THE INDIAN POWER SECTOR: INVESTMENTS, GROWTH AND PROSPECTS

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In a statement, the Planning Commission of India said that for the Indian economy to grow at 9 per cent, it is imperative for the power sector to grow at 8.1 per cent per annum\(^{13}\). Therefore, it becomes essential to assess the power sector by analysing its current status, the key challenges faced by it, and its future growth drivers.

The power sector consists of generation, transmission and distribution utilities and is a crucial component of India’s infrastructure. India’s rapid growth over the past decade has increased power demand, which is still largely unmet. According to Government of India estimates, the nation’s per capita power consumption was pegged at 779 kWh in FY10, far below the world average of over 2,782 kWh\(^{1}\). However, the government is striving to increase the per capita consumption to 1,000 KWh per year by the end of 2012\(^{2}\) through large sale power projects and rural electrification programmes.

Therefore, this report covers the current status of the power sector in India, assessing the generation capacity, and correlating it with economic growth. The report also provides an analysis of the key achievements of the 11th Five Year Plan, and initiatives that the government is taking to increase power generation. The report also provides some indications on the way forward for the industry through a discussion on the current Union Budget and projections for the 12th Five Year Plan.

\(^{1}\) Government of India – Press Information Beaureau  
\(^{2}\) Central Electricity Authority
1. KEY DEVELOPMENTS AND THE CURRENT STATE OF THE INDIAN POWER SECTOR

Power is considered to be a core industry as it facilitates development across various sectors of the Indian economy, such as manufacturing, agriculture, commercial enterprises and railways. Though India currently has the fifth largest electricity generation capacity in the world pegged at 1,92,792 MW\(^3\), the growth of the economy is expected to boost electricity demand in coming years\(^4\). Figure 1 exhibits a strong correlation between the GDP growth and increase in power generation capacity over the last decade.

![Figure 1: Comparison of growth in GDP and power generating capacity](source: Central Electricity Authority, World Bank)

India saw a total capacity addition of approximately 54,000 MW during the 11th Five Year plan\(^3\), of which approximately 47 per cent was contributed by the central government, 34 per cent from the state government, and a little over 19 per cent from the private sector\(^5\). Some examples of top public sector companies include National Thermal Power Corporation (NTPC), Damodar Valley Corporation (DVC) and National Hydroelectric Power Corporation (NHPC). Some key companies in the private sector include Tata Power and Reliance Energy Limited\(^4\).

In India, power is primarily generated from thermal and nuclear fuels, hydro energy and renewable sources. Figure 2 exhibits different inputs used for power generation and power consumption by different sectors.

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\(^3\) The Economic Times – India sees 54,000 MW capacity addition in the 11th Plan

\(^4\) Invest India – Power Sector

\(^5\) India Energy Congress report
As shown in Figure 3, India’s power generation capacity has significantly increased since 2008, and is also expected to show a strong growth in the future. However, India faced a power deficit of approximately 8.5 per cent and a peak demand deficit of over 10 per cent in FY11\(^\text{5}\) primarily due to fuel shortage. This shortage can be attributed to aggregate technical and commercial (AT&C) losses, which is about 30 per cent with a high variance across various utilities\(^\text{6}\). Therefore, it is essential for the government to work proactively to increase the sector’s generation capacity in a sustainable manner by addressing key challenges, such as supply shortage and distribution losses without damaging the environment, to attain a high growth rate during the 12th Five Year Plan.

\(^{5}\) CSTEP – Working paper on the Indian power sector
To cope with the demand deficit, the Indian government has implemented various progressive measures to maximise the country’s power generation capacity and improve distribution. Some examples of such measures include rural electrification programmes and ultra mega power projects. In particular, the inflow of foreign direct investments is expected to step up capacity addition significantly. The government has allowed FDI of up to 100 per cent through the automatic route in all segments of the power sector except for nuclear energy. Consequently, the sector has drawn about US$ 4.6 billion investment over the past decade, of which US$ 1.6 billion came in FY12 alone. In particular, the petroleum and natural gas segments saw the maximum investments from international companies (US$ 2.7 billion since 2000) due to the government’s New Exploration Licensing Policy (NELP). This jump in overall investments was facilitated by the planned capacity addition of 76,000 MW and 93,000 MW during the 12th and 13th Five Year plans, respectively. Further, a statement released by the Ministry of Power revealed that the power sector is expected to receive investments of about US$ 300 billion due to large scale expansion plans over the next few years. A large chunk of investments is expected to come from private investors, who have high confidence in the sector, as demonstrated by the success of recent IPOs of public sector undertakings under the Ministry of Power.

In a recent move to propagate power trading in India, the Government allowed FDI of up to 26 per cent and foreign institutional investments of up to 23 per cent in power exchanges segment. This strategic initiative is expected to help the Indian power trading segment to mature, and draw numerous private investors who can

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5 Overseas Indian Facilitation Centre – Power in India
6 Public Information Bureau – Statement by Sushil Kumar Shinde
help bridge the supply-demand gap in the country, in addition to bringing in new and advanced technology\textsuperscript{9,10}.

Hence, we can comfortably say that the Indian power sector has strong future growth prospects. Consequently, we need to assess the various policy initiatives that have had a positive impact on the sector, and capitalise upon them further to ensure a strong future growth.

1.1 Major achievement of the 11th Five Year Plan and key emerging developments

The 11\textsuperscript{th} Five Year Plan was one of the most successful plans implemented so far. The sector achieved a total capacity addition of approximately 53,922 MW (more than two and a half times that in the 10\textsuperscript{th} Plan), out of which close to 19,500 MW was added in the FY12 alone\textsuperscript{11}. Figure 4 below highlights the year wise capacity addition till August 2011.

Some key achievements of the 11\textsuperscript{th} Five Year Plan are highlighted below\textsuperscript{11}:

- First, in the transmission sector approximately 70,239 circuit kilometres of transmission wires were added, along with a capacity addition of 13,800 MW till the end of FY12 for inter regional transmission lines.
- Second, the government achieved the electrification of over one lakh villages, and provided free electricity to close to two crore households below the poverty line by the end of the 11\textsuperscript{th} Plan.

\textsuperscript{9} The Economic Times – FDI in power exchanges
\textsuperscript{10} The Hindu BusinessLine – FDI in power exchanges
\textsuperscript{11} Indian Power Sector – Capacity added during the 11th Plan
• Third, a capacity addition of 6,080 MW was sanctioned through nine super critical technology units, with over 24,000 MW to be added in a similar manner in the 12th Plan.

• Fourth, a National Electricity Fund (NEF) was formed which subsidises the interest to be paid on loans taken by State Electricity Boards to hedge against distribution losses.

Key emerging developments in the power sector include the use of more efficient and environment friendly supercritical technology in thermal projects. Approximately 60 per cent of the total capacity addition in the 12th Plan is expected to use supercritical technology for electricity production. Further, focus is increasingly shifting to cleaner forms of generation such as renewable, hydro or nuclear sources with the Government proactively encouraging electricity supply companies to adopt the Renewable Purchase Obligation (RPO) scheme; this ensures that they obtain a specified portion of their total energy consumption from renewable resources. In addition, power trading is also becoming an important business within the country, with companies in the power sector setting aside 15 to 20 per cent of the total power they produce to be sold in the market.

1.2 Some factors affecting the performance of the power sector

The Indian Government took the proactive measures mentioned above to ensure sustainability, and address some of the following challenges.

Fuel shortages

Power is a capital intensive industry with long gestation periods, and the shortage of fuel can be a major challenge in the long term. Traditionally, most power plants in India use coal or natural gas as fuel, both of which are fast depleting reserves. Further, the Working Committee on Power forecasts a shortage of 238 metric tons of coal per annum by FY17. Additionally, there is also a shortage of natural gas in the market, though the deficit has reduced by 25 per cent over the past decade to reach 20 per cent over FY11.

As a remedy, the Indian government plans to allot 40 billion tons of coal reserves through a bidding process, and deregulate the power sector to promote investments. Further, the government will explore the possibility of importing natural gas from countries, such as Bangladesh, which have surplus of coal reserves.

12 Business Standard – A renewed hope for alternative energy
13 PwC report – Emerging Opportunities and Challenges [published for India Energy Congress], Jan 2012
Difficulty in obtaining environmental approvals and land clearances

Land acquisition is one of the key challenges impeding the growth of the power sector in India\textsuperscript{14}. Further, obtaining environmental approvals is also difficult as a large number of government bodies need to be contacted for clearances, including the Ministry of Environment and Forests, Ministry of Aviation, Department of Forests, and other government institutions\textsuperscript{13}. These challenges primarily arise due to concerns over environmental pollution, issues regarding rehabilitation, afforestation and regulatory delays\textsuperscript{13}.

Degrading financial health of state distribution utilities

Eight state electricity boards (SEBs) had stopped making payments to NTPC in 2011, despite getting discounts of up to 2 per cent on immediate payments, and 1 per cent on payments made within one month. The losses of distribution utilities in India were pegged at Rs 75,000 crore (US$ 13.9 billion) in 2011, and are expected to rise to Rs 1.16 trillion (US$ 21.4 billion) by 2014-15\textsuperscript{15}.

Detractors or risks associated with competitive bidding

The power sector is inviting bids from private investors, which in turn is increasing price competition. This is a positive sign for the sector but it might increase risk for private companies primarily because during the bidding process, power generation companies normally quote prices for a period of 25 years and power transmission companies quote for a period of 35 years.\textsuperscript{13} Table 1 exhibits an analysis showing such risks.

<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 aluminium 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 analysis

\textsuperscript{14} The Hindu Business Line – Comments by Ratan Tata
\textsuperscript{15} Livemint – State distribution utilities stop payments
Competition from international OEM manufacturers

Indian companies manufacturing equipment for the power sector face significant competition from international companies, especially Chinese companies, offering faster delivery schedules and lower costs. The prices of Chinese players are 50 per cent lower than that of domestic manufacturers\textsuperscript{13}.

These challenges now set a context to discuss the measures that the Indian Government is expected to take in the future through the implementation of corrective policies as described in the Union Budget of 2012–13 and the 12th Five year Plan.

Power is one of the key sectors driving India’s infrastructure growth. Therefore, it is essential for the country’s power sector to meet planned capacity additions and reduce power deficits to increasingly contribute to the country’s GDP growth. According to statements by the Planning Commission it is imperative for the power sector to grow at 8.1 per cent per annum to attain an ambitious economic growth target of 9 per cent\(^{13}\).

The following sections provide a perspective on the various policy reforms that the government has taken in the 2012–13 Union Budget and other initiatives that aid the development of the power sector.

2.1 What the Union Budget of 2012–13 holds for the power sector in India

The Indian government has recognised the power sector as a key driver to sustain GDP growth in coming years. Therefore, the government is proactively working towards scaling up the generation capacity through actionable reforms and measures. Consequently, the prognosis of the 2012–13 Union Budget for the power sector was largely positive.

First, the government has waived the basic customs duty (BCD) on coal imports and has reduced the countervailing duty (CVD) on coal from 5 per cent to 1 per cent\(^{16}\). This is expected to benefit numerous private sector players who depend on imported coal to carry out day to day operations\(^{17}\). In addition, the government has directed Coal India Limited (CIL) to sign agreements with power plants that are in long term power purchasing agreements (PPA) with distribution companies (DISCOMS)\(^{18}\) to reduce the cost of raw materials.

In addition to allowing External Commercial Borrowings (ECB) to provide additional finance to existing power projects, the government allocated Rs 100 billion (US$ 1.8 billion) in the form of tax free bonds to fund infrastructure projects in the power sector over FY13\(^{19,18}\). Further, the tax on interests earned on ECBs was reduced by 15 per cent to 5 per cent. This is expected to increase the working capital for companies in the sector\(^{17}\).

The government proposed a deduction of 100 per cent on the profits of power sector undertakings set up in the next one year, up to 10 years\(^{18}\). The former Finance Minister, Mr Pranab Mukherjee, also proposed a 20 per cent depreciation

\(^{16}\) Business Monitor International – India Power Report, 2012
\(^{17}\) MoneyControl – Impact of budget on the power sector
\(^{18}\) Union Budget 2012–13
\(^{19}\) D&B analysis of the union budget
on new assets acquired by power generation companies in the initial year.\textsuperscript{19,20} As per a D&B analysis, the government’s moves are expected to encourage more companies to enter the Indian power sector, while simultaneously helping existing companies to expand their operations. The budget also provided an exemption of 100 per cent on CVD for equipment used in solar or thermal projects. This will encourage companies operating in the power sector to focus on renewable energy sources rather than conventional sources\textsuperscript{19}.

2.2 An approach to the 12\textsuperscript{th} Five Year Plan

Total investments for the Indian power sector, as projected by the Working Group on Power for the 12th Five Year plan, stand at Rs 13,72,580 crore (US$ 253.6 billion). To this effect, the government has focussed on raising funds through measures, such as credit enhancement schemes and infrastructure debt fund. A major part of capital required for financing power projects is expected to come from commercial banks, public financial institutions, infrastructure/power finance institutions, international investments, bilateral credit and equity markets\textsuperscript{21}. Table 1 shows the expected distribution of funds between the centre and state governments and private sectors during the 12th Five Year plan.

<table>
<thead>
<tr>
<th>Expenditure Area</th>
<th>Centre</th>
<th>State</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal</td>
<td>48,650</td>
<td>55,734</td>
<td>1,73,117</td>
<td>2,77,500</td>
</tr>
<tr>
<td>Hydro</td>
<td>35,183</td>
<td>8,042</td>
<td>6,952</td>
<td>50,159</td>
</tr>
<tr>
<td>Nuclear</td>
<td>26,200</td>
<td>-</td>
<td>-</td>
<td>26,600</td>
</tr>
<tr>
<td>Biomass</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>10,500</td>
</tr>
<tr>
<td>Small Hydro Projects</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8,000</td>
</tr>
<tr>
<td>Solar</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>49,400</td>
</tr>
<tr>
<td>Wind</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>67,200</td>
</tr>
<tr>
<td>Captive Projects</td>
<td>-</td>
<td>-</td>
<td>65,000</td>
<td>65,000</td>
</tr>
<tr>
<td>Modernisation of Plants</td>
<td>19,847</td>
<td>12,040</td>
<td>-</td>
<td>31,887</td>
</tr>
<tr>
<td>Transmission</td>
<td>1,00,000</td>
<td>55,000</td>
<td>25,000</td>
<td>1,80,000</td>
</tr>
<tr>
<td>Distribution</td>
<td>48,191</td>
<td>2,38,082</td>
<td>19,963</td>
<td>3,06,235</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>7,482</td>
<td>-</td>
<td>-</td>
<td>7,482</td>
</tr>
<tr>
<td>Human Resources</td>
<td>4,108</td>
<td>-</td>
<td>-</td>
<td>4,108</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>4,168</td>
<td>-</td>
<td>-</td>
<td>4,168</td>
</tr>
<tr>
<td>Advance for 13\textsuperscript{th} Plan</td>
<td>1,65,372</td>
<td>15,417</td>
<td>91,793</td>
<td>2,72,582</td>
</tr>
<tr>
<td>Total Investment</td>
<td></td>
<td></td>
<td></td>
<td>Rs 13,72,580 crore (US$ 253.6 billion)</td>
</tr>
</tbody>
</table>

Table 2

Proposed distribution of funds during the 12\textsuperscript{th} Plan (in Rs crore)

Source: Planning Commission – Report of the Working Committee on power

\textsuperscript{20} The Hindustan Times – Finance Minister allows high depreciation for power
\textsuperscript{21} Overseas Indian Facilitation Centre – Power sector
These investments are expected to come in the form of mostly debt and equity. The debt-equity ratios for centre, state and private investments, along with the projected investments by year are given in Figure 5.

Figure 5
Projected investments in the 12th Five Year Plan

The demand for power is expected to grow at a CAGR of approximately 7.5 per cent during the 12th Five Year plan from 9,68,658 Gwh in FY12 to 13,95,065 Gwh in FY17, whereas peak load requirement is expected to grow at a CAGR of 7.4 per cent. In view of projected increase in demand, the government has already initiated various power projects. It also plans a capacity addition of approximately 100 GW, of which 28 GW will come from projects started in the 11th plan.22 However, the primary problems faced by the sector include the depleting natural reserves of coal and natural gas, transmission losses and AT&C losses.23 Consequently, the focus of the Planning Commission during the 12th and 13th plans lies in conventional sources, such as hydro and nuclear energy, as well as renewable sources, such as solar and wind energy.24 Therefore, the power sector in India plans to capitalise on the hydropower capacity in the North Eastern region,

22 The Planning Commission – An approach to the 12th Plan
23 ERSAF report on Indian power sector
24 Central Electricity Authority
and is in the process of obtaining clearance to speed up the development. An addition to the generation capacity of nuclear and gas based power plants is also expected during the 12th plan.

In particular, about 22,000 MW of untapped capacity has been identified in the hydropower segment that is likely to benefit the sector during the 12th and 13th plans, whereas an increase of 2,800 MW is expected in nuclear energy generation.

During the 12th plan, the share of the private sector in capacity generation and transmission is likely to increase. The private sector is expected to contribute approximately 60 per cent of the total planned capacity over 2012-17. This increase in private participation is primarily due to measures such as allowing 100 per cent FDI through the automatic route, the setting up of ultra mega power projects and public sector participation through PPP initiatives or joint venture route.

The power sector in India is expected to offer tremendous opportunities to players as the demand for power is expected to increase exponentially to 9,50,000 MW by 2030. It is projected that 76 per cent of the total expected investments of US$ 1,250 billion in the energy sector will go to power generation, distribution and transmission by the end of this period. The government’s focus is expected to shift from thermal generation to nuclear generation and renewable sources to ensure sustainability and prevent the depletion of natural reserves. Further, the Indian government tries to reduce the time required to obtain regulatory approvals, and to improve the legal framework to increase private sector participation in power generation, transmission and distribution. Consequently, we see numerous metrics that demonstrate this growth such as a 31 per cent increase in per capita electricity consumption over 2002-09, and the electrification of 49 lakh villages under the Rural Electrification Program over 2002-11.

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25 Invest in India – Power sector
24 The PowerTimes – Indian power sector to offer immense opportunities
27 India Energy Congress report
3. CONCLUSION

The power sector in India is currently in the developing stage, and supports the growth of various sectors, such as infrastructure, manufacturing, commercial enterprises and railways. Therefore, it is a key enabler for India’s economic growth, and has historically shown similar growth trends as compared to the economy.

Currently, the primary fuels used for power generation in India are non-renewable, such as coal and natural gas. However, given the expected increase in future demand (9,50,000 MW by 2030), the government’s focus has now shifted to capacity additions using cleaner fuels, such as renewable and nuclear energy. To this effect, the Indian government has taken several initiatives, such as promoting the RPO scheme, allowing 100 per cent FDI through the automatic route, setting up of ultra mega power projects and encouraging joint ventures through the PPP route to step up private sector participation. In fact, the private sector is expected to contribute nearly 60 per cent of the total capacity additions planned over 2012–17. Further, the Government has also allowed foreign investments up to a limit of 49 per cent in power trading to aid the rapid development of the sector.

The industry sees tremendous scope of growth through programmes such as the Rural Electrification Program and the ultra mega power projects, which would require huge investment. The Government’s focus is now shifting towards the use of renewable energy sources, and more efficient and environment friendly supercritical technologies for thermal generation to ensure sustainable development. In fact, the power sector’s future focus is expected to be on hydrogeneration and the identification of close to 22,000 MW of untapped hydro capacity.

These positive developments along with initiatives such as concessions to players on CVD and BCD for coal import as taken in the 2012–13 Union Budget address some key challenges in the sector such as depleting coal and natural gas reserves. Through the budget, the government also provided additional capital by allowing ECBs and allocating Rs 100 billion (US$ 1.8 billion) in the form of tax free bonds. Further, the sector is expected to generate investments of approximately Rs 13,72,580 crore (US$ 253.6 billion) during the 12th Plan period to meet the increased power demand and grow at a CAGR of 7.5 per cent over 2012–17.
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