Investment in Indian Power Sector: Growth, Prospects and Challenges
Pallvi Aggarwal and Neelam Jain

ABSTRACT

To keep pace with other developing countries and to maintain growth of the economy, power sector is a critical sector for India. The widening gap between power demand and supply is hindering the growth of the economy. This concern is attracting the attention of central and state governments towards the infrastructure development, various reforms and the fresh investment in the power sector. This paper focuses on the growth of power sector along with the current state of investment needs. It analyses investment prospects in the light of infrastructure development, reforms and macroeconomic factors. The study also aims to find out the potential opportunities and challenges for the investment in power sector.

Keywords: Power Sector, Investment, Infrastructure, Reforms

1.0 Introduction

The power sector is a critical growth driver for India. To sustain economic growth and to be globally competent, India needs fast growth in power sector along with manufacturing, gas and water supply sectors. Presently, the electricity needs of economic development are unfulfilled due to shortages in supply and various other problems. The sector needs more investments and reforms in the areas of generation, transmission and distribution of electricity, in order to scale up its power generation capacity.

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India is currently fifth amongst the largest electricity producing nations. The per capita electricity consumption in India is targeted to 1000 kWh from 785 kWh for coming years. 80,000 MW is under construction as of now (Shinde, 2012). In the electricity sector alone supported by data, we are facing a peak shortage of 12.9% and total energy shortage of 10.3%. The existing power deficit, rising demand and commitment to provide access to electricity for all, necessitated large scale capacity addition, transmission and distribution programmes (Shinde, 2010). In the next five years, India targets to add about 80 Giga Watt of power generation capacity. Private sector is likely to drive this capacity addition with a dominant share of about 55% (Kulkarni and Kadakia, 2013). This has encouraged several overseas companies to establish their operations in India under the Public-Private Partnership (PPP) programs.

1.1 History

Electricity was introduced in India for the first time in 1880 with the establishment of a small hydroelectric power station in Darjeeling. However, after Independence, generation and distribution was carried out by private sector. Later on to meet the needs of rural sector and urban centers, Central and State agencies came into existence. In the year 1991, power sector reforms were initiated with the opening of gates for private sector, allowing of foreign investments and tax benefits. Before 2001, India’s electricity-supply was mainly owned and operated by public sector. The risk of bankruptcy and serious hurdles in the investments led to the emergence of private players in the power sector. The National Thermal Power Corporation, Tata Power, Torrent Power, Reliance Infra and Power Grid are the market leaders in the power sector. The favorable government policy, growing demand, use of latest technology and foreign investment in the sector are the main reasons of entry and growth of private sector players (Adithya et.al, 2009).

The Ministry of Power (MoP) started functioning independently with effect from 2 July, 1992. It brought drastic changes with the advent of reforms and competition in the power sector. MoP is concerned with perspective planning, policy formulation, processing of projects for investment decisions, monitoring of the implementation of power projects, training and manpower
development and, the administration and enactment of legislation in regard to thermal, hydro power generation, transmission and distribution.

The Power sector can be divided into three categories:
*Generation*: It involves activities of generation at power plants or stations. Conventional sources – hydro, nuclear, natural gas, coal and lignite and non-conventional sources- solar, wind, biomass, tidal, geothermal, hydrogen, etc. in some form of chemical, mechanical, solar or nuclear energy are converted into electricity.

*Transmission*: When generated power is transferred to a designed location with the help of transmission inter and intra stations, sub stations and transmission lines, it is called transmission.

*Distribution*: It is the last stage in providing electricity to its end users i.e. households, commercials, farmers, organizations and government.

### 2.0 Objectives

To meet the increasing demand for the power sector, huge funds for fresh investment are necessary. So aim of present paper is to get an insight into the sector and to focus on the following objectives:

- To study the growth of power sector along with the current state of investment needs.
- To analyze the investment prospects in the light of various factors and their contribution in promoting the investment in this sector.
- To analyze the opportunities and challenges for new investment in value chain of power sector.

### 3.0 Review of literature

Indian electricity reforms were necessary to deal with commercial losses and burgeoning subsidy burden. Investment in the sector was not able to keep pace with growing demand for electricity. Discussion on need and impact of introduction of competition in the power sector primarily through development of
a market for bulk power explains the importance of investment and role playing of private players (Singh, 2006).

Electricity provides multiple uses such as light, the ability to use modern equipment and computers, and access to information and communication technology (ICT). A large portion of the profit could make good the deficit caused by demand and supply factors as well as shortages in the power sector. Shortage of power supply is indicative of the potential for increasing the return to investment (Newberry, 2006).

Major constraints for the private investment are macro level instability, business policy, regulatory environment and level of infrastructure development. To access more finance effectively, tools can be financial liberalization, well working commercial banking system, credit guarantees specially to scale up SME financing (Sinha and Fiestas, 2011). To accelerate private investment in this sector, macroeconomic issues need to be addressed by the government, or at least measures should be taken to mitigate their adverse impacts on electricity sector investments. Sahi and Khan (2011) point out that the government needs to address the issues of electricity sector market, institutional and structural reforms in order to increase power generation and transmission capacities for meeting electricity demands.

India’s power sector flexibility is attributed to its strong domestic demand fundamentals which have been driving its growth. Various challenges faced by Indian power sector cover aspects relating to debt financing like changes in availability of funds and cost of funds, changes in commercial and industrial consumption at the distribution level; project delays; relative riskiness of power sector entities. Measures addressed to mitigate challenges are broadening of the domestic private power developer base over the years; greater dependence on domestic sources of debt funding; existence of strong sector-focused financing entities; timely intervention by the government in the form of fiscal stimulus packages to revive demand; appropriate monetary policy measures by the central bank to address liquidity problems; and existence of government-owned central sector entities with strong balance sheets and robust cash flows arise the need for study for future investment (Mukherjee and Pratap 2010).

The various Indian government agencies like Ministry of Power, Department of Industry Policy and Promotion, Central Electricity Authority offer
a good source of information. The 11th and 12th economic development plans – by the Indian Planning Commission – are reviewed by this study and provide great help in assessing the electricity sector’s needs, and the investment scenario to deal with these needs.

4.0 Investment trends in Power sector and Current State of Investment Needs

4.1 Investment Trends

Investments in this sector are made by government, public sector undertakings (PSU), private players and other investors. The present paper highlights the investment trends for all the above mentioned categories.

*Investment trends in generation*

Electricity generation for deficit has characterized power sector operations to bring reliability and accessibility in India. Till 31st December, 2011, the installed generation capacity in the utility sector was about 1, 86,665 MW. Classification of installed capacity shows that more supply is largely coal based with the total installed capacity comprising of 104021.4 MW (55 %) coal based. Secondly; 38,748.4 MW (20%) hydro and others like 20,162.24 MW (11%) from renewable energy sources, 17,742.85 MW (10%) gas based, 4,780 MW (3 %) nuclear and 1199.75 MW (1%) diesel generation are contributed in generation as on 31st December, 2011. The Installed Capacity from renewable sources has grown to 20,162 MW in June 2011 comprising 3,226 MW in state sector & 16,936 MW in private sector.

11th plan period ended on 31st March 2012, registering as widely expected 60% achievement of planned addition to power generation capacity. 54,000 MW (including Renewable Energy- RE) power was added to the installed capacity in the 11th plan as against planned capacity of approx. 90,000 MW (incl. RE). Last fiscal FY12 saw a huge capacity addition of 20,000 MW. However, this was possible due to increased private sector participation and is expected to grow in future (*Ranade, IEEMA Mumbai*).
The goal for the augmentation of the power sector’s capacity required in the XII Plan period, 2012-2017 is to add a total of 100,000 MW of capacity. Capacity addition of more than 1,00,000 MW is estimated to provide availability of over 1000 units of per capita electricity by year 2012. The generation infrastructure investment requirements are estimated at nearly $100 billion (2011 India Energy Handbook).

Investment trends in transmission

The Electricity Act, 2003 opened doors for private sector participation in the power sector but private investment in transmission happened in 2006. Private sector investment was permissible in the form of 100 per cent private equity or with 74 per cent Joint Venture with the Central Transmission Unit. For an integrated power system for the country; system efficacy and investments in transmission system are required to enhance the state transmission along with substations. India has a total length of around 2,40,000 circuit km of transmission lines. India's power transfer capacity stood at 20,750 MW, much less than targeted of 32,650 MW in 11th Plan Period on January 2011. During the year 2010-11, 16 nos. 400 kV lines in central sector, 17 nos. 400kV lines in state sector and 6 nos. lines in private sector have been commissioned. These would considerably enhance the inter-state and intra-state power transfer capability of the country. The Inter-state transmission sector was opened up for private sector participation through joint venture with Power Grid and through selection of Transmission System Provider using competitive bidding. The Central Commission had to be approached by the joint venture (JV) companies for grant of transmission license. Torrent Power grid Company Ltd., Jaypee Power grid Ltd., Parbati Koldam Transmission Co. Ltd., Teesta Valley Power Transmission Ltd. and North-East Transmission Co. Ltd. were granted licenses for purpose of developing specific transmission projects.

Ministry of Power issued guidelines for:
- Healthy competition in transmission projects development
- Open access strategy for electricity transmission
- Tariff based competitive bidding for transmission services
Standard bid documents for procuring transmission services through the market route

Establishing Smart Transmission Grid

The total funds requirement for development of transmission system estimated for 11th plan was Rs. 1,40,000 Cr and increased to expected level of Rs. 1,80,000 Cr to be needed for Central sector Rs 1, 00,000 Cr, State sector Rs. 55,000 Cr and Private sector Rs. 25,000 Cr for 12th plan. It will be Rs. 2, 00,000 Cr for 13th plan.

Investment trends in distribution

There has been a growing concern over the financial health of Distribution Utilities having heavy losses on transmission and distribution (T&D) and Aggregate technical and commercial (AT&C) for the distribution sector (Table 1). Thus, there is an urgent need for immediate actions for sustainable distribution.

<table>
<thead>
<tr>
<th>Year</th>
<th>T&amp;D losses</th>
<th>AT&amp;C Losses*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>31.25</td>
<td>34.33</td>
</tr>
<tr>
<td>2005-06</td>
<td>30.42</td>
<td>33.02</td>
</tr>
<tr>
<td>2006-07</td>
<td>28.65</td>
<td>30.62</td>
</tr>
<tr>
<td>2007-08</td>
<td>27.20</td>
<td>29.45</td>
</tr>
<tr>
<td>2008-09</td>
<td>25.47</td>
<td>27.74</td>
</tr>
<tr>
<td>2009-10</td>
<td>25.39</td>
<td>27.15</td>
</tr>
<tr>
<td>2010-11</td>
<td>24.2</td>
<td>25.23 (Expected)</td>
</tr>
<tr>
<td>2011-12</td>
<td>23.3</td>
<td>23.31 (Expected)</td>
</tr>
</tbody>
</table>

*Energy accounted for

Source: CEA

Two areas of power sector- transmission and distribution - are in deficit due to resource crisis being experienced by the State transmission and distribution utilities and hindrances in attracting investment. However, more investment is taking place in generation and investment in intra-state transmission system while distribution system has been much less than the
desired proportion. There are 73 distribution utilities at present—13 electricity departments, 17 private distribution companies, 40 corporatized distribution companies and 3 State Electricity Boards serving the consumers. Investment in the distribution sector is estimated at $86.4 billion for the XII Plan (2011 Energy Handbook).

Re-structured Accelerated Power Development and Reforms Programme (R-APDRP) is developed for State Power Utilities (SPU) to improve their functioning and reduce the level of AT&C losses from 23.31 (expected) to 15%. The outlay for 2011-12 for R-APDRP is Rs. 2034 Cr. It includes the projects for establishment of baseline data, IT applications for energy accounting/auditing & IT based consumer service centers, and regular distribution strengthening projects. Under Part-A (IT) of the R-APDRP, 1402 projects worth Rs. 5196.50 Cr, to cover all the eligible towns in the country has been sanctioned. Under Part-B, 1039 projects worth Rs. 23658.18 Cr for strengthening of sub-transmission distribution system, against 1100 eligible towns in the country have also been sanctioned so far. The outlay for 2012-13 is Rs. 3114 Cr which includes Rs. 117 Cr as grant and Rs. 2997 Cr as loan (Outcome Budget 2012-13, MoP).

4.2 Current state of investment needs

Economic theory says that if demand is greater than the supply for any commodity then prices will rise and make a big space for super normal profit. The present period is a golden period for investment in the power sector due to demand and supply gaps. Further, it is beneficial for public and prospective private sector players due to favorable attitude of government. It can be seen from Table 2 that there is a huge potential for power sector to grow as electricity demand for household, agriculture and productive uses is growing rapidly. During 2011-12 this deficit was 10.3% for total demand and 12.9% for peak demand, opening doors to invest in this sector. Demand for power is estimated to be in 7digits for 12th and 13th year plans. The Installed Capacity of the country is growing rapidly from 132329.21 as on 31st December, 2010 to 206456.04 MW as on end of July 2012 (CEA report). To meet the demand government has
estimated the fund requirements of Rs. 13, 72,580 Cr for 12th year plan. The year-wise plan is given in Table 3.

**Table 2: Power Demand and Supply Trends**

<table>
<thead>
<tr>
<th>Region</th>
<th>Energy Requirement (MU)</th>
<th>Energy Availability (MU)</th>
<th>Deficit (%)</th>
<th>Peak Demand (MW)</th>
<th>Supply (MW)</th>
<th>Deficit (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12 (11th Plan end)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td>279581</td>
<td>249145</td>
<td>-10.9</td>
<td>41000</td>
<td>36140</td>
<td>-11.9</td>
</tr>
<tr>
<td>Western</td>
<td>287757</td>
<td>256237</td>
<td>-11.0</td>
<td>42422</td>
<td>37781</td>
<td>-10.9</td>
</tr>
<tr>
<td>Southern</td>
<td>250024</td>
<td>223814</td>
<td>-10.5</td>
<td>37247</td>
<td>31859</td>
<td>-14.5</td>
</tr>
<tr>
<td>Eastern</td>
<td>105461</td>
<td>97294</td>
<td>-7.7</td>
<td>17171</td>
<td>15185</td>
<td>-11.6</td>
</tr>
<tr>
<td>North Eastern</td>
<td>10918</td>
<td>10884</td>
<td>-0.3</td>
<td>2198</td>
<td>2068</td>
<td>-5.9</td>
</tr>
<tr>
<td>All India</td>
<td>933741</td>
<td>837374</td>
<td>-10.3</td>
<td>136193</td>
<td>118676</td>
<td>-12.9</td>
</tr>
<tr>
<td>2016-17 (12th Plan end)</td>
<td>1354874</td>
<td>--</td>
<td>--</td>
<td>199540</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2021-22 (13th Plan end)</td>
<td>1904861</td>
<td>283470</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: CEA*

**Table 3: Year wise fund requirements during 12th Plan (In Rs. Cr)**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fund requirements</td>
<td>2,36,996</td>
<td>2,42,335</td>
<td>2,72,042</td>
<td>3,02,770</td>
<td>3,18,436</td>
<td>13,72,580</td>
</tr>
</tbody>
</table>

*Source: Planning commission*

[http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_power1904.pdf](http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_power1904.pdf)

It can be seen from Table 3 that the total outlay required has increased tremendously in 11th and 12th Plan and it is generation activity that is getting nearly half of the requirements.
5.0 Role of Reforms, Infrastructure and Macroeconomic factors

5.1 Power Sector Reforms and Investment Policy

The government by regulations affects the investment patterns in a particular sector. Power sector reforms determine the participation of domestic and foreign investors. Government of India (GoI) has initiated several reform measures since 1991 to improve the power sector. Some important reforms in the power sector are as follows:

- The National Electricity Policy (NEP) targets power for all. Other important policies like Ultra Mega Power Project Policy, Mega Power Policy, Central Electricity Regulatory Commission Policy and Tariff Policy intensify the private player's confidence in the sector.
- Under the 1991 Amendments, independent power producers (“IPPs”) were granted attractive terms to set up power stations and sell electricity to the vertically integrated State Electricity Boards (SEBs) through long-term power purchase agreements (“PPAs”).
- Permission of Foreign direct investment (FDI) up to 100% will encourage the investment through adequate fund supply and, benefit the technology and skills move in India. As per the provisions of the Electricity Act 2003, foreign companies and foreign investors can bring FDI under automatic route for generation and transmission of electric energy (except atomic power plant is reserved for public sector), distribution to households, industrial, commercial and other users, and for Power trading.
- There is no requirement of licensing for generation easing the entry in generation system.
- Development of Ultra Mega Projects - An initiative has been inaugurated by the government for development of coal based Ultra Mega Power Projects (UMPPs) of about 4,000 MW capacity each under Tariff based competitive bidding. The objective is to achieve faster capacity addition and to minimize the cost of power for consumers by economy of scale. These projects are Sasan in Madhya Pradesh, Tillaya in Jharkhand, Mundra in Gujarat and Krishnapattanam in Andhra Pradesh. Various other UMPPs planned at different locations all over the country are in under process for start.
Decentralized Distribution Generation (DDG) System is launched under RGGVY (Rajiv Gandhi Gram Vidyuthikaran Yojana) where grid supply is not feasible and not cost effective.

- **Tax Benefits**: Coal sector may be given benefits of tax Holidays and Duty exemptions in future for better coal exploration. Zero customs duties & taxes and interest rate subsidy for gas based contribution for reducing carbon space will happen soon in future. Excise duty stand currently 14% on power generation, transmission and distribution equipment while generation equipments have import duty relaxations also.

- **Open access in transmission with short, medium and long term contracts has been introduced to promote competition among generators and traders, for efficient utilization of the energy and for a good price mechanism.**

- **Under the national Electricity Policy, 14 per cent return on equity (ROE) is ensured in generation and transmission schemes and adequate incentives in future will be taken to increase the level to 15.5% or more.**

- **External Commercial Borrowings (ECBs) are allowed to improve fund availability for the sector for existing power projects in Union Budget 2012-13.**

- **The Union Ministry of New and Renewable Energy (MNRE) has introduced a scheme in which incentives will be provided to encourage generators to set up corresponding renewable sources based power generation. State level players, local institutions and villages can be a member of value chain for renewable energy under the extension program of the MNRE.**

- **Special Economic Zones (SEZs) and Manufacturing Parks will be boosted to meet the energy requirement through Zero import duty on capital equipments, raw materials and excise duty exemption.**

### 5.2 Infrastructure development and investment trends

Infrastructure development is a primary requirement for realizing the vision of progress for creating an investment climate. Inadequate infrastructure is a major constraint in the growth of the country. Our government continuously is emphasizing the need for expansion plans for investment in infrastructure. The total investment in infrastructure is estimated to have increased from 5.7 per cent of GDP from 2007 to 8.0 per cent in the 2012 and include power sector required
basic infrastructure like roads, railways, ports, airports, and oil gas pipelines. It would be above $1 trillion during the Twelfth Plan period. Private and Public Private Partnership (PPP) investments are estimated to be 50.0% in the Twelfth Plan, previously accounted for 30.0% of total outlay in the Eleventh Plan.

Railways have planned new railway lines, electrification, electrification of new routes and procurement of locomotives and wagons towards creation of infrastructure and capacity build-up. Several initiatives are being taken by the Ministry of Shipping including modernization of port infrastructure, construction of new terminals, installation of new and modern equipments, mechanization of cargo handling operations and automation through computer aided systems. It involves special attention towards close coordination and interface between Roads, Railways and Port Authorities. For the supply of coal mines, ports and requisite transportation facilities have been developed. Ministry of Coal, Railways and port authorities are enabling them to undertake coordinated development of coal mines, ports and transport infrastructure. To ensure ease of capacity creation by establishing solar generation Parks with dedicated infrastructure plants at state level, State Governments would be encouraged (National Electricity Plan, 2012).

5.3 Macroeconomic Factors and Investors

Investment in power sector is discretionary with a long-term commitment from investors for the entire life of a project. Macroeconomic factors affect government investment in infrastructure due to fiscal environment, domestic and commercial investors by inflation and present interest rates for loans, and foreign investors by growth rate and exchange rate fluctuations. Since the financial crisis, Indian economy is unstable. The macroeconomic policies of an economy are critical to shape the investment climate. However GDP for 2011-12 is 6.5% but there is inbuilt boom in power sector because of shortfall in power generation and favorable attitude of government.

6.0 Opportunities

Investment climate is supportive in India for power sector. The major supply of finance for the sector is expected from commercial banks, public
financial institutions, power finance institutions, insurance companies, overseas markets, multilateral credit, bond markets and equity markets for 12th five Year plan. Some of the more exciting opportunities are as follows:

**Generation, Fuel and related Infrastructure**

Thermal projects power is likely to be the major source of generation opportunities as the coal and gas based projects presently have a competitive tariff advantage over renewable energy projects. Companies that can mine coal on lower cost basis, trading and infrastructure development for imported coal can be lucrative for entering into power sector. Various policy and regulatory initiatives are being taken to explore hydro and solar power potential along with renewable energy and nuclear energy addition in the country. The Ministry of New and Renewable Energy has set aggressive targets of approaching 25,000 MW by 2012 for renewable energy; with projection of estimated investment of about $257 million is area of good investment. Setting of Group Captive plants and trading activities participation can leverage the emerging opportunities.

**Transmission**

The State Transmission Utilities and Central Transmission Utilities will invite private companies to implement these projects through an independent private transmission company (IPTC) or on a Joint Venture basis through an international competitive bidding process. However, The IPTC’s role will be limited to the construction, ownership and maintenance of transmission lines as operations of the grid, including load dispatch, scheduling and monitoring, will be undertaken by the STUs and the CTU at the intra-state and inter-state/inter-regional level, respectively.

**Distribution and Franchisee**

As privatization is gathering momentum, distribution will become a very large profitable opportunity. Equipment makers, Smart technology providers and specialist with billing, collections and network management can come to avail the emerging market for power distribution. M/s Torrent Power was selected as the distribution franchisee in January, 2007 for Bhiwandi on input based and result in reduction of AT&C losses from 54.64% to 20.20%, Distribution Transformer failure rate from 40% to 3.7% and improvement in metering from 23% to 100%. Learning from the experience of Bhiwandi, the towns of Nagpur,
Aurangabad and Jalgaon in Maharashtra, Agra in Uttar Pradesh have also been awarded to Franchisees. Many distribution companies are on their way to adopt urban and rural franchises based on Bhiwandi model with longer control period. Private players with experience of operating in urban and rural locations can be the part of distribution chain.

**Outsourcing**

Entry of private sector is opened for power sector. But new players are facing the challenge of trained technical shortage. So, outsourcing of power Operation and Maintenance (O&M) activities in generation and distribution become a significant opportunity for the specialists. To be opportunistic for private players outsourcing includes a reduction in lifecycle cost and risks leveraging technical know-how of operating similar power plants with increased performance. Various opportunities will come with performance linked returns by competitive bidding process.

**Opening of Various Routes**

Allowance of private sector is a liable point in the growth of this sector. Private Sector is participating and performing well by government support and reforms. During the 11th Year Plan one-third of investment came from private sector and this share is expected to be 55% in next Five Year plan. It is a big opportunity for the private players to invest and get the piece of future gains. Also entrepreneurs in regional geographic having the deep understanding of conditions can be participants of value chain of power sector.

FDI is gaining momentum in India and investors are expected to come forward to benefit from the investment opportunities in India as 100% FDI is permitted for power generation, transmission and distribution to facilitate private investment on automatic routes. “Japanese power equipment companies and lenders are keen to work in the entire chain of power right from equipment supplies, maintenance, and also refurbishing old plants and upgrading them with Indian companies.,” as per Tsuneyuki "Hiro" Ito, Deputy Director in Ministry of Economy, Trade and Industry, Japan.

PPP projects- Some of the major PPP projects undertaken are four ultra-mega power and Jhajjar power transmission project in Haryana will happen more
frequently in future. Besides for foreign investors along with domestic players joint venture can be medium to enter and reap the profits.

**Good performance of Power sector players**

Public sector players like National Thermal Power Corporation Ltd., National Hydroelectric Power Corporation Ltd., North Eastern Electric Power Corporation (NEEPCO), Bharat Heavy Electronics Ltd., and Power Grid Corporation of India Ltd. etc. are taking various measures to improve the power sector performance. NTPC and Power Grid in public sector and, Reliance infra and Tata power in private sector are among the top players for investment in their stock. BHEL, Larsen & Toubro, ABB Ltd. and Sieman India Ltd. are also performing well. For best stocks selection, Investors should prefer players with assured fuel supply through captive blocks or through imported coal like Tata Power, Adani, Lanco Infratech and JSW, players unaffected with exposure to mismanaged SEBs like NTPC and Tata Power.

**7.0 Challenges**

Despite a conducive environment for investment, there are still a number of challenges that are faced by investors the power sector. Some of the important challenges are given below.

(a) Shortage of fuel - With passage of time, reserves for fossil fuels will deplete and need to move to non-conventional energy. However, these new energy sources are significantly more expensive at present and will mean higher per unit energy costs. Coal is nonrenewable sources of energy and the burning of coal accounts for approximately one half of all electricity generation. Coal is not presently being produced at required level to meet the demand of the capacity addition requirement. However, matching coal requirement with new projects taken up to go on stream in near future can be arranged in advance. Similarly, for the import of coal, the estimates are to be clearly defined so that the ports gear up to handle the projected quantity of coal. India’s domestic energy supplies are limited, creating an energy challenge and import dependence will make supply costly.
(b) Under-pricing supply of electricity from the state owned sector imposes a large burden on the energy producers reducing the resources that should accrue to them for financing new investments in these areas.

(c) Crime and corruption undermine the investment climate by discouraging firms from investing and increasing the costs of business through the payment of bribes and taking precautions of environmental concern.

(d) Global crisis and continued difficulties in world markets are hindering the pace of increase in private corporate investments. Rise in prices of global energy and commodities are also flowing uncertainty in power sector. Domestic inflationary pressures, particularly as reflected in rising wages are adding uncertainty in power sector. Due to Shortage of coal, Coal allocation is big challenge to encourage further investment in the sector.

(e) Risks associated with competitive bidding- There are also inbuilt risks associated with competitive bidding for private players due to long duration of tenders (Table 4).

<table>
<thead>
<tr>
<th>Cases</th>
<th>Major uncertainties</th>
<th>Duration of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Generation</td>
<td>Fuel costs (both local and imported)</td>
<td>25 years</td>
</tr>
<tr>
<td></td>
<td>Transportation costs</td>
<td>25 years</td>
</tr>
<tr>
<td></td>
<td>Equipment costs</td>
<td>3-5 years (impact 25 years)</td>
</tr>
<tr>
<td></td>
<td>Financial closure</td>
<td>10-15 years</td>
</tr>
<tr>
<td>Transmission</td>
<td>Equipment cost including materials such as Aluminum for conductors and steel for high tension towers</td>
<td>10-15 years</td>
</tr>
<tr>
<td></td>
<td>Financial Closure</td>
<td>10-15 years</td>
</tr>
</tbody>
</table>

_Source: PricewaterhouseCoopers_

All the impediments listed above demand proper implementation of policies and continuous improvement in regulations on a regular basis in the right direction.

Some suggestions for a boost in investment are as follows:
Investment in Indian Power Sector: Growth, Prospects and Challenges

- There are great needs for Fuel reforms particularly in the coal sector.
- For the place availability, logistical arrangements are required for fuels movement.
- SEBs in distribution segments need immediate actions to improve their bad performance.
- Proper and timely supply of ‘Balance of Plant’ equipments.
- Skilled manpower is required to handle the operations and maintain them profitably.

8.0 Conclusion

The demand for the electricity for various uses by the households, farmers, commercials and government is growing day-by-day. Power sector has thus become an attractive sector for investment. The public sector undertakings have not been able to catch up with the growing demand for electricity. Inefficiency and huge losses have made the government introduce various reforms directed towards private and foreign investment. It would be beneficial to outsource some of the power utility activities / services to small and medium scale enterprises (SMEs) as well. Infrastructure development by the related authorities, opportunity environment of Indian economy, opening up of various routes for FDI and investment trends in generation, transmission and distribution are important drivers for prospective investors to consider investing in the power sector.

Power sectors reforms are bringing a change in the environment of power sector and encouraging the investors by providing various opportunities. Numerous policy initiatives in the form of opening of the doors for FDI, delicensing, independent power projects, competitive price bidding, and mega power projects taken by Indian government have increased the likelihood of investment. Besides, improvement in working of PSUs, operational efficiency and training to employees is inviting the debt and equity financing to the sector. The importance of private participation lies in introducing competition in this sector which will lower the cost of power purchase and improve the performance. Further, returns under an appropriate investment climate are encouraging the
other countries’ project promoters to look towards India. In the light of government's openness to reforms and private sector allowance and performance in power sector, there are significant short-term and long-term investment opportunities for domestic and foreign companies across the power industry value chain. India needs to assure continuity of reforms for long-term investment in the sector.

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