

Comparative study on power situation in the Northern and Central states of India

PHD Research Bureau

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Abbreviations

OECD	Organisation for economic Co-operation and Development
PLF	Plant Load Factor
GDP	Gross Domestic Product
APDRP	Accelerated Power Development and Reform Programme
BRPL	BSES Rajdhani Power Limited
BYPL	BSES Yamuna Power Limited
CERC	Central Electricity Regulatory Commission
FY	Financial Year
GW	Giga Watt
HP	Himachal Pradesh
J&K	Jammu & Kashmir
KWh	Kilo Watt Hour
MP	Madhya Pradesh
MU	Million Units
MW	Mega Watt
Bn	Billion
NDMC	New Delhi Municipal Corporation
NDPL	New Delhi Power Limited
T&D	Transmission & Distribution
UP	Uttar Pradesh

Executive Summary

The Indian energy sector is today at a crucial juncture of development. With growing economy, the aspiration of people for improved energy services in terms of availability, accessibility, quality and affordable power have come up in a big way. However, the present energy scenario is not satisfactory as the demand and supply represents a deficit overall (8.5% at all India level) as well as across the states.

The power sector reforms were initiated in the early 1990s with a need to accelerate the power generation. However, still there remains a wide scope for further reforms in several directions such as strengthening regulation, improving distribution and opening bulk supply to competition, revising tariffs to more economic levels and synchronizing tariff structure amongst the states. The present study has been undertaken with the view to take stock of the current power situation in the Northern and Central states of India (the states under the command area of the PHD Chamber) and to evaluate the tariff structure of these states.

Study found that states with higher power tariffs like Delhi, Punjab and Haryana have exhibited low power deficits while the states with lower power tariffs have high deficit such as J&K and UP. J&K has posted the highest power deficit (-25%) amongst the states while Delhi has the lowest demand and supply gap for power (-0.3%).

Most of the Northern and Central Indian states have registered high per capita power consumption as compared to 779KWh in case of India. Delhi (1651KWh), Chhattisgarh (1547KWh), Punjab (1527KWh), Haryana (1222KWh), Uttarakhand (1112KWh), and J&K (952KWh) have high per capita power consumption as compared with the national average whereas Rajasthan (736KWh), MP (602KWh), and Uttar Pradesh (348KWh) are significantly below the national average.

In the category of domestic consumers, Delhi with the highest per capita energy consumption has marked high energy charges (4.2/KWh), while UP with the lowest per capita energy consumption has low average energy tariffs (2.9/KWh). The energy charge for industrial consumers is highest for Haryana (4.9KWh) and lowest for Uttarakhand (2.1/KWh). Rajasthan, Delhi, MP and Punjab have also high industrial tariff structure (above 4/KWh) amongst the other states. In a nutshell, Delhi, Punjab, Haryana, and Rajasthan have high energy charges for both domestic and industrial consumers.

While huge disparities exist among states in terms of installed power generation capacities, the larger states of Rajasthan, UP, Punjab, Haryana and Chhattisgarh have relatively high generating capacities. Most of the states have a dominance of thermal power plants followed by Hydro power stations. Many states have a long way to go in terms of generating new and renewable energy. Chhattisgarh has been found one of the most attractive destinations for industrial investments, and is backed by a robust power scenario marked by marginal power deficit. Although MP has also been able to attract a sizable share of industrial investments; however, the state faces a very high power deficit. Rajasthan has marked a good share of industrial investments and is making attempt to strengthen its power sector.

Going ahead, the states should aim at self-sufficiency in power production to meet the increasing demand-supply gap. Substantial growth of power transmission infrastructure system is necessary for sustainable development and optimal utilization of country's energy resources.

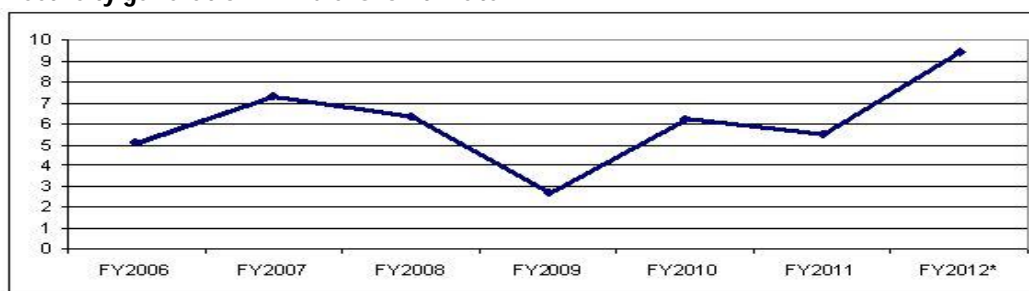
1. India's energy scenario: A brief outlook

Energy is one of the prime movers of economic growth and development of India. Energy is needed for economic growth, for improving the quality of life and for increasing opportunities for development. Internationally, Non-OECD countries account for 93% of the projected increase in world primary energy demand. China overtook the United States in 2009 to become the world's largest energy user despite its low per capita energy use – contributes 36% to the projected growth in global energy use.

In India, as the economy expands, the demand for energy grows exponentially. Although, energy sector in India has achieved the utmost priority; however, the crisis still prevails in country both in terms of energy requirement and peaking availability. The deficit in energy supply in terms of peak availability and total energy availability rose steadily from 2004 to 2008, a period of high growth in peak demand and total energy requirement. In 2009, the peak deficit came down on account of a slowdown in growth of peak demand. During April-December 2010, the total energy deficits were estimated at 10.2% and 8.8% respectively. However, some 600 million Indians do not have access to electricity and about 700 million Indians use biomass as their primary energy resource for cooking.

The 11th Plan envisaged capacity addition of 78,700 MW in the power sector; this has been revised to 62,374 MW. Capacity addition of 32,032 MW has been achieved till 31 Dec2010 and projects with a capacity of 30,725MW are under construction for commissioning during the remaining period of 11th Plan.

Electricity generation in India-Growth rate



Source: PHD Research Bureau, compiled from Office of the Economic Advisor.

* April to July 2011-12

The present energy scenario of the country is not satisfactory as the demand and supply represents a deficit overall as well as across states. The present study observes that Jammu and Kashmir has witnessed the maximum energy shortage of 25% and Delhi has witnessed the lowest energy shortage of 0.3%.

Energy shortages are an indication of insufficient capacity generation and inadequate transmission and distribution networks. Reforms in the Energy sector, for making it

efficient and more competitive, are need of the hour. While there has been some progress during the recent years, shortage of energy and lack of access continues to be a major constraint on economic growth. The persistent shortages of electricity indicate the need for improving performance of the energy sector in the country.

The Energy so far.....

Contents	Units
Installed Capacity	176 GW
Private sector share in generation	22%
Share of RE capacity	10.42
Gross generation	811 bn KWh
PLF(Central sector)	85%
PLF(State sector)	71%
Peak deficit	9.8%
Energy Deficit	8.5%
Per-capita energy consumption(FY2010)	779KWh
Villages Electrified	91%
Households Electrified	56%
Transmission & Distribution loss (FY2009)	25.4%

Source: PHD Research Bureau, compiled from various sources.

Going forward, the total estimated energy requirement is likely to increase to 3628bn KWh in FY2032 at 8% growth rate of India's GDP. While at 9% growth rate, it is expected to reach at 4493bn KWh energy requirement in FY2032. Whereas projected peak demand is estimated to increase to 592 GW in FY2032 at 8% growth rate of India's GDP and at 9% growth rate projected peak demand will increase to 733 GW in FY2032. The installed generation capacity is also likely to reach at 778 GW at 8% growth in FY2032 and 960 GW at 9% growth rate to meet the power deficit situation. However, these are only the conservative estimates over 8-9% GDP growth. As the economy is expected to enter the double digit growth trajectory in the next few years, than the demand for energy is likely to increase more tremendously in coming years.

Projections of energy requirements

	Total energy requirement (Billion KWh) @GDP growth		Projected Peak Demand (GW) GDP growth		Installed Capacity Required (GW) GDP growth	
	8%	9%	8%	9%	8%	9%
2016-17	1425	1577	226	250	306	337
2021-22	1980	2280	323	372	425	488
2026-27	2680	3201	437	522	575	685
2031-32	3628	4493	592	733	778	960

Source: Report of the Expert Committee on Integrated Energy Policy, GOI (2006a).

2. Power sector reforms in India

The power sector reforms in India were initiated in the early 1990s with a need to accelerate the power generation investment. Lately, introduction of Electricity Act 2003 has provided a legal and regulatory framework for the power sector to move forward in a more comprehensive way. In India, reforms have made major progress in the following areas:

- Entry by private independent power producers (IPP); corporatization of state-owned enterprises; unbundling of generation, transmission and distribution (T&D)
- A national enabling legislation (Electricity Act 2003); independent power regulation at national level (CERC) and in states
- Bulk transmission improvements (for example Powergrid), with wholesale electricity markets emerging in inter-state trading and merchant power sales (as an alternative to long-term power purchase agreements in cost-of-supply)
- Some, limited, private entry into distribution (for example Orissa, Delhi), and splitting up of some state electricity distribution companies into discoms (distribution companies); and
- Central incentives like APDRP (Accelerated Power Development and Reform Programme) to support the implementation of electricity reform in states including accelerated metering and reducing high unaccounted-for T&D losses.

However, still there remains a wide scope for further reforms in several directions:

- Strengthening regulation
- Improving distribution and opening bulk supply to competition
- Revising tariffs to more economic levels and synchronization of tariff structure amongst the states

3. Objective of the study

The present study has been undertaken with the view to take stock of the current power situation in the northern and central states and to evaluate the tariff structure of these states.

The specific objectives of the study include:

- Evaluating the current situation of power supply in the Northern and Central states of India with respect to the total power generation capacities installed.
- Assessment of the demand for power in states with reference to per capita power consumption and the power deficit or surplus in the states.

- Computing the average power tariffs in states for domestic and industrial consumers.
- Analysis of the relation between the parameters like per capita power consumption and deficits with the power tariffs in states.

4. Power situation in Northern and Central states of India

Power generation

Installed capacity generation of electricity in the country has increased to more than 159,000 MW as on 31st March 2010 from 147970 MW during the corresponding period in the previous year, by marking a growth of more than 7%.

However, among the Northern and Central states of India, the total installed capacity for power is the highest in the larger states of Rajasthan (5860 MW), UP (5480 MW), Punjab (5140 MW), MP (4800 MW), Chhattisgarh (4000 MW) and Haryana (3580 MW) as on 31st March 2010. In few states such as Chhattisgarh, Rajasthan, UP, HP and Haryana, the installed generation capacity have increased during 31st March 2009 to 31st March 2010 to cater to the growing power demand.

State wise installed generating capacity of electricity (utilities)

States	Hydro		Thermal		New & Renewable		Total (MW)	
	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010
India	36880	36860	93730	100810	13240	15520	147970	159390
Rajasthan	990	990	2990	3940	730	930	4700	5860
UP	530	520	4120	4370	400	590	5050	5480
Punjab	2320	2230	2630	2630	160	280	5110	5140
MP	1700	1700	2810	2810	260	290	4770	4800
Chhattisgarh	120	120	2920	3660	170	220	3210	4000
Haryana	880	880	2150	2620	70	80	3100	3580
Uttarakhand	1650	1650	0	0	110	130	1760	1790
J&K	780	780	180	180	110	130	1080	1090
HP	780	780	0	0	190	280	960	1060
Delhi	0	0	920	740	0	0	920	740

Source: PHD Research Bureau, compiled from Energy Statistics 2011

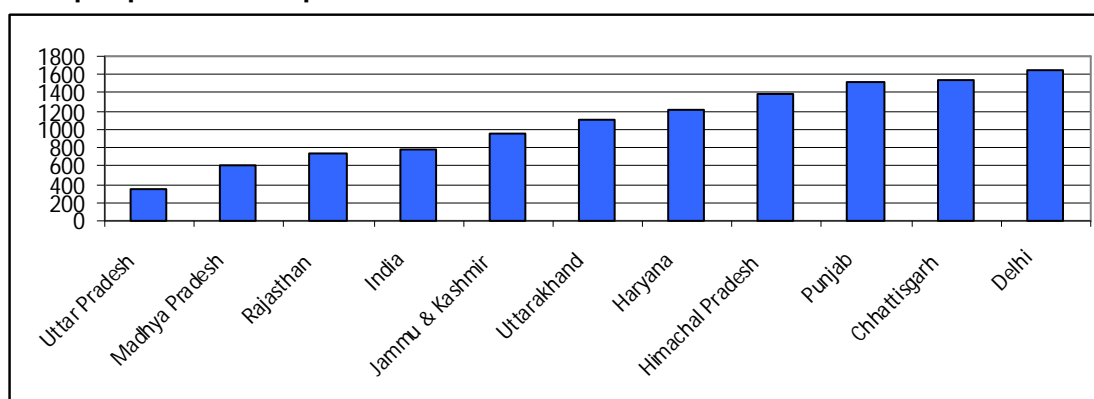
Note: Only Northern and Central states of India under the Command area of PHD Chamber of Commerce and Industry have been taken for the analysis.

Per-capita power consumption

The average per-capita power consumption of the country has increased from 631KWh during FY2006 to around 779 KWh during FY2010 marking a growth of around 23%

while that of 10 states¹ have also increased from around 858 KWh to 1108 KWh during the same period, representing an increase of around 29%. Thus, on an average, the performance of northern and central states has been better in comparison to the national average.

Per-capita power consumption across states



Source: PHD Research Bureau, compiled from Press Information Bureau
Data pertains to FY2010

The per-capita consumption of power is highest in Delhi at around 1651 KWh, followed by Chhattisgarh and Punjab at 1546.94 KWh and 1526.86 KWh respectively. States of HP, Haryana, Uttarakhand and J&K have per-capita power consumption of 1379.99 KWh, 1222.21 KWh, 1112.29 KWh and 952 KWh respectively, while Rajasthan hovers around the national per-capita consumption level of about 779 KWh. MP and UP fall below the national level with relatively low per-capita consumption. In all, the northern and central states have put up a good performance as compared to the national average.

Demand-Supply position of power

India is currently facing power deficit of 8.5%. While Delhi, Chhattisgarh and Rajasthan have been able to meet their power demand more or less during FY2011. Whereas Jammu & Kashmir, MP and UP have registered high rates of power deficit of 25%, 20.2% and 15% respectively during the same period.

¹ Only Northern and Central states of India, under the Command area of PHD Chamber of Commerce and Industry have been taken for the analysis.

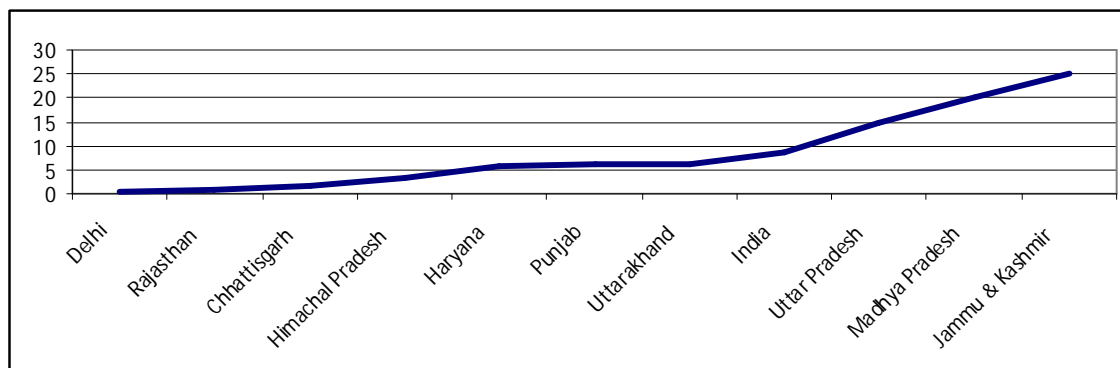
Demand and Supply scenario across the northern and central states of India

	Energy requirement(MU)	Availability(MU)	Surplus(+)/deficit(-) (MU)	% Surplus(+)/deficit(-)
India	861,591	788,355	-73,236	-8.5
Jammu & Kashmir	13,571	10,181	-3,390	-25.0
Madhya Pradesh	48,437	38,644	-9,793	-20.2
Uttar Pradesh	76,292	64,846	-11,446	-15.0
Uttarakhand	9,850	9,255	-595	-6.0
Punjab	44,484	41,799	-2,685	-6.0
Haryana	34,552	32,626	-1,926	-5.6
Himachal Pradesh	7,626	7,364	-262	-3.4
Chhattisgarh	10,340	10,165	-175	-1.7
Rajasthan	45,261	44,836	-425	-0.9
Delhi	25,625	25,559	-66	-0.3

Source: PHD Research Bureau, compiled from Press Information Bureau
Data pertains to FY2011

Delhi(0.3%),Rajasthan(0.9%),Chhattisgarh(1.75%),HP(3.4%), Haryana(5.6%), Punjab(6%) and Uttarakhand(6%) have posted lower power deficit than the national power deficit of 8.5%. While UP, MP and J&K post higher power deficits than the average national power deficit during FY2011.

Power deficit across the ten states

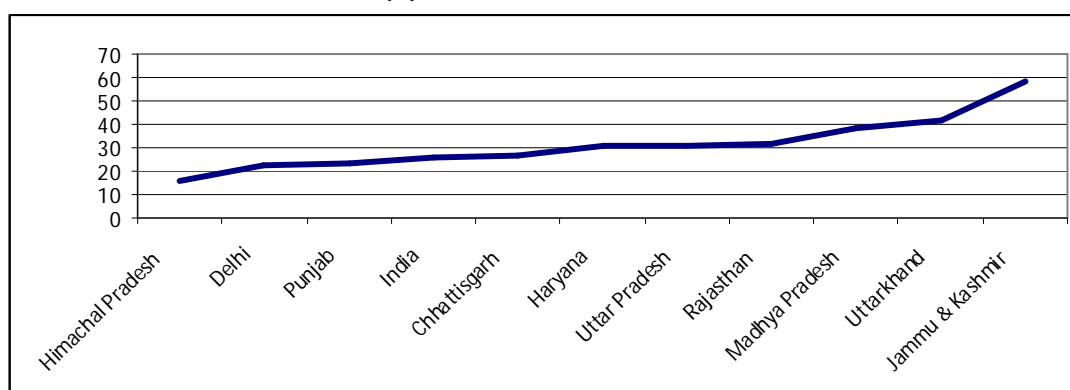


Source: PHD Research Bureau, compiled from Press Information Bureau

Transmission & Distribution (T&D) Loss

T&D losses caused during the production process have boosted the energy deficits across states. J&K , MP and UP have posted high percentages of T& D losses of around 58%, 42% and 38% which is higher than national average T&D loss of 25.4% during FY2009. While states like HP, Delhi and Punjab have registered lower percentage of T&D losses of around 16%, 22% and 23% respectively.

Transmission & Distribution loss (%)



Source: PHD Research Bureau, Compiled from Central Electricity Authority
Data pertains to FY2009

5. Average energy tariff structure

Tariff structure—Average energy tariffs² vary from Rs.1.0/KWh to Rs.4.2/KWh for domestic consumers and from Rs.2.1/KWh to 4.9/KWh for industrial consumers. Haryana, Rajasthan, Delhi, Madhya Pradesh and Punjab have high rates of average energy tariffs for industrial category while HP and Uttarakhand have lowest average energy charges. For Domestic consumers, Delhi, Punjab and Haryana have high rates of average energy tariffs and Chhattisgarh, J&K and Uttarakhand have lower average energy tariffs.

Average energy tariff structure

States	Average Energy charges (Rs./KWh) for Industrial Consumers	States	Average Energy charges (Rs./KWh) for Domestic Consumers
Haryana	4.9	Delhi	4.2
Rajasthan	4.7	Punjab	4.1
Delhi	4.5	Haryana	4.0
Madhya Pradesh	4.5	Madhya Pradesh	3.8
Punjab	4.4	Rajasthan	3.0
Jammu & Kashmir	3.2	Uttar Pradesh	2.9
Uttar Pradesh	3.2	Himachal Pradesh	2.4
Chhattisgarh	2.9	Uttarakhand	1.9
Himachal Pradesh	2.6	Jammu & Kashmir	1.7
Uttarakhand	2.1	Chhattisgarh	1.0

PHD Research Bureau: compiled from various government policy papers

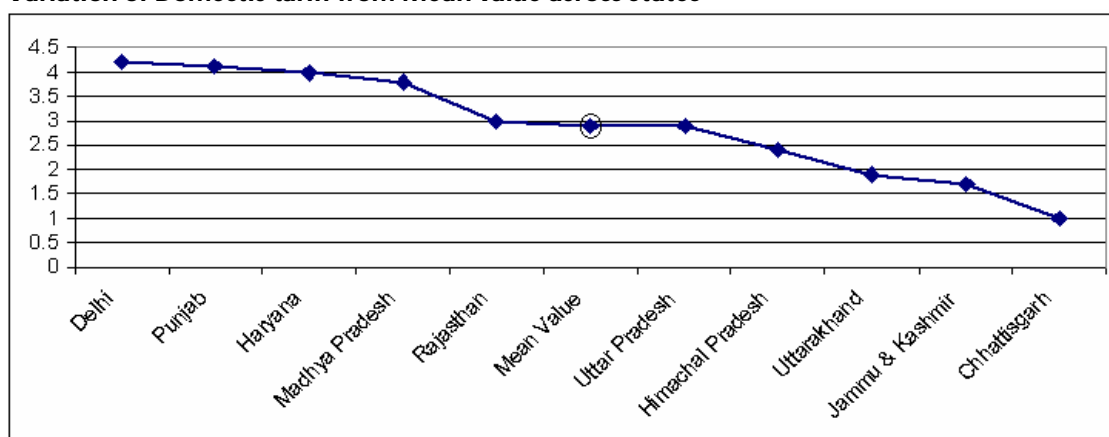
² Energy tariffs for domestic and industrial consumers are classified amongst various sub-categories. For simplification of analysis, the average energy charges have been computed by taking simple average of the tariffs for the respective sub-categories.

Difference from the Mean rate of tariff

In order to analyse the tariff structure of the states, the mean value of average energy tariff rates of 10 Northern and Central states have been calculated by taking the average of industrial and domestic tariffs, so to analyse the deviation of respective tariffs of states from the mean value.

Domestic tariff --For domestic category, average energy charge of Delhi is 45% higher than the mean value. Whereas, the average energy charge of the state Chhattisgarh is around 66% lesser from the mean value.

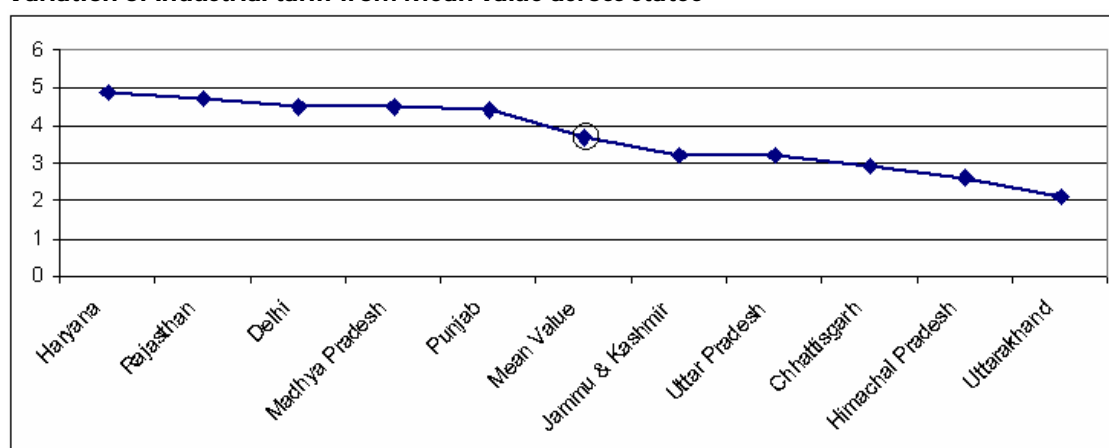
Variation of Domestic tariff from Mean value across states



Source: PHD Research Bureau, compiled from Economic Survey 2010-11

Industrial tariff-- In case of Industrial consumers, the average energy charge for Haryana is 32.4% higher than the mean tariff value while the average energy charge for the state Uttarakhand is around 76% lesser than the mean value.

Variation of Industrial tariff from Mean value across states



Source: PHD Research Bureau, compiled from Economic Survey 2010-11

6. Industrial investments

Chhattisgarh has been one of the most attractive destinations for industrial investments, and is backed by a robust power scenario marked by marginal power deficit. MP has also been able to attract a sizable share of industrial investment proposals, despite having a very high power deficit. Rajasthan has marked a good share of industrial investments and is making attempt to strengthen its power sector.

Trend in Industrial investment

S. no.	States	GSDP as a % of India's GSDP(FY2009)	Industrial investments proposals as a % of total investment during			% Energy Surplus(+)/deficit(-)
			2009	2010	2011(upto June)	
1	UP	8.92	0.97	0.79	1.39	-15
2	Rajasthan	4.76	1.29	1.71	0.57	-0.9
3	Delhi	4.04	0.03	0.01	0.003	-0.3
4	Haryana	3.67	0.23	0.60	0.53	-5.6
5	MP	3.63	6.41	11.77	7.86	-20.2
6	Punjab	3.42	0.94	0.39	0.82	-6
7	Chhattisgarh	1.77	12.56	16.45	4.32	-1.7
8	Uttarakhand	0.91	0.89	0.46	0.32	-6
9	HP	0.88	0.58	0.21	0.10	-3.4
10	J&K	0.81	0.12	0.07	0.11	-25

Source: PHD Research Bureau, compiled from various sources

7. Summary of findings

The present power scenario of the country is not satisfactory, as the existing power shortage in the country is at 8.5%. While the average per-capita power consumption of the country has increased from 631KWh during FY2006 to around 779 KWh during FY2010 marking a growth of around 23%. The T&D losses accounts for 25.4% during FY2009. The average electricity tariff for the country stands at Rs. 4.18 .KWh for large industrial category, while for domestic consumers it stands at RS. 3.4/KWh. The industrial investment proposals in India have registered a positive growth of around 70% in 2010 from a negative growth of around -32% in 2009.

J&K has the highest power shortage of 25% with per capita power consumption of around 952 KWh which is slightly higher than the average national consumption. The state has the highest percentage of T&D loss of more than 58% during FY2009. The average energy charge for the state is low for domestic consumers, which stands at Rs. 1.7/KWh. While for Industrial consumer, the average energy charges stands at Rs. 3.2/KWh. The industrial investment proposals attracted by the state were marginal.

The least power deficit of 0.3% posted by Delhi, has the maximum per-capita power consumption of around 1651 KWh and low percentage of T&D loss of around 22%. The state has the highest average energy charges for domestic categories of around Rs. 4/KWh while for industrial consumers, the average energy charge stands at Rs. 4.5/KWh, which falls under high tariffs trajectory. On the other hand, industrial investment proposal attracted by the state are extremely less.

Madhya Pradesh with the power deficit of around 20% has lower level of per-capita power consumption of around 602 KWh, which is lesser than the national average per capita power consumption. The state has high percentage of T&D loss of more than 38%. For domestic as well as industrial category, the average energy charges of the state are high, stands at Rs. 3.8/KWh and RS. 4.5/KWh respectively. The industrial investment backed by the state has been impressive.

Uttar Pradesh has power shortage of 15%, with the lowest per capita power consumption of around 348 KWh. The state has T&D loss of more than 30%. The average energy charges for industrial and domestic category hovers around Rs. 3/KWh.

Himachal Pradesh has power shortage of 3.4% with per capita power consumption of around 1378 KWh, which is higher than the national per capita power consumption. The T&D loss posted by the state is the lowest amongst the state of around 16%. For domestic consumers, the state has moderate average energy charge of Rs. 2.4/KWh, while for industrial category the state has low average energy charge of Rs. 2.6/KWh.

Uttarakhand with power deficit of 6% has per capita energy consumption of more than 1000 KWh, slightly higher than average national consumption. The state has second highest percentage of T&D loss of around 42%. The average energy charges for industrial consumers is lowest at Rs. 2.1/KWh, while for domestic consumers the state has low average energy charges of RS. 1.9/KWh.

Chhattisgarh has power shortage of 1.7% with low percentage of T&D loss of around 26%. The state has the second highest per capita power consumption of around 1545 KWh after Delhi. For domestic consumers, state has the lowest average energy charge of Rs. 1.0/KWh. Whereas for industrial consumers, the average energy charge is also low at Rs. 2.9/KWh. The state has been one of the most attractive destinations for industrial investments and is backed by marginal power deficit.

Punjab with power shortage of 6% has low percentage of T&D loss of around 23%. The state has high level of per capita power consumption of around 1526 KWh. The average energy charge for domestic and industrial category falls under high tariff trajectory of Rs. 4.1/KWh and Rs. 4.4/KWh respectively.

Haryana with low power shortage of 5.6% has T&D loss of more than 30%. The state has per capita power consumption of around 1222 KWh. For industrial category, the state has the highest average energy charge of Rs. 4.9/KWh, while for domestic category the average energy charge is also high at Rs. 4/KWh.

Rajasthan with the low power shortage of 0.9% has the T&D loss of more than 30%. The per capita power consumption of the state is low of around 736 KWh. The state has high average energy charge for industrial consumers of Rs. 4.7/KWh and for domestic consumers, it stands at Rs. 3.0/KWh. The state has attracted a good share of industrial investment proposals and is striving towards to strengthen its power scenario.

8. Conclusion & Recommendations

The Indian power sector is today at a crucial juncture of development. With growing economy, the aspiration of people for improved energy services in terms of availability, accessibility, quality and affordable power have come up in a big way. It was observed that states with higher average power tariffs like Delhi, Punjab and Haryana have exhibited low power deficits while the states with lower average power tariffs have high deficit such as J&K and UP. Delhi with the highest per capita energy consumption has marked high average energy charges, while UP with the lowest per capita energy consumption has low average energy tariff.

- The study found that the present energy scenario for the country is not satisfactory as demand exceeds the supply. During 2010-11, the maximum energy shortage was witnessed in Jammu and Kashmir of 25% and the lowest energy shortage of 0.3% was witnessed in Delhi while that of country as a whole faced the energy shortage of 8.5%.
- The Installed generation capacity of electricity in the country has increased to more than 159,000 MW as on 31st march 2010 from 147970 MW during the corresponding period previous year, by marking a growth of more than 7%.
- The average per-capita energy consumption in the 10 states have also increased from around 858 KWh to 1108 KWh during the same period, representing an increase of around 29%.
- The per-capita energy consumption during FY2010 was highest in Delhi amounting to 1765 KWh and lowest in Uttar Pradesh accounting to 312 KWh.
- During FY2011, J&K has the highest energy shortage of 25%, followed by MP at 20.2% and UP at 15%. Delhi has the least power deficit of 0.3%, while Rajasthan, Chhattisgarh and HP post power deficit of 0.9%, 1.7% and 3.4% respectively.
- Rajasthan has the highest installed generation capacity of 5860 MW, followed by UP at 5480 MW and Punjab at 5140 MW, as on 31st march 2010.
- It has been found that T&D losses caused during the production process boosted the energy deficits in many states. Rajasthan MP, Uttarakhand and J&K have high T&D losses in their generation process, which is a matter of concern.

- Lowest energy deficit state i.e. Delhi has the highest average energy charges for domestic consumers of Rs. 4.2/KWh whereas the highest deficit state i.e. J&K has posted the low average energy charges of Rs. 1.7/KWh.
- Chhatisgarh has been one of the most preferred locations for Industrial investments, while Delhi has registered by very low share of industrial investments.

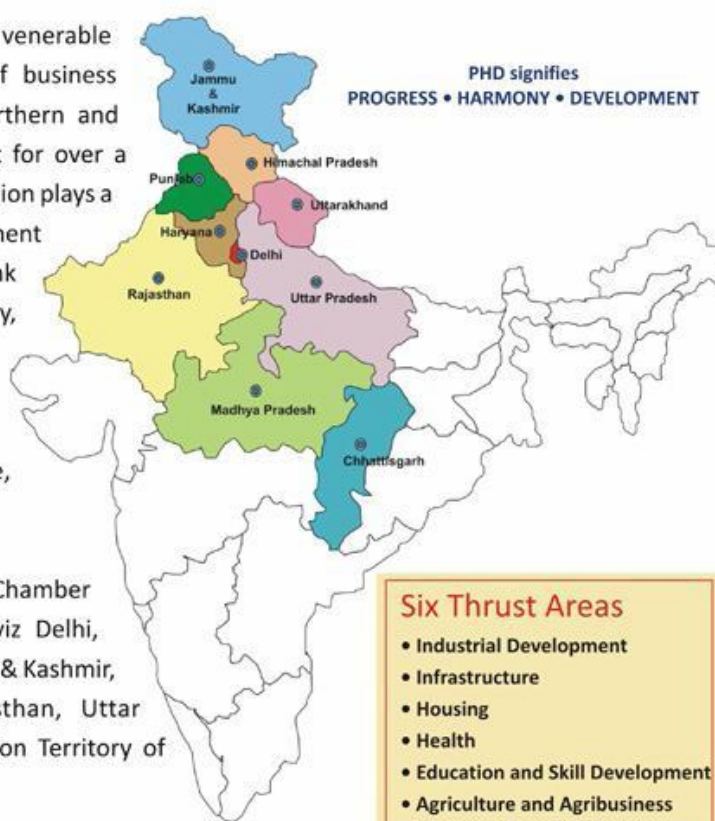
Recommendations

- The Indian economy is projected to grow at 8% over the long term and with ever-rising population, the demand for energy is escalating to cater to the growing needs.
- There exists a lot of disparity among the states in terms of installed power generation capacity, and the government must focus on balanced development through sustained investment in power in the deficient states.
- Modernization and updation of power plants should be taken up, so as to attain efficiency in production process and it is essential to reduce the Transmission & Distribution losses across the states, so to improve the power distribution scenario.
- The per capita energy consumption of the country stands at 734KWh in 2008 which is relatively lower than the per capita energy consumption of the world at 2782KWh. Thus, more rational and affordable power tariffs should be set, in order to increase the access of power to a larger consumer market.
- Acquiring land and lengthy clearance processes are major constraints in setting up power plants. Single Window Clearance systems for power projects should be implemented in the states so as to free investors from multi agency clearance problems.
- The states should consider beforehand the dos and don'ts of power projects by project management techniques and therefore should take in to consideration all the factors that are likely to impact the production process.
- Inviting private players at large with a structured policy framework and guidelines would aid in reducing the power deficit issues in the states.
- The power sector in India is crippled by the shortage of skilled manpower, and hence the government must facilitate rapid up-skilling of workforce which could eventually evade the probable issue of manpower shortage in the sector.
- The states should aim at self-sufficiency in power production to meet the increasing demand-supply gap. There is a huge potential to generate alternate energy such as Wind, Solar, Agricultural biomass, Geothermal etc in the region and hence harnessing energy through alternative sources can aid in meeting power deficit situation.
- Substantial growth of power transmission infrastructure system is necessary for sustainable development and optimal utilization of country's energy resources.

About the PHD Chamber

PHD Chamber is a vibrant, venerable representative organization of business and mercantile community of Northern and central India, serving their interest for over a century. This apex regional organization plays a proactive role in India's development and acts as a much needed link between government and industry, Acts as a catalyst for rapid economic development and prosperity of the community in the region through promotion of trade, industry and services.

With its base in National Capital, Chamber has Regional Chapters in States viz Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand and the Union Territory of Chandigarh.



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