

CHAPTER 2

REFORMS IN INDIAN POWER INDUSTRY

This chapter introduces the Indian Power Sector in general and power distribution companies (DISCOMs) in particular with specific relevance to reforms in structure and regulations in Indian Power Sector. The first part of the chapter presents the reforms in the structure of Indian Power Sector by introducing its brief genesis leading to the formation of Power Distribution Companies. The second part of the chapter elaborates on the regulatory reforms in Indian Power Sector. The role of regulatory reforms is then discussed in the emergence of the wholesale and retail electricity market.

2.1 INTRODUCTION

Reforms in the Indian power sector have brought major changes to the sector's operating environment. It has led to commercial approach, setting up of independent regulators, restructuring, and privatization in the sector (Vishwakarma and Tyagi, 2016). Vertically integrated State Electricity Boards (SEBs) have been unbundled into separate power generation, power transmission, and power distribution companies, DISCOMs (Tyagi and Vishwakarma, 2017). In developing and transition countries most governments are unwilling to support the existing arrangements. The few reasons leading to unwillingness includes- the burden of price subsidies, low service quality, low collection rates, high network losses, and poor service coverage (Newbery, 2002; Joskow, 1998). Many of the power sector reforms in developing economies were initiated when their international experience with privatization of electricity markets were limited (Bacon and Besant-Jones, 2001). Therefore, there is no one size fit policy for reforms. Each country has taken the reforms as per their requirements and availability of resources (Millan. et al., 2001). Studies whose findings are indicative of reforms in power sector are enlisted in Table 2.1.

Table 2.1: Relevant Studies Undertaken on Need for Reforms in Power Sector

S. No.	Author	Year	Findings
1.	Boyck et al.	1996	Privatization is leading to the efficient restructuring of firms as public enterprises under study proved to be greatly inefficient.
2.	Wood et al.	1997	Privatization improves the economic performance by reducing the power of unions in public sector by promoting popular capitalism through wide share ownership.
3.	Tongia	2003	Attempts at increasing capacity without reforming the underlying SEB structure proved to be a failure, reforms to disassemble the SEBs and empower independent regulators.
4.	Singh	2006	Power sector reforms in India were initiated at a juncture when the sector was plagued with commercial losses and burgeoning subsidy burden.
5.	Chunbo Ma et al.	2015	Restructured and decentralized power markets have increased the competition and improved the operational efficiency.

Source: Compiled by the Researcher

In India, the origin of production of electricity can be drawn from the late nineteenth century by means of hydro-electric power plant established at Darjeeling in 1897. The capacity of this hydro-electric power plant was 130 kW (Singal et al., 2008). Indian power sector has gradually grown over the period of time; the first commercial power plant was established in the year 1899 as “Sivasamudram hydropower plant” with the installed capacity of 4.5 MW. The Sivasamudram hydropower plant reached the installed capacity of 27 MW in the year 1927. Calcutta (now, Kolkata) and Bombay (now, Mumbai) became first two cities which were granted the license for distribution of electricity (Kurulkar, 2008). Consecutively, the ownership issues and installation of thermal power generation plants came up. In 1947 the total installed capacity of power generation in India reached to 1392 MW (508 MW Hydro and 884 MW Thermal). Vis-à-vis there were developments in the regulations the Indian Electricity Act 1910 was then strengthened by Electricity (Supply) Act, 1948. It is Electricity Act 2003 which brought in the provisions for establishing “power exchanges”. Most recently the Electricity Amendment Bill 2014 advocates the introduction of separation of carriage and content.

For better understanding, the brief genesis and present status of Indian power sector is elaborated through succeeding headings in order to discuss the structural and regulatory reforms in detail.

2.2 BRIEF GENESIS AND PRESENT STATUS OF INDIAN POWER SECTOR

The Indian power sector could not catch the rapid pace of demand and modernization which resulted into high losses for the state electricity boards in the 1980s and 1990s. Thus, Privatization was introduced in India in 1991 attracting private capital to participate in power generation, and distribution leading to reforms. These reforms were introduced in the power sector on the administrative, legal, structural, and regulatory front. The State Electricity Boards (SEBs) were alienated into manageable entities for setting up a regulatory mechanism to rationalize power tariff and promote effective policies. Thus, for the purpose of present study the reforms are discussed on the structure and regulatory front only. Table 2.1 delineates the evolution of structural reforms in Indian Power Sector. India was a British colony up to 15 August 1947 thus, it owes its initial electricity market structure to United Kingdom.

Table 2.2: Evolution of Structural Reforms in Indian Power Sector

Year	Development
Developments during the pre-reform phase of Indian power sector	
1879	The first demonstration of electric light in Calcutta
1897	First power plant based on hydro (130 kW), Darjeeling
1899	First major hydroelectric project (4.5 MW), Sivasmudram
1951	Establishment of Central Electricity Authority (CEA) at the Centre, State Electricity Boards (SEBs) at the State level.
1980	Private sector participation was proposed to handle power crisis.
1981	National Power Grid was formed and National Power Transmission Corporation (NPTC) was incorporated.
1986	Power Finance Corporation (PFC) was formed to supplement planned expenditure on existing and new power plants.
Developments during the reform phase of Indian power sector	
1991	Independent Power Producers (IPPs)
1996	Restructuring in power sector initiated. Orissa became the first state to restructure its power sector as per the suggestions of the world bank.
Developments during the post-reform phase of Indian power sector	
2012	Financial Restructuring Plan [FRP] to enable the turnaround of the Indian Discoms
2014	Integrated Power Development Scheme
2016	Ujwal DISCOM Assurance Yojana (UDAY) - financial restructuring and efficiency-enhancing programme

Source: Compiled by the Researcher

Power distribution companies, christened as ‘DISCOMs’, came into existence upon introduction of reforms in Indian power sector in 1991. DISCOMs are responsible for delivering electricity, transformed from the high-voltage transmission system to the low-voltage distribution system, and finally to the customers of different categories in their area of operations. There are presently 73 power distribution companies operating in the 29 States and 7 Union Territories of India (Alam et al., 2014). Power sector reforms have changed the roles and responsibilities of executives at different levels of lately formed DISCOMs as many new technologies and practices have been introduced in the electricity distribution sector. Lately formed DISCOMs now undertake many more operations with a commercial approach (Dwivedi and Vishwakarma 2016). Introduction of SMART grid, SMART metering infrastructure, automation of grid station operations, demand response, energy monitoring, promoting High Voltage Distribution System (HVDS), increasing energy efficiency and integrating intermittent forms of renewable energy like - solar and wind power, implementation of anti-theft measures, efficient metering, timely billing, effective revenue collection, and improved customer services, are just a few to mention (Singhania and Kinker, 2015).

Technical indicators for post-reform phase: More than 20 Indian states have implemented as many as 17 new technologies and practices to improve the efficiency of their DISCOMs (Khurana and Banerjee, 2015). The comparative assessment of operational and technical indicators for the post-reform phase is indicated in Table 2.3 to understand the impact of reforms.

Table 2.3: Losses as Percentage of GDP (1993-2003)

Particulars	Early 1990s	Early 2000s
Energy deficit (%)	7.7%	7.5%
Peak deficit (%)	18.8%	14.0%
Per capita consumption (kWh)	268 kWh	355 kWh
Transmission and Distribution Losses (%)	22.8%	27.8%
Percent share of power sector in total national plan outlay (%)	18.9%	12.2%
Cost recovery (%)	79.4%	68.6%
Financial losses (Rs billion)	40 (billion Rs)	250 (billion Rs)
Losses as a percentage of GDP	0.7%	1.5%

Source: Khurana and Banerjee, 2015

Despite the reforms and restructuring efforts of the power sector, commercial performance and challenges of state-owned utilities did not see any significant improvement. Table 2.3 indicates financial losses of Rs. 250 billion which were equivalent to 1.5% of India's GDP for early 2000. Further, the above data shows 10% decrease in recovery cost, which is quite high and marks for inefficiencies in Indian power sector.

Table 2.4: Studies Undertaken on Post-Reform Performance in Indian Power Sector

S. No.	Author	Year	Findings
1	Kannan et al.	2000	Gross inefficiencies are due to unaccountability culture of SEBs.
2	Kannan et al.	2002	Inefficiencies in technical, financial and organizational management indicate the of efficiency improvement program.
3	Godbole	2002	Financial viability of the sector is declining continuously.
4	Yadav et al.	2010	Indian distribution segment as a whole has lagged in terms of operation and financial performance.
5	Ranganathan et al.	2010	The poor financial performance of the SEBs and their lack of commercial orientation is applying a brake on foreign IPPs. investment.
6	Mohanty et al.	2013	Increase in efficiency of distribution and production activities due to the introduction of private players.
7	Banerjee et al.	2014	Power sector after-tax losses are overwhelmingly concentrated among distribution companies (DISCOMS) in the unbundled states.
8	Pargal et al.	2014	The technical and financial performance of the power sector in India had deteriorated by 1994.
9	Mukherjee	2014	Lack of commercial culture and sense of commercial pressure is leading to losses.
10	Khurana et al.	2015	The Indian power sector found itself in financial crisis at the end of the year 2011.

Source: Compiled by the Researcher

Efficiency improvement measures in technical, organizational and financial operations need to be adopted by Indian Power Sector (Kannan et al, 2002). Researchers claimed that technical and financial performance of power sector deteriorated badly in the 1990s and most of these bodies were State Electricity Boards (Pargal et al., 2014, Godbole, 2002). The remedial measures taken by the Indian Government includes milestone step of introducing privatization in 1991 but the studies reveal that the results are not as expected (Ranganathan et al. 2010, Mohanty et al. 2013).

The common reason argued by researchers were SEBs low accountability and poor operational efficiency (Yadav et al. 2010, Kannan et al. 2000). Even the States which adopted strict mechanisms to reduce distribution losses were also not able to achieve successful outcomes (Mukherjee, 2014). The sectorial losses rose to 618 billion Indian rupees in the year 2011 which was nearly equivalent to 17% of India's Gross Fiscal Deficit. The major cause of these losses were Power Distribution Companies and unbundled State Electricity Boards (Banerjee et al., 2014). At the end of the year 2011, financially bankrupted power distribution utilities were not able to pay their bills and repay their debts (Khurana et al., 2015). With this discussion, the researcher has identified his first theme for the literature review. The first research theme is- **“Performance Indicators of Indian Power Sector.”** Under this theme researcher will review studies undertaken on Indian Power Sector after privatization i.e. after 1991.

The researcher will now present the relevant regulatory reforms in detail under the heading regulatory reforms.

2.3 REGULATORY REFORMS

Indian Electricity Act, 1910 was the first electricity Act. This Act was passed to regulate the generation segment by defining the: i) rights and responsibilities of power plant operators; ii) requirements to grant license; iii) record keeping and mandate to publish annual reports. The Electricity Supply Act, 1948 was the first Act introduced by independent India. The Electricity Supply Act, 1948 defined Electricity as a ‘concurrent’ subject of Indian Constitution which makes both Central and State Legislature responsible to establish the related policy framework (Panda, 2002). The central government had suggested to all the State governments to adopt unbundling of SEBs for smoother and effective functioning.

In 1998, enactment of ‘Electricity Regulatory Commissions Act, 1998’ provided establishment of regulatory commissions at the Central level and State Level (Ministry of Law, Justice and Company Affairs, 1998) The Central Electricity Regulatory Commission was set up by the Central Government to act as a regulator in the power sector. Realizing the need for nationwide transmission utility, the government decided to set up a Power Trading Company (PTC), which was to be responsible for buying power and selling it to the SEBs. The government also achieved

a major breakthrough with the enactment of the Power Transmission Bill that ended the monopoly of Power Generation Corporation of India Ltd (PGCIL) and allowed private companies into transmission business. The Central Electricity Authority had the advisory role while the State Electricity Boards¹¹ were responsible for Generation, Transmission, and Distribution of Electricity (Joseph, 2010). For providing financial assistance to the domestic power sector, the Power Finance Corporation was set up by the Central Government. The responsibility of Power Finance Corporation also includes providing technical assistance to State governments to undertake studies prior to reforms, evaluating the right pattern of options for restructuring, preparing draft documents for reforms etc. The instant impetus for action was a serious balance of payments crisis in 1991 (Ahluwalia, 2002). Liberalization was needed as the immediate remedy in the main sectors of industry, which includes electricity industry as well. Lifting of government control from the finances and privatization was much needed. Thus, Independent Power Producers (IPPs) were introduced. In response to this call, there was a key euphoria and keenness among domestic as well as foreign private investors to become potential players in the sector. This magnetism was primarily because of the large size of the economy and assured sops of post-tax return of 16 % to the prospective investors (Kumar et al., 2012). However, this euphoria did not last long owing to reasons such as low availability of power in comparison to demand. Inefficient operations, technical and managerial inefficiencies, high debt on SEBs, increasing trend of losses and low accountability, obstructing and inconsistent policies, procedural complications internal to the sector, and dire financial state of SEBs (Shukla et al, 2011; Kumar et al, 2012). Further, uncertainty over the purchasing capacity of SEBs also generated doubts among the potential investors and dried up the enthusiasm (Rao, 2004). The above-discussed developments are enlisted chronologically in Table 2.5. The below Table gives an insight of evolution of reforms in Indian power sector.

¹¹ Vertically Integrated Organization

Table 2.5: Evolution of Regulatory Reforms in Indian Power Sector

Year	Development
Developments during the pre-reform phase of Indian power sector	
1910	Indian Electricity Act, 1910
1948	Electricity (Supply) Act, 1948
Developments during the reform phase of Indian power sector	
1998	Electricity Regulatory Commissions Act, 1998
Developments during the post-reform phase of Indian power sector	
2003	Electricity Act 2003 to bring competition in power sector
2005	National Electricity Policy to provide “Electricity to All”
2006	National Tariff Policy to ensure electricity to consumers at competitive price Competitive Bidding Guidelines, Rural Electrification Policy
2007	Amendment in Electricity Act 2003
2014	Deendayal Upadhyaya Gram Jyoti Yojana Electricity Amendment Bill 2014 with special focus on Retail Competition

Source: Adapted from Agrawal et al. 2017

The Electricity Act 2003 set a new milestone in the regulatory environment of Indian power sector and brought competition in generation segment by removing license mandate to undertake generation. The act allowed power distribution through franchisees and made provisions to roll out National Electricity Policy and National Tariff Policy. The electricity distribution sector in India is viewing an energetic growth in recent times. An annual growth of 2.07% and 7.65% was reported in the distribution network and transformer capacity in the year 2012. To further boost the growth rate most recently in 2016; Government of India has initiated various schemes for distribution sector. These are - Integrated Power Development Scheme (IPDS), Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY), Ujwal DISCOM Assurance Yojana (UDAY) etc. (Pai, 2016). Deendayal Upadhyaya Gram Jyoti Yojana was introduced to achieve 100% rural electrification. Integrated Power Development Scheme was launched to strengthen the existing power system with the support of Information Technology and latest innovations. The government came up with Electricity Amendment Bill, 2014 with the objective of introducing retail in India. Consequently, National Renewable Energy Act, 2015 was introduced to accelerate the growth of renewable energy (Energetica, 2015).

2.4 REFORMS LEADING TO EMERGENCE OF WHOLESALE ELECTRICITY MARKET

Mainstreaming of the reform processes and its implementation trajectories are well articulated in various legal promulgations, policy pronouncements and other such policy directives, resolutions, orders, and guidelines (IIMA, 2003). These pronouncements spell out the intended goals and objectives of the reform to be achieved within stipulated timeframes and by specific entities. The constitutional manifestation of energy as a “concurrent” subject while offers larger scope to the energy policy formulation processes both at the federal and sub-national levels, specific regulatory goals, objectives and operational norms and standards are largely articulated in various legal, legislative and policy pronouncements promulgated from time to time at varying levels of governance (Sarangi, 2015). Interestingly, given the constitutional status of the sector as a concurrent subject, there are federal characters of the stated regulatory objectives as well as provincial identities (Godbole, 2003; Ranganathan; 2004; Bhattacharyya, 2005). All the more, dynamic policy regime has been fast changing the stated regulatory objectives bringing additional roles into the regulatory portfolio (Phadke and Rajan, 2003; Rejikumar, 2004; Sankar, 2004; Thakur et al, 2005). At the core of these legislative and policy landscape stays the Electricity Act 2003 (Sarangi 2015). A detailed scrutiny of the various features of the Act reveals that electricity regulators have been tasked to perform varied functions on different dimensions at different scales of sector’s operation and management (Dasgupta, 2013).

ELECTRICITY ACT 2003

Electricity Act 2003 is considered as the Bible of Indian Power Sector. This Act came into force on 26 May 2003, with an overall objective to increase the competition in power sector. The Electricity Act 2003 ensured the development of Indian power sector through various provisions for this salient features of the Act are described as below:

- 1) **National Electricity Policy** – Section 3 mandated the Central Government to formulate National Electricity Policy in consultation with both Central Electricity Authority and State Government. The policy guided the Central and State Electricity Regulatory Commissions for their functioning. Policy showed the pathway to Central Electricity Authority to prepare

National Electricity Plan. The Policy formulated national objectives with key thrust areas to ensure the availability of reliable and quality electricity to all.

- 2) **Rural Electrification** – Policy formulation for the standalone system with a focus on generation from renewable energy in rural areas was provisioned in this act. Strengthening of rural power infrastructure and rural electrification is the joint responsibility of Central and State Government. The Central government in coordination with State government formulates policy to better manage the power procurement and distribution in the rural areas.
- 3) **Delicensed Generation** – A generation plant may be established, operated and maintained by a company without getting a license. Although this is not applicable to the hydropower generation plants. The company can establish a power generation plant if it fulfills the technical standards as described in the grid code. Construction and generation from the captive power plant is also a permitted activity, however, supply through the grid from such plant is regulated in the same manner.
- 4) **Constitution of Load Dispatch Centers** – For the optimum scheduling and dispatch of electricity within the country, establishment of National Load Dispatch Center (NLDC), Regional Load Dispatch Centers (RLDC), and State Load Dispatch Centers (SLDC) was provisioned in Act. Functions of NLDC, RLDC, and SLDC were prescribed by the Central Government, Central Transmission Utility and State Government respectively. Load dispatch centers are responsible to monitor and manage grid operations through the exercise of supervision and control over interstate and intrastate transmission system.
- 5) **Central Transmission Utility** – Formation of Central Transmission Utility (CTU) was provisioned in Section 38 of the Act. CTU is responsible to undertake interstate transmission system in coordination with the State Transmission Utilities, Generation Companies, and other stakeholders. CTU needs to ensure the development of an efficient and economical inter-state transmission system.
- 6) **Open access** – Section 42 of Electricity Act 2003 made State Commission responsible for the introduction of open access in a phased manner. State commission was needed to define various conditions for open access such as treatment of cross-subsidy, wheeling charges and other applicable surcharges which are applicable. Such surcharges and wheeling charges were provisioned to be reduced progressively. It was mandated to provide the open

access in a non-discriminatory way to all consumers who have connected electricity load of 1 MWh and above.

- 7) **Electricity Supply Code** - Electricity Supply Code specified by State Commission defined the protocol for power utilities for various measures like intervals of billing, recovery of charges, connection, alternation or disconnection of supply, prevention of meter tampering, theft of electricity etc.
- 8) **National Tariff Policy** – To ensure the availability of affordable power to all, the Act came up with the concept to introduce National Tariff Policy. The policy set certain objectives and promotes Multi-Year Tariff and Cost Reflective Tariff. The policy provided support to generation from renewables by setting particulars for Renewable Power Obligation and Renewable Generation Obligation. It also showed the commitment to reduce cross-subsidies in a phased manner. Tariff regulations of the act mandated the determination of generation tariff through competitive bidding only.
- 9) **Central Electricity Authority** – Duties and functions of the Central Electricity Authority were prescribed by the Central Government. The authority plays an advisory role to the government on formulation of National Electricity Policy and other short-term plans. The authority provides advice on technical matters and defines Grid Standard for power transmission operations. The authority ensures optimal utilization of resources in the interest of national economy.
- 10) **Regulatory Commission** – To regulate the power industry, Central Electricity Regulatory Commission and State Electricity Regulatory Commissions were set up at the Central level and State level respectively. The commission regulates the tariff of a generation plant as well as it determines tariff for transmission activities. The commission specifies grid code and fixes the trading margin for interstate and intrastate power trading. Electricity Regulatory Commission may also establish Advisory Committee to seek advice on the matters related to the policy and consumer interest.
- 11) **Appellate Tribunal** – Establishment of Appellate Tribunal was provisioned in the Act to hear an appeal against the verdict of appropriate commission or adjudicating officer, as the case may be. Any person, who is aggrieved by the decision of Appellate Tribunal, may appeal against it at Supreme Court.

- 12) **Reorganization of Electricity Boards** – As per the guidelines of this act, State Government prepared a transfer scheme for unbundling of State Electricity Board. Assets, liabilities, and rights which were vested in State Government, were supposed to be re-vested in the newly formed generation, transmission and distribution company of that particular State where unbundling was being done.
- 13) **Development of Wholesale Power Market/Power Trading** – Appropriate commission matched with the National Electricity Policy was assigned with the responsibility to endorse the development of power market in the country.

Development of Wholesale Market

Central Electricity Regulatory Commission (CERC) approved the creation of ‘Power Exchange’ in India. The first power exchange of India – Indian Energy Exchange (IEX) became operational on June 27, 2008. This was followed by opening up of the second power exchange ‘Power Exchange of India Ltd (PXIL) (Singh, 2008) became operational. These power exchanges have been modeled based on the most successful international power exchange, Nordpool. The exchanges have been developed as a market-based institution for providing price discovery and price risk management to the electricity generators, distribution licensees, electricity traders, consumers and other stakeholders. The participation in the exchange operations is voluntary (Mediratta et al, 2008)

At present, power exchanges in India offer trading at Day Ahead Market (DAM), Term Ahead Market (TAM)¹², Renewable Energy Certificates (REC), and Energy Saving Certificates. The trading timeline is set in accordance with the operations of regional load dispatch centers. Power exchanges coordinate with the National Load Dispatch Center (NLDC), Regional Load Dispatch Centers and State Load Dispatch Centers for scheduling of traded contracts’ in order to get up-to-date network conditions (Mathur et al., 2014). The day ahead market for Indian Energy Exchange (IEX) offers double-sided auction. The market clearing price and market clearing volume are discovered by double-sided auction. Few relevant studies undertaken on Indian power market and exchanges are compiled in Table 2.6.

¹² TAM includes Intra Day, Day Ahead Contingency, Daily Contracts and Weekly Contracts

Table 2.6: Relevant Studies Undertaken on Indian Electricity Market

S. No.	Author	Year	Dimension
1	P. Bajpai	2006	Adequacy of Indian electricity market for wholesale competition.
2	S. Mukhopadhyay	2005	Impact of Power Exchange on Indian Electricity Market.
3	G. P. Girish	2015	The activities of power exchanges and Power Market Regulations.
4	R. K. Mediratta	2008	Decentralized market model in Indian Power market.
5	M. Prabavathi	2013	Indian Power market as Day Ahead market (DAM) and Term Ahead Market (TAM)

Source: Compiled by the Researcher

According to Mediratta (2008), Power market in India is also the decentralized market model. The Indian power market has now achieved all its segments of - (i) Bilateral markets constituting long-term, medium-term and short-term markets; (ii) Multilateral market i.e., power exchanges presently covering day-ahead segment and (iii) real-time multilateral balancing market i.e., Unscheduled Interchange (UI). A number of power market models are prevalent in the International arena, the same could not be directly adopted for Indian electricity markets (Bajpai,2006). The activities of power exchanges i.e. Indian Energy Exchange (IEX) and Power Exchange India Limited (PXIL) are regulated by the Power Market Regulations 2010 which has been issued by the CERC for power trading (Girish, 2015). Power Exchange is power market platform that enables market participants to bid, price, schedule and settles transactions on a real-time basis (Mukhopadhyay,2005). In India, there are two types of ahead market. These are -Day Ahead market (DAM) and Term Ahead Market (TAM). DAM offers 24 separate hourly products (Prabavathi, 2013. Price discovery in DAM is through double side bidding. In double-side bidding, the suppliers and buyers receive or pay the uniform price. At this time, it works on 15 minutes scheduling rather than an hourly day ahead scheduling. While. TAM offer other products like weak ahead, a year ahead and seasonal contracts.

Electricity Transacted through Traders and Power Exchanges

The volume of electricity transacted through traders from 2008-09 to 2015-16 under bilateral transactions and through power exchanges is presented in Table 2.7.

Table 2.7: Volume of Electricity Transacted through Traders and Power Exchanges

Year	Electricity Transacted through Traders (BUs)	Electricity Transacted through IEX (BUs)		Electricity Transacted through PXIL (BUs)		Electricity Transacted through IEX and PXIL (BUs)	Total (BUs)
		Day Ahead Market	Term Ahead Market	Day Ahead Market	Term Ahead Market		
2008-09	21.92	2.62		0.15		2.77	24.69
2009-10	26.72	6.17	0.095	0.92	0.003	7.19	33.91
2010-11	27.70	11.80	0.91	1.74	1.07	15.52	43.22
2011-12	35.84	13.79	0.62	1.03	0.11	15.54	51.38
2012-13	36.12	22.35	0.48	0.68	0.04	23.54	59.66
2013-14	35.11	28.92	0.34	1.11	0.30	30.67	65.78
2014-15	34.56	28.12	0.22	0.34	0.72	29.40	63.96
2015-16	35.43	33.96	0.33	0.14	0.58	35.01	70.43

Note1: The volume of electricity transacted through traders in 2008-09 (April to July 2008) includes cross border trading and intra-state trading volume.

Source: CERC Annual Report 2015-16

The above Table 2.7 depicts the significant variation in the amount of transacted power. The quantity of transacted power through the power exchanges and traders increased by 45.74 BU from 2008-2016. Increase in the amount of transacted power through the power exchanges reflects that the demand of Day Ahead Market was more in comparison to bilateral transactions. As per study conduct by CERC in 2016, only 11% of power generated in India is transacted through the power exchange. On the other hand, bulk supply of power is still tied in long term contracts. Distribution companies rely on long term contracts to fulfil their needs.

2.5 REFORMS LEADING TO EMERGENCE OF RETAIL ELECTRICITY MARKET

India had its first act of Power Sector in 1910. Up to 1991, lack of significant structural changes and achievements has labeled these 80 years as a nascent stage for Indian Power Sector. In 1991, various reforms were initiated by the Government to deal with the shortage of power and to attract

private investment. Though further reforms initiated by Electricity Act 2003 attempted to address many issues of the Indian power sector; losses and bad financial health of distribution sector is still a reality and concern. Hence to manage the distribution segment in more efficient manner - a need for third generation reforms was felt. The existing distribution business serves both carriage business and content business. Parallel players may be introduced to supply business. For this the Electricity Amendment Bill, 2014 has been introduced The Bill lays down provisions for third generation reforms through bifurcation of carriage and content. The researcher will now discuss the Electricity Amendment Bill, 2014 in relevance to the third generation reforms:

THE ELECTRICITY (AMENDMENT) BILL, 2014

Indian Power Sector has transformed from Vertically Integrated Single Buyer Model to Wholesale Competition Model. Thus the third generation reforms point out on the adoption of 'Retail Competition Model. This is in line with the recommendations of Government of India.

In line with the 12th five-year plan, the Government of India requested policy recommendation for third generation reforms from Standing Committee on Energy and a Working Group on Indian Power Sector. As an outcome, The Electricity (Amendment) Bill, 2014 was introduced in Lok Sabha on 19 December 2014. The major highlight of the Bill relevant to the present study are as follows:

1. Segregation of commercial losses from technical losses.
2. Bifurcation of carriage [Network Business] and content [Electricity Business]
3. Introduction of retail competition
4. Measures to secure the Grid.
5. More transparency, affectivity, and accountability in the regulatory system.
6. To strengthen the provisions to provide non -discriminatory open access
7. Supplier Switch through choices given to end consumer.
8. Healthy tariff policy and Rationalization of Tariff Determination

Foreseen Importance of the Electricity (Amendment) Bill, 2014

As the Electricity (Amendment) Bill, 2014 consolidates all previous acts i.e. the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998, the Electricity Act, 2003; it is taken that this Bill will strengthen the concept of Electricity Act, 2003. The salient feature of the Electricity (Amendment) Bill, 2014 is that it addresses the key stakeholders. The design of the Electricity (Amendment) Bill, 2014 recommends for 'Retail Competition in Distribution Segment' through the mechanism of bifurcation of carriage and content.

The Electricity (Amendment) Bill, 2014 recommends separating distribution network i.e. 'wire business' from the 'supply business'. At this point in time, power distribution companies in India serve for both the aspects. But for future, the Bill proposes competition in supply business through introduction of retail with the concept of multiple suppliers in an area. Distribution network i.e. wire business may remain as a natural monopoly.

Based on the international experiences, it seems that segregation of carriage and content is a requisite to introduce the competition and to increase the efficiency leading to lowering down of the losses. The concept behind this belief is - if there will be multiple retail suppliers – competition level will increase since the customers may switch the supplier in case they are not satisfied with the service quality of present supplier. So by the fear of loss of a customer and its business, the supplier will increase the standard of his service and also will try his best to provide electricity at a competitive price. [Supplier will be responsible for the commercial losses]. On the other hand, System upgradation in distribution network will happen as the carriage system will be responsible for the technical losses.

The Bill suggests the formation of new bodies, their functions, and necessary procedures to introduce retail competition in Indian power sector. Few of the suggestive bodies are as follows:

1. **Intermediary Company** - Entity Intermediary Company will be created to succeed all the existing Power Purchase Agreements [PPAs] and other procurement arrangements. State Governments will play the supervisory role during the transfer of such agreements and arrangements.

2. **Incumbent Supply Licensee** - After the segregation of distribution and supply; supply (and other undertakings) functions will be vested in the Incumbent supply licensee.
3. **Supply Licensee** - A person may supply electricity if he is authorized under section 14 of the Electricity Amendment Bill, 2014 to supply electricity to consumers. Supply licensee will have the obligation to supply electricity based on the load factor.
4. **Provider of Last Resort** - POLR is the Supply licensee who may be designated and instructed by the State Commission to supply electricity if the supply licensee chosen by the consumer is ceased or suspended for any reason. The government supply licensee may also play the role of POLR.
5. **Distribution Licensee** - Only one license will be granted by the Appropriate Commission in an area. In case two or more Distribution Licensees exist in an area before passing the Bill then they are authorized to continue only till the expiry date of their licenses. Distribution licensee will have the obligation to supply until the work of transfer of supply functions to the incumbent supply licensee gets complete.
6. **Supplier Switch** - Consumer will have the freedom to choose a supplier to get the supply of electricity to his/her premise. The consumer can also switch the supplier at any point in time later on but the switching interval as defined in the act is supposed to be followed.
7. **Open Access** - Electricity Act 2003 allows Open Access only for the Consumers with a connected load of 1 MW and above. The Bill amends the Electricity Act 2003 to provide Open Access to the consumers of below 1 MW also.

Observations for the Electricity (Amendment) Bill, 2014

Standing committee on energy processed some observations on the Electricity Amendment Bill 2014 after due consultation with Ministry of Power, experts of the power industry and with various stakeholders. Observations made are as follows:

- 1) More clarity, broad and flexible guidelines should be there to specify the level and manner at which the segregation of distribution and retail will happen.
- 2) The way of treatment of losses at the point of segregation should be cleared.
- 3) Management of supply licensees should not be the responsibility of Appropriate Commission.

- 4) Segregation of carriage and content should happen in a gradual manner. Incentives may be provided to the States which take the lead.
- 5) The Supply Licensee should not be given freedom entirely to select an area for the supply. It should be notified with the wisdom of all concerned.
- 6) The responsibility for 'Provider of Last Resort' should not be the function of Government Company owned only. It should be shouldered by all the supply licensees irrespective of the area of supply.
- 7) As the supply licensees will use the distribution system. Thus, their accountability towards the distribution system should be fixed.
- 8) Guidelines which ensure the fair and transparent work of intermediary company should be laid down.
- 9) A provision like metering and billing, collection and other consumer-related needs; require more clarification. Provisions for supplier switch, switching cost, a timeline of switching frequency are certain issues which further need to be addressed.
- 10) A franchisee may not have any need to obtain any separate license in the case if respective distribution or supply licensee wants to operate in an area through that franchise.
- 11) Management of cross-subsidies is the area of concern. For the efficient retail market, it is necessary to phase out the subsidies in a time-bound manner.

Introduction of the Electricity Amendment Bill 2014 has raised expectations of all stakeholders of Power System in India. If passed, this Bill may be the way forward to roll out next generation of reforms in Indian Power Sector which are necessary in order to enhance efficiency. Though the **Electricity (Amendment) Bill, 2014 advocates separation of carriage and content** to increase competition it is silent about various practical aspects pertaining to guidelines, mode of treatment, implementation of bifurcation and management of segregated businesses. The Bill needs to envisage and formulate guidelines pertaining to level and manner of segregation, the category of supply licensees, role and work of the intermediate company, distribution licensee, and franchisee. The Bill is also silent about the treatment of losses and cross-subsidies at the time of segregation, detailed responsibility of the provider of last resort and his accountability towards the distribution of power. The act needs to take into its purview the detailed process and incentivization at all the levels of implementation. A review of segregation implemented across the globe provides us an

insight that the sustainability of retail competition lies to a great extent on the post-implementation management of the bifurcation. The Electricity (Amendment) Bill, 2014 is obscure about the management of metering and billing, collection, supplier switch, switching costs, a timeline of switching frequency and other consumer-related needs. A deep study pertaining to the bifurcation experience in other countries may provide us a blueprint for policy and ground-level strategy formulation.

2.6 IMPACT OF REFORMS

Power sector reforms receive a major thrust in the reform agenda of the state budgets (Vadra, 2012). With the lack of competition and existence of major challenges, the Government of India made significant institutional and legal changes. The most important legislation in this direction is Electricity Act 2003 (Reineberg, 2003). After the enactment of Electricity Act 2003, growth in annual productivity was observed as 5.6% (Yadav et al., 2010). The act was proved a landmark in the history of Indian power sector as it introduced the concepts of open access, power trading, multiple distribution licensees and competitive generation (Mukherjee et al., 2017). The objective of Electricity Act 2003 was to bring a paradigm shift in the sector with the opening up of the door of immense possibilities to unleash competition (Ranganathan, 2004). Though Electricity Act 2003 ensured competition in generation, it could not bring competition in distribution side. Hence, policymakers came up with the Electricity Amendment Bill 2014 to amend the existing act. Electricity Amendment Bill 2014 focuses on the separation of carriage and content business from existing distribution business in order to make the distribution business competitive (Agrawal et al, 2017). Table 2.8 outlines few such studies.

Table 2.8: Studies undertaken on Regulatory Reforms in Indian Power Sector

S. No.	Author	Year	Discussion
1	Godbole	2003	Several of issues remains attended for reforms when the Electricity Act, 2003 was under consideration of the standing committee of parliament.
2	Sankar	2004	The regulatory reforms are intended to introduce competition in every link of the power supply chain in order to enhance efficiency and reduce costs.
3	Ranganathan	2004	The Electricity Act 2003 opens the door-to immense possibilities in unleashing competition and trading, but at the same time opens a new area of policy risk, which it is supposed to mitigate.
4	Parameswara et al.	2005	An integrated approach to redefine the objectives and methodologies are imperative to realize development. This approach can ensure reliable and affordable electricity.
5	Reineberg	2006	To meet the industry challenges, the Indian government has made significant legal and institutional changes. The most important piece of legislation to become law is Electricity Act of 2003.
6	Tankha et al.	2010	The reform is partial in that it proceeds towards a broader transformation of the power sector through modest and experimental steps, building upon successes and lessons.
7	Yadav et al.	2010	Power sector of India has experienced annual productivity growth of 5.6% after enforcement of EA, 2003, which is mainly contributed to the technological progress of the sector.
8	Dubash et al.	2011	Power sector policy in India appears to have locked itself into adverse arrangements. These circumstances may yield favorable institutions and unfavorable institutions.
9	Vadra	2012	Power sector reforms receive a major thrust in the reform agenda of the state budgets. Some states have outlined initiatives aimed at the restructuring of the power sector through different measures.
10	Mukherjee et al.	2017	The Electricity Act 2003 was a landmark Act which promised to remove the maladies which afflict the Indian Power Sector and that too at a time when the sector was ridden with problems.

Source: Compiled by the Researcher

There have been attempts to identify the beneficiaries and losers in the process of reform (Santhakumar, 2003; Balachandra, 2006; Mukherjee et al., 2009; Kundu and Mishra, 2011). While measuring impacts, price, quality, service, availability, increase in value, safety, and attitude of persons providing services are considered as major criteria to evaluate the benefits/losses. There have been varying explanations offered showing that reform has differently impacted different

groups. According to Santhakumar (2003), “it is the middle class, not the poorer class which stands to lose in the strategy of cost recovery”. The impacts of privatization are found to be mixed for both utilities and consumers and privatization has equally impacted the both (Balachandra 2006). Going more specific to the issues of impacts on consumers, Mukherjee et al. (2009) explore the impact of reform between two different groups of agricultural consumers/beneficiaries. Another interesting dimension of impacts of reforms is studied with respect to the state of access to electricity under reform. It is found that reform, at its best, has not changed the access conditions and more or less neglected poor people in the process (Sihag et al, 2004; Chaurey et al, 2004). It is further argued that the reform with its focus on top-down approach is poorly endowed to solve the access problem (Ailawadi and Bhattacharyya, 2006). Regulatory incompatibility of the current franchisee based rural electrification programme is also found to be a cause of concern for enhancing access to electricity (Bhattacharyya and Srivastava, 2009). It is further contended that cherry picking of good customers and service areas, rigid labor markets, and poor financial designing of the system, and unaddressed social contracts notably supply of electricity to poor households characterize the electricity industry in India (Tongia, 2003; Bhattacharyya, 2007). Studies point out that reform has not been succeeded in addressing key sectoral problems like huge deficits, unsustainable and regressive subsidies, large-scale theft, inefficient and overstaffed employees, poor quality of power supply (Lal,2005; Singh, 2006; Bhattacharyya and Patel, 2007, Nair, 2008). However, in contrast, there are studies, which highlight the success cases of reforms and restructuring efforts. For instance, micro-level reforms in terms of change in governance systems are attributed to have produced better results (Dash, 2006; Tankha et al, 2010). Reforms have also found to enhance the quality, availability, and plant load factor (PLF) of the power supply (Kundu and Mishra, 2011). In nutshell, the above discussion on the structural and regulatory reform has been fundamental to present day retail completion in Indian power sector. With this discussion, the researcher has identified his second theme for the literature review. The second research theme is, “**Regulatory Framework and Reforms in Power Sector.**” Since the present day, changes in Indian electricity market are influenced by changes in the global electricity market. Therefore, in the next chapter, the researcher will focus and discuss global electricity market, models, and theory of market competition.

2.7 SUMMARY

1. Structural reforms in the Indian power sector have brought certain major changes in the operating environment.
2. DISCOMs have already implemented or are in the process of implementing many new technologies and practices to improve efficiency with this backdrop, the researcher identified his first research theme for the literature review. The first research theme is: **“Performance Indicators of Indian Power Sector”**.
3. The government of India came up with Electricity Amendment Bill, 2014 to amend Electricity Act, 2003 in order to have necessary provisions to introduce next-generation reforms in the form of retail competition.
4. Regulatory reforms in the Indian Power Sector have brought certain major changes in the electricity market. With this backdrop, the researcher identified his second research theme for the literature review. The second research theme for the present study is: **“Regulatory Framework and Reforms in Power Sector”**.
5. The next chapter details on global electricity markets and models.