ANALYSIS OF CHALLENGES AND PROSPECTS OF POWER INDUSTRY IN INDIA

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Abstract

The population of India is increasing at very fast rate, the present surge in electricity demand, and the projected increase of the Indian population, the importance of available energy cannot be underestimated. In India, the coal accounts for approximately one half of all electricity generation, nuclear energy approximately one fourth of all electricity generation, and hydro, and gas roughly ten percent of the total electricity generation. Globally, India is presently positioned as the eleventh largest manufacturer of energy, representing roughly 2.4% of the overall energy output per annum. Usually energy, especially electricity, has a major contribution in speeding up the economic development of the country. The existing production of per capita electricity in India is around 600 kWh per annum. Ever since 1990s, India's gross domestic product (GDP) has been increasing very rapidly and it is estimated that it will maintain the pace in the next couple of decades. Expanding access to energy means including 2.4 billion people: 1.4 billion that still has no access to electricity (87% of whom live in the rural areas) and 1 billion that only has access to unreliable electricity networks. We need smart and practical approaches because energy, as a driver of development, plays a central role in both fighting poverty and addressing climate change. The paper discusses the key trends that are expected to drive the power generation and transmission in India and associated opportunities and challenges.

Key words: Economic development, Transmission and distribution losses, Hydro power.

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Introduction

Energy is a crucial ingredient for economic development. As both agricultural and industrial activities increase, the demand for energy similarly increases. In the developing world provision of a greater access to energy has been suggested by some that will help grow their economies and improve the lives of the poor. Economic growth is critical in reducing poverty, increasing self-sufficiency, and achieving prosperity. Trade and investment accelerate growth, stimulating income and wealth generation. Virtually all economic activity is dependent on energy, whether in urban, peri-urban, or rural areas Electricity and modern fuels are integral to economic development and trade and underpin agriculture, industry, transportation, and commercial enterprises in all countries. Though energy is not sufficient on its own to achieve economic growth, it is a necessary prerequisite. Populations that lack access to energy services cannot create the conditions needed to lift themselves out of poverty

As developing nation industrialize and move toward modern commerce, there is an urgent need for high-quality electricity and fuel services. The largest developing nations—China, India, Brazil, Mexico, and South Africa—have strong industrial and commercial sectors and corresponding high energy demand similar to those of developed

For many developing countries, agriculture continues to be the dominant sector for employment and one with significant potential for growth as countries enter the global marketplace. Energy is key to expanding agricultural markets and trade by contributing to

increased and diversified crop production, powering the chain of farm – to – shelf production, and transporting products to market. Used efficiently and effectively, energy services can enhance productivity, increase output, boost competitiveness, and strengthen local economies. Electricity can transform businesses from manual labor to mechanization and automation, stimulate uniform production, and improve quality, thus allowing for higher prices for goods and services. Consistent products also help to establish a more reliable clientele base simply ensuring that electricity is available for industry and commerce is not sufficient. If electricity is not highly reliable and of **suffi** cient quality, the costs to industry of power outages and the need for investment in backup systems can be substantial and limit economic growth. This population shift places additional pressure on already strained infrastructure, institutions, and natural resources in the urban areas. From the energy perspective, two key issues have emerged in urban areas—access and the environment. As urbanization continues to outpace energy service supply,

meeting the demand of poor communities becomes increasingly difficult. Today, an estimated 25 – 50% of urban residents in developing countries live in slums and squatter settlements. Finding ways to provide access to affordable energy services as well as opportunities for jobs, income, and economic development is essential.

Current level of demand and supply of electricity

The Government of India has an ambitious mission of **'Power for all by 2012'**. This mission would require that our installed generation capacity should be at least 2, 00,000 MW by 2012 from the present level of 1, 14,000 MW. To be able to reach this power to the entire country an expansion of the regional transmission network and inter regional capacity to transmit power would be essential. The latter is required because resources are unevenly distributed in the country and power needs to be carried great distances to areas where load centers exist.

The annual growth in power generation during 11th Plan period is as under:

Table 1

11th Plan	Growth in Achievement(%)
2007-08	6.3
2008-09	2.7
2009-10	6.6
2010-11	5.56
2011-12	8.11

Source: Ministry of Power

During 11th five year plan growth in electricity generation has been erectic one. The growth rate was very low in 2008-09. The growth in electricity generation during 2008-09 was constrained due to delay in commissioning of new units during 2008-09, long outages, shortage of coal/gas/nuclear fuel, poor hydrology, etc. But the demand side constantly increased at a very high rate, thereby creating the huge gap between supply and demand of electricity. The domestic energy requirement for the financial year 2010 was 8,30,594 million units (mkwh) while the energy generated was only 7,46,644 million units (mkwh) creating a gap of 83950 million units (mkwh). During FY 2010 overall energy deficit in the country was 10.1% while peak deficit stood at 12.7% with shortage of 15,157 MW. During the period April – July 2010, the domestic energy requirement and availability were 2,91,214 MU and 2,58,972 MU respectively leading to energy deficit of 11.1% while the peak deficit stood at – 13.8%.

The overall generation in the country has increased from 811.143 BU during 2010-11 to 877 BU during the year 2011-12. The category wise generation performance is as given in table.

Table 2

Thermal	Improved by	6.59%
Hydro	Improved by	14.22%
Nuclear	Improved by	22.92%
Bhutan Import	Improved by	-5.82%

Source: Ministry of Power

As is clear from the table that there is improvement in almost every field of electricity generation except imports from Bhutan which has increased in negative. Electricity generation from nuclear power has registered a highest growth rate of 22.92%. In a country like India generation from water should be promoted as it is a renewable resource. Nuclear power is highly risky. Generation from coal should be minimized as coal is a non renewable resource.

Challenges for power industry

Indian power industry is plagued with a number of problems due to which it is not able to supply quality power to other industries and general households. A reliable transmission and distribution system is important for the proper and efficient transfer of power from generation facilities to sub-stations or between sub-stations and up to the consumer. A transmission and distribution system is typically comprised of transmission lines, sub-stations, switching stations, transformers and distribution lines.

Distribution is the most challenging area as compared to Transmission due to various reasons. Due to lack of adequate investment on Transmission and Distribution works, the T&D losses have been consistently on higher side, and reached to the level of 32.86% in the year 2000-01.The reduction of these losses was essential to bring economic viability to the State Utilities. As the T&D loss was not able to capture all the losses in the net work, concept of Aggregate Technical and Commercial (AT&C) loss was introduced. AT&C loss captures technical as well as commercial losses in the network and is a true indicator of total losses in the system. High technical losses in the system are primarily due to inadequate investments over the years for system improvement works, which has resulted in unplanned extensions of the distribution lines, overloading of the system elements like transformers and conductors, and lack of adequate reactive power support.

The commercial losses are mainly due to low metering efficiency, theft & pilferages.

This may be eliminated by improving metering efficiency, proper energy accounting & auditing and improved billing & collection efficiency. Fixing of accountability of the personnel / feeder managers may help considerably in reduction of AT&C loss. Distribution sector is responsible for collecting revenue from consumers and thereby plays a significant role for sustenance of the Power sector

Hydro power projects are expected to face risks on account of factors such as political and environmental protests, delay / cancellation of environmental clearances, delays in land acquisition, poor infrastructure, tunneling delays, geological surprises, contractual and procurement issues, shortage of skilled man power, difficulties in evacuation of power, etc. Hydro power projects are also increasingly becoming prone to hydrology risks. Based on recent studies, Himalayan glacier is becoming increasingly susceptible to non linear climate changes and have been melting at a faster rate in the past two decades. Reliance on past Hydrology data may not reflect the future projections, thus the hydro projects based on glacier fed rivers will be increasingly exposed to Hydrology risks. Hydro power projects also face risks on account of developments in intercontinental rivers.

In recent times, there have been problems pertaining to evacuation of power in case of generation projects who are unable to identify beneficiaries / tie up transmission through Bulk Power Transmission Agreements (BPTAs) leading to uncertainty in planning / investment in transmission line augmentation (associated transmission system) by transmission utilities / licensees. Also, there have been difficulties for evacuating power in case of small – hydro / renewable energy projects which are often located in remote / difficult State Regulatory Commissions on the issue of interconnection of renewable / non firm power to the grid). Availability of fuel has emerged as biggest risk by thermal projects in India. Coal production has not kept pace with power capacity addition in this plan and developers have been forced to import coal at a time when international prices of coal have shot up. Lack of clarity on financing this extra cost as well as added transport costs for plants in the interior has led to uncertainty and reduced investments in power.

With coal backed capacity addition accounts for more than 50 percent of the total capacity addition in the current plan, the issue of acute coal shortage is to be addressed for targets to be achieved.

Deteriorating financial condition of SEBs Most of the state electricity boards are in bad financial health. As they are buying power at high rate and selling to the customers at low rate. This cannot be sustainable for long. So it is the need of the hour that work should be done to improve the financial health of these SEB's. Demand – and supply gap is growing. Acute energy and peaking shortages of about 9% and 18% respectivelyis existing in Indian economy. .Existing coal consumption is about 215 million tonnes and expected to grow to 350 million tons by end of 9th plan and 500 million tonnes by end of 10th plan. So Massive investments are required in mining, railways, ports for transportation of fuel. Supply of natural gas, even from existing gas based stations is very short of requirements and resulted in under-utilization of these stations.

Hydro power plants has inherent capability of quick start and stop operation. It represents the most economic and ideal combination with thermal power plants to meet peaking shortages. But share of hydro power in total installed capacity declined to 26%. This trend putting pressure on power system and additional burden of developing new coal mines and rail transportation and other infrastructure facilities.

Suggestions

Nearly 40 percent energy is lost in transmission and distribution which is a huge loss. In case of some state electricity boards this loss may be higher than 40%. 1% reduction in T & D Losses means saving capacity of 800 MW. For reducing T & D losses there should be continuous energy audits for identifying the elements causing excessive losses. Tamper proof meter boxes should be installed to check theft of energy. At present Haryana State Electricity Board is going to install new technology meters in the industries which would send meter reading automatically to headquarter. In case of power theft it would also send SMS to headquarter about the location where theft of power is taking place. These types of meters can be installed at the premises of all power consumers. This would not only stop power theft but also improve financial condition of state electricity boards. Installing and setting up vigilance squads to detect cases of theft of energy (theft of energy made a cognizable offence). Unmetered supply for agricultural – should be restricted to 30% of total power supply. The flat charge should be linked to capacity of HP motors used for agricultural purposes.

Most SEBs face time and cost overruns in project implementation because of poor cash flows. Those projects which depends on state funds for starting operations fails to get timely finance

from state governments. Due to which the construction period i.e. date of sanction/placement of order to commercial operation, in India is very high and is given below

- 24 to 240 months - hydro electric projects
- 37 to 206 months - thermal projects
- 39 to 129 months - Central Sector thermal projects

Major reasons for slippage in Central and State power Sector projects are paucity of funds, delay in placement of order for main plant and equipment, delay in supply of equipment by suppliers, procedural delays in land acquisition, non-resolution of inter-state disputes, problems due to disturbed site conditions at some projects, unresolved issues in fuel linkages, suspension of works due to contract failures and resettlement problems, States took private participation policy as opportunity to cut their own involvement in generation projects - State Sector inadequate funds, continued investment required in these projects so that investments already made not lost. prioritize investments before taking up new projects. These reasons if addressed well may reduce the gestation period of the power projects to the lowest side as given above. Which in turn would bring the demand supply gap downside?

There is always surplus power in some states while at the same time other states may be facing power shortages. In such a situation, regional grids which have surplus power during off-peak periods and certain seasons - be harnessed and optimally utilized in deficit regions. Inter-regional links interconnecting regions should be established - to lower aggregate requirement of capacity additions.

Private participation in development of power sector should be encouraged. Incentives should be provided to woo international investors, so that they can bring new technologies in power sector. Government should made competitive bidding mandatory for development of power projects. This would encourage private participation in power sector.

Present performance of most SEBs is not satisfactory. Losses are steadily increasing as hardly any state Electricity Board is earning statutory minimum of 3% rate of return on its fixed assets. This is due to improper managerial practices, high levels of inventories and establishment costs, unrealistic tariff structures, inadequate billing and heavy arrears in realization, substantial revenue collected by states as 'electricity duty', while full subsidy not paid to Boards for rural electrification and time and cost overruns in project implementation. Reforms and Restructuring of SEBs is a top priority for making them commercially viable entities. They should be

autonomous and have ability to take decision on commercial considerations to meet financial obligations to suppliers of inputs and independent generators and meet debt servicing and debt redemption obligations to raise finance for expansion of own operations.

Conclusion

Electricity remains an area of concern for India as it struggles to provide for the needs of the world's second fastest expanding economy. With the country's average per capita consumption of electricity at 704 kWh against the world average of 2,300 kWh, the sector has immense potential for growth. India needs an estimated $400bn investment in the power sector if it is to meet its development goals. Power failures shave percentage points off the country's growth, inhibiting development and delaying the time when millions below the poverty line can live a life of dignity. Electricity is vital. It doesn't just keep the plasma TVs working or the air conditioning humming – it means students in rural India can study at night, medicines and vaccinations don't spoil due to a lack of refrigeration, and food in cold storage doesn't rot. To boost the capability, India has ushered in a range of reforms since 2003. These include allowing private sector participation and exporting technological know-how by allowing FDI investment up to 100 per cent in projects relating to power sector. India had a target to add 78,000 MW of installed generation capacity under the 11th Five Year Plan (2007-12). It also planned to make electricity available to all by establishing an integrated National Power Grid in the country by 2012, with close to 200,000 MW generation capacities and 37,700 MW of inter-regional power transfer capacity. However, Planning Commission deputy chairperson Montek Singh Ahluwalia this year said that the planned targets were unrealistic.

Hopefully, the enactment of relevant legislation like Mining Bill, and Land Acquisition, Rehabilitation and Relief Bill, both of which are expected to be cleared by the Parliament this Winter Session, may help resolve some of the uncertainties from power projects. Also, breaking the monopoly of Coal India Ltd. by introducing private players in commercial market may be another good idea to help raise output. But India has to go miles to resolve its power problems.

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