulation.**

Short Term Contracts

4. The Committee note that the Power Market is largely dominated by long-term power purchase agreements. However, these long-term contracts have been found to create problem of peak demand as either the buyer is stuck with excess capacity or there is a shortfall in supply. Besides, the storage capacity of electricity is very limited, adding to the problem. To address these shortcomings of the Power Market, there is a need to emphasize short-term and Day Ahead Markets. Before the Power Exchanges, short-term contracts were driven by either

direct contracts between parties or through power traders. The Exchanges have restructured the unorganized short-term market, especially Day Ahead Contracts. The new market structure that has evolved over the last few years provides distribution utilities with avenues to optimize their power purchase portfolio and reduce overall power purchase cost. This has brought in real time competition and helped the Power Market in balancing its sale and purchases. However, a lot more needs to be done so as to instill confidence in the fair functioning of the Power Exchanges. **The Committee, therefore, recommend that:**

(i) A mechanism should be evolved to ensure that electricity trading at the Power Exchanges is being done in a proper and effective manner.

(ii) The short-term contracts need to be redefined so as to make them fit for contracts other than Day Ahead Market.

(iii) The bulk purchasers of power, i.e., distribution utilities should have some say in the wheeling of the Powers Exchanges.

B). ROLE OF THE POWER EXCHANGES

5. The Committee note that the Power Exchanges were set up to mitigate the volatility of power supply and to facilitate the flow of power from surplus to deficit regions. An equilibrium in pricing as well as demand/supply with low transaction cost and efficiency gains is to be maintained by the Power Exchanges. The Central Electricity Regulatory Commission had notified the Power Market Regulations 2010, creating a comprehensive market structure wherein inclusion of all types of products in electricity market has been ensured. The objectives of the Regulations are to ensure fair, neutral, efficient and robust price discovery, provide

extensive and quick price dissemination, design standardized contracts and work towards increasing liquidity in such contracts. The primary role of the Power Exchange is to fill the gap in the demand/supply of electricity through trading in the Day Ahead Market. Price discovery is done on the basis of demand and supply bids submitted by participants. In the Day Ahead Market, prices are discovered for every 15 minutes for next day delivery and in case of congestion, Market Splitting Mechanism is adopted. The Committee find that although short-term electricity demands are being met through the Power Exchanges in a structured manner, yet there are scope for human intervention and manipulation. Availability of transmission corridors, real time declaration of transmission capacity, availability of liquidity in the Power Exchanges are some of the areas which indicate the possibility of scope for preferences and choices in the Power Exchanges. **The Committee, therefore, recommend that:**

(i) Availability of transmission corridor should be notified in advance to make power trading more meaningful.

(ii) Efforts should be made to indicate a timeline to ensure that electricity traded will be transmitted within the given time.

(iii) The Price Discovery Mechanism should be streamlined in such a way that there is no scope for any extraneous intervention.

6. The Committee note that functions of the Power Exchanges, among others, include :

(i) Providing fair, transparent and neutral platform for trading of electricity;

(ii) Matching algorithm on the principle of social welfare maximization;

(iii) Scheduling power through merit order dispatch across the country;

(iv) Splitting of market to alleviate congestion for delivery of power;

(v) Providing access to smaller consumers located in remote corners;

(vi) Having provisions of clearing and settlement mechanism;

(vii) Round the clock access with introduction of contracts which operate as close as 3 hours to the actual delivery;

(viii) Monthly operation of renewable energy certificate market;

(ix) Information dissemination regarding prices discovered for the next day;

(x) Providing pan India electronic platform for anonymous bids by buyers and sellers;

(xi) Portfolio optimisation by distribution utilities;

(xii) Facilitating open access as envisaged in the Electricity Act, 2003;

(xiii) Ensuring a robust payment security mechanism.

The functions are varied and are meant for development of fair and transparent system. However, it has also led to various problems which are inherent and related to the working of the Power Exchanges. The temporal nature of prices, seasonality of supply and demand dynamics, inadequate transmission network, scope of participant's ability to influence prices, etc. have also been brought to the fore which require immediate remedial attention. **The Committee, therefore, recommend that:**

(i) The areas of functioning of the Power Exchanges need to be safeguarded from external interventions.

(ii) Functioning of the Power Exchanges should be thoroughly reviewed.

(iii) Clearing and settlement mechanism needs to be more simple and transparent.

C). PERFORMANCE OF THE POWER EXCHANGES

7. The Committee note that the Power Exchanges offer limited portfolios in the form of Day Ahead Market, Term Ahead Market, Renewable Energy Certificates, etc. Of this, the Day Ahead Market in electricity trading is a vital component and most of the trading revolves around this portfolio. It consists of round the clock, 15 minutes, block-wise, bidding for the next day and the trading is done on all days, irrespective of holidays.

The Term Ahead Market includes products for delivery of electricity for duration upto 11 days, and enables participants to purchase electricity for the same day through intra-day contracts. There is also a provision of Day Ahead Contingency Contract in which trading for a day before delivery after the Day Ahead Market auction is done. In daily contracts, trading upto one week in advance is done for any calendar day. The Committee find that there is some overlapping in the Day Ahead Market and Day Ahead Contingency Contracts. Similarly, daily contracts and weekly contracts are also on the same footing, as the first contract allows trading upto one week in advance, while the weekly contracts goes upto 11 days in advance. The Committee feel that these contracts should have clear and identifiable distinctions as it is difficult to ascertain and comprehend as to how trading in Day Ahead Market is different from Day Ahead Contingency Contract, more so when the bidding is done every 15 minutes in the Day Ahead Market. For any contingency, intra-day contracts can be taken recourse to. Similarly, daily and weekly contracts can also be seen to be overlapping; there is scope for some improvement as there is hardly any justification for having different portfolios for trading upto a week and upto 11 days. Moreover, no figures have been given regarding the volume of

electricity traded under these products separately. **The Committee, therefore, recommend that:**

(i) The portfolios for trading at the Power Exchanges should be devised in such a way so as to minimize the scope for manipulation and overlapping.

(ii) Day Ahead Market and Day Ahead Contingency Contract need to be synchronized for better functioning of the Power Exchanges or the conditions for the operation of Contingency Contracts should be spelt out clearly.

(iii) **Similarly, daily and weekly contracts should be reviewed, and, if needed, conjoined for better and efficient functioning of the Exchanges.**

8. The Committee find that the volume contracted on the Power Exchange platform through Day Ahead Market constitutes about 95 per cent of the electricity traded, while the Term Ahead Market constitutes rest of the 5 per cent of the electricity traded at the Power Exchanges. The Term Ahead Market consists of contracts which are Intra-Day Contract, Day Ahead Contingency Contract, Daily Contracts and Weekly Contracts. The Committee also find that there has been a consistent increase in the trading of electricity under the Day Ahead Market since 2009-10, except for the year 2014-15. Also, this is the portfolio which has the most liquid product. The Term Ahead Market, though increasing, is not so consistent. While there has been increase in the trading volume of electricity at the Power Exchanges, yet it has been only 3.11 % of the total generation of electricity, which speaks about the functioning and performance of the Power Exchanges. Although there has been long-term PPAs, the DISCOMs

have been buying electricity through the Power Exchanges to meet their requirements. The Committee note that the functioning of the Power Exchanges is still not very transparent and lacks promptness in delivery. **The Committee, therefore, recommend that:**

(i) Reasons as to why the portfolio under the Term Ahead Market is not getting appropriate response should be identified and measures put in place to improve trading through this portfolio.

(ii) **Steps should be taken to popularize the concept of the Power Exchanges so as to make people aware about their role and usefulness in making electricity rates more competitive and transmission efficient.**

Price Discovery Mechanism

9. The Committee note that the Price Discovery Mechanism for the Day Ahead Market is governed by Regulation 11 of the Power Market Regulations 2010. The Regulation provides for the economic principle of social welfare maximization and to create buyer and seller surplus. It is determined by the Price Discovery Mechanism in which the buyers and sellers at the Power Exchanges have to pay for purchasing or for selling electricity in a specific product category. Price discovery in the context of the Day Ahead Market is done by auction for all the 24 hours which is sub-divided into 15 minutes contracts. It allows simultaneous buy and sell bids and demand-supply curves are formed. The intersection of the two curves is the price for the market which is referred to as the Market Clearing Price. Afterwards, the bids matched are included in the day ahead schedules. Buy trades are settled at below the quoted price and sell trades are settled at above the quoted prices ensuring maximum benefits to both buyers and sellers of electricity. It has also been informed that there is complete anonymity of the bids

between members. The congestion management is done through market splitting and financial settlement/ clearing is done by the Exchanges. The Committee find that there is no clarity and transparency with regard to formation of curves; besides it is not known as to what principle is adopted for this when there are multiple buyers and sellers. In what manner will the prior knowledge of quoted price for buying and selling impact the curve making process? The Committee observe that as per the current practice, the Power Exchanges receive Buy Bids and Sell Bids and follow the double sided closed bidding process. As part of the process, the Power Exchanges process the bids for Day-Ahead transactions at the designated time, through a specific algorithm to arrive at Market Clearing Volume (MCV) and Market Clearing Price (MCP). Subsequently, the availability of transmission corridor is verified and bids are re-run in case of congestion to determine market splitting as per requirement and then the final Market Clearing Volume and Market Clearing Price for the surplus and the deficit zones are arrived at separately. The information about the availability of transmission corridor being not known, the bidders are unable to take well-informed decisions before placing their bids. Further, the stakeholders have complained about lack of transparency in the process. Quoting of different prices for trading becomes irrelevant after the price discovery through curve formation which, besides being non-transparent also creates some scope for genuine apprehensions. The Committee are not against the Price Discovery Mechanism, per se, but are of the considered view that the process involved requires improvement.

Therefore, in order to make the bidding process more transparent and to avoid human intervention at multiple points, **the Committee recommend that**:

(i) The Price Discovery Mechanism should be an open ended process.

(ii) The process of curve formation should be brought within the public domain.

(iii) Some alternative mechanism for discovery of prices should be considered which is holistic in nature.

(iv) The Ministry of Power should expeditiously look into the expansion of transmission network and augmenting transmission capacity/transformation capability, so that transmission congestion and resultant market splitting are avoided.

(v) POSOCO/NLDC may be directed to declare the availability of transmission corridor in advance, to enable more informed decision making and robust price discovery in the Power Exchanges.

(vi) The Price Discovery Mechanism needs to be verified to make sure that matching of bids and the resultant prices discovered are fair and not manipulated. While stringent regulatory oversight is the need of the hour, one alternative is to assign the responsibility of price discovery to a neutral Third Party.

(vii) The Third Party, before initiating the bid process, should consider the availability of transmission corridor and then run the bids through the matching engine to arrive at MCV and MCP. The structure, functional responsibilities, over-sight mechanism, etc. for the Third Party service provider may be decided by the CERC.

(viii) **Such an arrangement would enable greater social welfare maximization as the number of bids for price matching will increase (as a result of combining the bids of all the Power Exchanges). This will also encourage establishment of multiple the Power Exchanges and bring in more competition in this segment of the Power Market. The Power exchanges will then compete, based on the services they provide.**

Shareholding Pattern

10. The Committee note that Regulation 22 of the Power Market Regulations, 2010 govern the broad structure of the Power Exchanges and Regulation 19 of the Power Market Regulations, 2010 specifies the share holding pattern of the Power Exchanges. Regulation 19 notes that any shareholder other than a member of the Power Exchanges can have a maximum of 25 per cent share holding; for a member, the limit has been fixed at 5 per cent. In total, a Power Exchange can have a maximum of 49 per cent of its total shareholding owned by entities (whether directly or indirectly) which are members of the Power Exchanges. The reason given for share holding pattern is that the Power Exchange should be a demutualised and ring fenced organization and hence a power sector participant may have the stake in the power sector only upto 5 per cent of the total share holding. The Committee find that despite precautions, the Regulations for share holding pattern of the Power Exchange provide an opportunity for control of the Exchanges and have led to their mutualisation. The over-bearing presence of one exchange in the electricity sector and its complete command and control exemplifies that the rationale behind the

Regulations for share holding pattern of the Power Exchange did not deliver the desired results. **The Committee, therefore, recommend that:**

(i) Regulation 19 of the Power Market Regulations, 2010 should be revised to find out as to why it has failed in its objective.

(ii) Share holding pattern of the Power Exchanges need to be made wide ranging and demutualised with the involvement of stake holders of every segment of the electricity sector.

D). CROSS BORDER ELECTRICITY TRADE

11. The Committee note that cross border trading of electricity has now become a reality in view of cooperation in the sector with neighboring countries like Bangladesh, Nepal and Bhutan. About the expected size and implications, and how these tradings may help India, the Committee have been apprised that out of 500 MW of inter-connectivity with Bangladesh, 50 MW can flow on the Exchanges. With Nepal, one transmission line is being strengthened which can have a maximum of 50 MW of transaction while with Bhutan a maximum of 120 MW can come through the Exchanges. It has also been reported that optimal utilization of resources is the potential gain of cross border transactions. Hydro resources of the neighboring country could be utilized to balance load/generation variations and also for handling intermittent renewable energy sources of the country. The Committee have been informed that trade in electricity can help bring down energy prices, mitigate power shocks, relieve shortages, facilitate decarbonization and provide incentives for market extension and integration. Regions with low cost generation resources could become net exporters of power, while electricity customers in high cost areas could benefit from cheaper imports. The Committee note that

Cross Border Trade may provide an emergency back-up for the existing system during shortages or plant outages and may also facilitate developing countries to opt for more Renewable Energy. **Therefore, the Committee recommend that:**

(i) India should play a leading role in facilitation of Cross Border Electricity Trade among its neighbours, without compromising on the Energy Needs of its own people, and should ensure that such a system does not worsen initial distortions in regional markets.

(ii) The Ministry and the CERC must formulate policies and regulations related to pricing of Electricity as a commodity for transmission, in coordination and harmonization with the neighbouring countries as different countries follow different regulatory practices which lead to difference in electricity pricing in the Indian Subcontinent.

(iii) The pricing of electricity coming from across the border should also be congenial and amenable to our market.

E). RENEWABLE ENERGY CERTIFICATES

12. The Committee note that trading of Renewable Energy Certificate has been introduced with a view to ensuring the fulfillment of RPO by the DISCOMs and State utilities. However, the mechanism adopted to achieve the objective is not transparent. It has been stated that the total quantity of certificates (solar and non-solar separately) placed for dealing at the Power Exchanges by the eligible entity shall be less than or equal to the total quantity of valid certificates held by eligible entity as per the records of the central agency, i.e., the National

Load Dispatch Centre, and will be dealt with by the Power Exchanges within the price band specified by the CERC from time to time. It is done through bidding; the eligible entities place their offers and the buyers shall place their bids through the trading platform of the respective Power Exchange. Thereafter, the Power Exchange shall send the maximum bid volume for each of the eligible entity which has placed offer on that Exchange to the central agency for verification of the quantity of valid REC available with the eligible entity concerned. The central agency then check the combined maximum bid volume in the Power Exchange for each eligible entity against the quantity of valid RECs for that entity and thereafter send a report to the Power Exchange confirming the availability of valid REC with the eligible entity. Market Clearing Price and Market Clearing Volume are worked out taking into account the advice from the central agency and then the final clear trades are sent to the central agency for extinguishing of RECs sold in the records of the central agency. The Committee find that although the process of trading in REC appear to be transparent, yet there is scope for vested interventions, as RPO is decided by Regulatory Commissions and are to be complied with by the DISCOMs. Ensuring compliance is the responsibility of the regulatory bodies. The availability of certificates is ascertained only after the receipt of the bids. This system need to be reviewed particularly in the context that this mechanism has not yielded the desired results and to examine whether this system is at all required to meet our renewable commitments. It is nothing but a process involving exchange of money to fulfill the commitment, and to achieve this, having the involvement of multiple agencies like CERC, NLDC, power exchanges etc. does not appear to be logical. Can there not be some price adjustment mechanism without the involvement of multiple agencies? After all, the target of this entire process is achieved only through the

money changing hands for the intended purpose. **The Committee, therefore, recommend that:**

(i) To meet the RPO, some alternative mechanism should be explored immediately without involving RECs.

(ii) If the current system is continued, then it should be ensured that it functions with integrity in an open manner. There should be no scope for manipulations in the trading of RECs and the involvement of agencies should be minimized to the bare minimum.

13. The developers generate revenue through sale of Renewable Power to the utilities at the pooled cost of power purchase of such utility as determined by the Appropriate Commission or to any other licensee or to an open access consumer at a mutually agreed price, or through the power exchange at market determined price. The developers also generate revenue from the sale of environmental credits in the form of Renewable Energy Certificates issued to them as per the terms and conditions provided for in the Central Electricity Regulatory Commission (Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) Regulations, 2010 (and amendments notified from time to time). The Committee were informed that Obligated entities such as DISCOMs; Open Access & captive users; Generators, that generate power from renewable sources of energy; State Agency, such as State Load Dispatch Centre; Central Agency, such as POSOCO; and the Power exchanges, where the transactions take place are involved in the REC mechanism. However, the Committee note that most of the States are not enthusiastic about meeting their Renewable Purchase Obligations. As per data provided by the Ministry, while the North-Eastern

States like Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, etc. and Tamil Nadu and Karnataka have achieved their Renewable Energy Targets, other States have not been able to comply fully with their Renewable Purchase Obligations. The Committee were also informed that on 16th March, 2015, the Ministry of Finance had released an incentive grant of around Rs. 5000 crores for incentivizing RPO compliance to the States. Despite such incentives, it seems that States are not willing to comply with their Renewable Purchase Obligations which *prima-facie* points to a systemic flaw in the working of the concept of Renewable Energy Obligations. Keeping in view the importance of Renewable Energy and the utmost need to increase the share of Renewable Energy in India's Energy mix, **the Committee recommend that:**

(i) The Ministry should devise some awareness programme to encourage States to fulfil their RPO targets and help them to comply with reasonable RPO requirements so as to enable the country to meet International Commitments.

(ii) If need be, for ensuring stricter compliance with the Power Market Regulations, the Ministry may come up with some Penal Provisions for non-complying States so that such States may fall in line and make every effort to fulfill their Renewable Energy Obligations.

(iii) Reasons should also be analyzed as to why the incentive scheme of the Government has not been successful in getting proper response from the States.

F). ROLE OF REGULATORS

14. The Committee note that the regulators have been entrusted with the responsibility of development of the Power Market as laid down in the Electricity Act which specifies that the appropriate Commission shall endeavour to promote the development of a market (including trading) in power in such a manner as may be specified, and shall be guided by the National Electricity Policy. The National Policy enjoins upon the appropriate Commission to undertake consultation for the development of market and to provide regulation for the Power Exchanges. Accordingly, the Commission has taken a series of steps, including issuance of guidelines and notification of market regulations. These regulations also provide for qualification and disqualification for the appointment of Director in the Board of a Power Exchange. It *inter alia* includes Risk Management Mechanism Requirement and framework for market oversight and surveillance. The regulations of the regulator are extended to Day Ahead Markets, Term Ahead Markets, Renewable Energy Certificates, etc. The Committee has been apprised that these regulations have ensured that the market functions in a fair and transparent manner. The market intermediaries like electricity traders and market infrastructure like the power exchanges are regulated through these regulations. In addition, the CERC has notified a series of enabling regulations for the development of the Power Market and for promoting power trading. The Committee have also been apprised that absence of market access for buyers and sellers of electricity, evacuation infrastructure for seamless flow of electricity, safe and secure operation of the grid are some of the major bottlenecks that are hindering the growth of the electricity sector. The Committee find that despite wide ranging regulations in this regard, the problems afflicting the sector are very evident. Inaccessibility to the market for buyers and

sellers, evacuation inadequacy, etc., are not insurmountable problems. If this is hampering the growth of the market, then the regulations of the CERC seems to have failed in achieving the desired objective. **The Committee, therefore, recommend that:**

(i) It should be ascertained as to why the regulations of the CERC have not yielded the desired results and whether these regulations are conducive for the development of the market.

(ii) In what manner the sector can be eased from over regulations, and it is left to develop on its intrinsic strength.

15 The Committee note that regulations of grant of connectivity, long-term excess and mid-term open excess in inter-State transmission aim at providing transmission products of different varieties, standardization of procedures, defining timelines and ensure level playing field among different categories of market players. CERC has also provided for deemed concurrence of SLDC for open excess if their decision is not given within a specified time frame. Grid code and deviation settlement mechanism regulations are also there for maintaining grid discipline. The Committee have been apprised that the Commission's initiative in regard to grid discipline, deviation settlement mechanism and grid security has resulted in improved reliability of power supply. However, close observance of these factors also lead to the conclusion that denial of permission by the State Load Despatch Centers, delay in the name of grid discipline and non-transparent settlement mechanism have led to manipulation of the activities. **The Committee, therefore, recommend that:**

(i) The necessity of prior permission from State Load Despatch Centre should be reconsidered and done away with.

(ii) It should be ensured that no malpractices is being resorted to in the garb of grid discipline.

(iii) Deviation Settlement Mechanism should be open and transparent.

16 The Committee note that there is an over-bearing presence of the Central Electricity Regulatory Commission in the electricity sector to regulate and promote it. In pursuance of its duties, the Commission has framed guidelines, issued regulations, and formed committees to oversee the sector. CERC has also initiated some governance control mechanism at power exchanges. This is done through Risk Management Committee, Market Surveillance Committee, Annual IT System Audit for Data Security, Data Integrity and Operational Efficiency, Annual Report along with Audited Balance Sheet, Monthly Report on Data on Prices and Volumes, and Reviewing of the Power Exchanges, etc. The Committee also find that all functions, varying from framing of regulations, their execution, amendments and dispute resolutions, revolve around the regulator. It has appropriated functions which should have been divided and delegated to other bodies for fairness and transparency in the sector. It has assumed the role of Judge, Jury and Executioner and in such a situation it is but obvious that fairness and objectivity can be compromised. Execution of the regulations and dispute resolutions should have been with different entities to make this sector competitive and transparent. **The Committee, therefore, recommend that:**

(i) Role and responsibilities of CERC should be reviewed thoroughly to make the system at the Power Exchanges fair and objective.

(ii) The functions of execution of regulations and dispute resolutions should be assigned to other bodies as the concentration of these powers in one

entity compromises the principle of division of responsibilities for efficient and transparent functioning.

(iii) If need be, the CERC itself may be sub-divided and each individual unit may be made autonomous for due discharge of its differentiated responsibilities.

17 The Committee observe that the determination of tariff by the regulator has not helped the market in its proper growth. The Committee were apprised that the regulator has fixed the tariff at Rs. 7.90 which is not compatible with the concept of open and competitive economy and the Committee find no rationale behind fixation of tariff by the regulator. When asked about it, the Committee was informed that Section 62 of the Electricity Act provides for determination of tariff by the Electricity Regulatory Commission. Further, as per Section 63 of the Act, the appropriate Commission shall adopt the tariff if such tariff is determined through a transparent process of bidding. The Electricity Act, 2003 does not provide for determination of tariff for short-term power as it varies from the tariff determined under Section 62 and Section 63 of the Act. This is due to the inherent differences in these products in terms of duration and certainty of contract, besides need for hedging against market risks. On being queried about how and from where the regulator arrives at these prices and what is the methodology used to arrive at the price, the Committee was informed that CERC determines the tariff in accordance with Section 62 of the Electricity Act, 2003. The Committee find that this exercise of determining tariff by the CERC is not helpful in the development of the Sector. Fixation of the tariff at Rs.7.90 is beyond comprehension when electricity is being traded at a much lower

tariff. Moreover, the high tariff is also detrimental to growth as the consumer may desist from buying electricity at a higher rate. **The Committee, therefore, recommend that:**

(i) The determination of tariff of electricity by the CERC under various provisions of the Electricity Act, 2003 should be reviewed.

(ii) Tariff determined by the regulator should reflect the market sentiments and support the market, involving all the stakeholders, i.e. generator, consumer, etc.

(iii) The ultimate benefit of tariff determination should accrue to the consumers and should also benefit the generators to strive for increased generating activities.

In conclusion, the Committee sum up that:

(i) Phase-I of the power reform had started with the Electricity Act, 2003 and as a sequel to that the Power Exchanges came into existence in the year 2008.

(ii) The quantum of trading at the Power Exchanges has been between 1% and 3 % of the total power generation for the last few years.

(iii) The concept of healthy and transparent use of the Power Exchange as a trading platform in India is yet to begin. Earlier, the power rates were in the range of Rs.6 to Rs.16 while at present the prices have come down to Re.1 per unit.

(iv) It is observed that the rates of power at the Power Exchanges are manipulated and are shown as market determined. The same are used to fix the power price to be payable by the consumers. This is nothing but abuse of the concept of Power Exchanges as an open and efficient platform.

(v) The short supply of power to the tune of 1% to 3 % multiplies the rates of power per unit as stated by supplier/ DISCOMs and other stake holders. Fixing this as a market determined price is nothing but a mockery and misuse of the system. This arbitrary fixing of benchmark prices by the agencies concerned, is shocking.

(vi) The Committee feel that due to manipulation and non-transparency, 97% trade is going to one power exchange, i.e. IEX. All the authorities concerned, including CERC, State regulators and officials concerned, have either ignored or allowed themselves to be used for such monopolistic hegemony.

(vii) The Committee is shocked as to how a scam ridden company and promoter of FTIL/NSEL/IEX, who is debarred from all the positions and from participation in the activities of the exchange, have been allowed to continue with the control of IEX till 2015.

(viii) After interaction with a cross-section of stake holders, the Committee feel that monopoly of one power exchange should be avoided as this is corrosive to the healthy functioning of the system and against the interests of the people.

(ix) After the NSEL scam episode, the experience of all the stake holders, as apprised to the Committee, is that there should be at least two well functional power exchanges in the market.

(x) The Committee is of the view that the Ministry/ PSUs/ Regulators/ State DISCOMs must play a healthy role to ensure that there is healthy competition in the power sector.

(xi) As we are entering the next phase of power reforms, development of a future product such as allowing two days ahead transactions, etc. may be considered.

(xii) Implementation/ execution of the order of CERC regarding dilution of FTIL share holding in IEX needed to be checked thoroughly. It is the duty of the Ministry/ Regulator to see that no cross holding/ holding through share companies/ buy back arrangement/ control/ cross control by promoter of FTIL is allowed in any form.

(xiii) Forensic audit must be ordered to check such cross control/ non-transparent control/ share holding of IEX by promoter of FTIL in the IEX.

(xiv) The conflict between CERC and SEBI regarding controlling of power/ commodity exchange has resulted into a legal battle between the two. Both the regulators have now approached the Supreme Court on the issue as to who will regulate the Power Exchanges. The Committee feel that the Government should come out with a conclusion and total clarity on the matter. The Ministry of Finance and the Ministry of Power should sort out this issue amicably in the larger interest of the sector.

New Delhi
18 April, 2016
Chaitra 29, 1938 (Saka)

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