

Physical Infrastructure

Infrastructure is one of the key drivers of growth of an economy. The key inputs for relatively faster growing sectors like industry or services sector are power, telecommunication, aviation and road connectivity. All this, besides providing spurt in economic activities, has relevance to the society in general and is a good aid to governance. In short, one cannot think of industrial development in the absence of basic infrastructure. Presently, one talks of public private partnership in nearly all our developmental endeavours, but the private players normally prefer to tread the easier pathways. The stimulus measures taken to fight the economic slowdown included infrastructure development plans through public investment. Like the rest of the world, the central government budget for 2009-10 stepped up allocation substantially for different infrastructure sectors, particularly for National Highways Development Programme (NHDP), Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Accelerated Power Development and Reform Programmes (APDRP). The State government in Bihar has also increased allocation for road construction and started its own programme like Mukhyamantri Gram Sadak Yojana (MMGSY) on the pattern of Prime Minister Gram Sadak Yojana (PMGSY).

Roads and Bridges

The first step towards development of basic infrastructure is provision of quality roads. The importance of roads is directly linked to the socio-economic development and aspirations of the people of the State. Bihar has been at the lowest rung of development in so far as the roads are concerned. While for every one lakh of population, the road density was 257 kms at all India level, at the State level, the density was only 90 kms. Similarly, for every 100 sq. kms of area, there were 75 kms of roads for the country as a whole, whereas, it was only around 51 kms in Bihar.

Average Length of Roads in Bihar and all-India (2009-10)

Item	Average Length Kms per lakh Pop.		Average Length Kms per 100 sq. km.	
	Bihar	India	Bihar	India
Total Roads	90.1	256.7	50.8	75

Source: Department of Road Construction, GOB

About half of the villages in Bihar lack all weather road connectivity. To provide better connectivity, major investment is needed. The central government has been investing in the road sector under different programmes like National Highways Development Programmes (NHDP), Prime Minister Gram Sadak Yojana (PMGSY), Border Area Development

Project, etc. For the last five years, the State government has also initiated various schemes like Mukhya Mantri Gram Sadak Yojana etc. on priority basis for all round development of the road sector. The State government has established Bihar State Road Development Corporation for speedy implementation of road construction works in the State. As a result, the total road length in Bihar by October 2010 was 94,009.42 kms. Of the total road length, around three-fourths (74 percent) were link routes, whereas, the National Highways (NH) and the State Highways (SH) constituted around 5 percent each. The Major District Roads (MDR) constituted 9.54 percent and the through routes 8.45 percent of the total roads.

Category	Total Road Length (km)	Percentage Share
National Highway (NH)	3,734.38	3.97
State Highway (SH)	3,989.00	4.24
Major District Roads (MDR)	8,966.04	9.54
Through Route (TR)	7,944.00	8.45
Link Route (LR)	69,376.00	73.80
Total	94,009.42	100.00

Source: Department of Road Construction, GOB

The plan outlay and expenditure of Road Construction Department in 2009-10 were US \$ 676.54 million (INR 3,046 crore) and US \$ 676.32 million (INR 3,045 crore) respectively, whereas, the physical achievement was 3,474 kms in 2009 - 10 and 1,325 kms in 2010-11 upto October 2010.

National Highways

Of the total length of National Highways in the State, 799 kms are under the upkeep of Indian National Highways Authority, of which 206 kms are under Golden Quadrilateral Project, 513 kms under East-West Corridor and 80 kms under NHDP. However, the remaining portion of 2,935 kms of National Highways is maintained by the Road Construction Department of the State government. The State Highways and Major district roads are also maintained by Road Construction Department, while through routes and 'link routes' are maintained by the Rural Works Department.

As against the target of developing about 3,165 kms of National Highways under the NHDP in 2009-10, the achievement till November 2009 has been 1,490 kms (47 percent). Against the target of awarding projects for about 9,800 kms of roads under NHDP during 2009-10, only 1285 kms of project (13 percent) were awarded upto November 2009. With

a view to expediting the programme of the National Highways Development Project, the Ministry of Road Transport and Highways set a target of completion of 20 kms of National Highways per day i.e. 7,000 kms per year during the five years period 2009-14. The National Highways Authority of India (NHAI) formulated work plans for awarding 12,000 kms during each of the years 2009-10 and 2010-11.

The status of 3,735 kms of National Highways in Bihar in October 2010 is presented in below mentioned table.

Status of National Highways in Bihar (2010-11) (upto Oct.2010)

Category	Length (km)	Percentage Share
Single Lane (3.75 m. width)	629.78	16.9
Intermediate Lane (5.50 m. width)	834.01	22.3
Double Lane (7.00 m. width)	1,463.18	39.2
More than 7.00 m. width	777.47	20.8
Missing Link	30.40	0.80
Total	3,734.84	100

Source: Department of Road Construction, GOB

As is discerned from the above table, around 40 percent of National Highways in Bihar are having less than 2 lanes. However, the initiatives have been taken by the central government to convert National Highways having less than 2 lanes to at least 2-lane standards by December 2014 by proposing a World Bank loan and also through budgetary allocations. Proposals were invited from the consultants for preparation of Detailed Project Report (DPR) for 3,800 km of road, proposed to be developed under World Bank assistance. The Ministry of Road Transport and Highways also initiated action for improvement of remaining 2,500 km of single / intermediate lane National Highways through budgetary resources.

The central government did not accord the approval for upgradation of National Highways. Therefore, the State government completed the work on 1,545 km at a total cost of US \$ 158.13 million (INR 711.96 crore) from the State fund during the years 2006-07 to 2008-09. However, under the various projects of the central government, like National Highway Organization (NHO), Permanent Bridge Fee Fund (PBFF), etc., a total of 974 km. of National Highways have been upgraded since 2006-07.

In 2006-07, 337 kms of roads were constructed through the National Highway Organization (NHO) and 436 kms through the State fund. In subsequent years of 2007-08 and 2008-09, the length of National Highway covered was more through the State fund. However, in 2009-10, the coverage by State fund was relatively less than that by the NHO. The turnaround of Road Construction Department is reflected in the table of development as shown below.

Physical Achievement of National Highways in Bihar

Year	State Plan (in km)	NHO (in km)	Total (in km)
2006-07	436	337	773
2007-08	510	191	701
2008-09	365	216	581
2009-10	298	378	676

Source: Department of Road Construction, GOB

Keeping in view the development needs of the State, four-laning of the important corridors has been taken up. Under Golden Quadrilateral Project of National Highways Development Project–Phase I, the four laning of 205 kms of roads has been completed, except the construction of Durgawati Bridge on this highway. Similarly, under East-West Corridor, 513 kms of road construction is going on. But the progress of work is not satisfactory. Under Phase III of NHDP, 1,015 kms of roads construction is under progress.

Besides the above, there are certain important routes, which have not been selected under NHDP– Phase III. There is a proposal to upgrade these roads as per the prescribed standard based on Public-Private Partnership (PPP). For this, Infrastructure Leasing and Financial Services Ltd. (IL & FS) and Infrastructure Development Finance Company Ltd. (IDFC) have been appointed as Project Development Consultants. There is a provision of 40 percent Viability Gap Funding (VGF) for the projects taken up under PPP and this funding will be shared by the central and State government. Upto 2010-11(Oct.2010), the State government has completed the improvement and resurfacing of 3,418 kms of roads, as shown in below table.

Improvement of Roads by State Government

Year	Road Length (km)
2005-06	364
2006-07	773
2007-08	701
2008-09	580
2009-10	676
2010-11 upto Oct 2010	324
Total	3418

Source: Department of Road Construction, GOB

State Highways (SH)

For development of a total of 3,989 kms of State Highways to two lanes, the State government has started the project under State Highways Development Programme (SHDP). The State government decided to upgrade the State Highways under the Rashtriya Sam Vikas Yojana (RSVY) and, in the last three years, about 72 percent of State Highways have been widened to two lanes under this programme. Thus, 2,035 kms have been upgraded under RSVY and, under the tripartite agreement reached in 2005, the works are being taken up by Central Public Works Divisions (1705 km) and M/s IRCON International (330 kms).

Again, under Bihar State Highway Programme (BSHP- I), the State government has declared 11 roads with the total length of 1,054 kms as State Highways. Out of these 11 roads, an agreement has been reached with the Asian Development Bank (ADB) for a sum of US \$ 438 million (INR 1972 crore) for the upgradation of 9 highways. The work is in progress and upto February 2010, around 25 percent of the financial and 15.9 percent of physical achievement have been recorded, which is in keeping with the target.

Under Bihar State Highways Programme-II (BSHP-II), 13 other important roads measuring 826.92 kms were declared State Highways. Of these, Dumraon-Bikramganj SH-79 with 44.40 kms of length is proposed to be developed under PPP. For the upgradation of

remaining 12 roads into double lane, the Detailed Project Report (DPR) has already been prepared.

The financial assistance for these roads has been agreed upon in principle with the Asian Development Bank. These schemes are to be initiated this year (2010-11) at an estimated cost of US \$ 477.53 million (INR 2150 crore) Thus, in 2010-11 (October 2010), out of a total of 3,787 kms of State highways, about 50 percent are having double lanes or more.

Lane-wise details of State Highways (2010-11, up to October 2010)

Lane Type	Width (in m)	Total Length (km)	% o.f total
Single Lane	3.75	1,598.19	42.20
Intermediate Lane	5.50	295.66	7.81
Double Lane	7.00	1,849.17	48.83
Four Lane	14.00	43.98	1.16
Total		3,787.00	100.00

Source: Department of Road Construction, GOB

Major District Roads (MDR)

Again, in 2010-11, there is a proposal to upgrade 690 kms of major district roads in the State, of which 475 kms are under Naxal affected area, 100 kms under the State plan and 115 kms under non-plan. The total estimated cost for this upgradation work is US \$ 128.82 million (INR 580 crore). It is expected that 30 percent of the work will be completed in 2010-11 and remaining 70 percent in 2011-12.

The selected major district roads owned by Public Works Department are upgraded (with bridges/ culverts) through the loan from National Bank for Agriculture and Rural Development (NABARD). Under Rural Infrastructure Development Fund (RIDF)-X and XI, 26 roads with a total length of 534 kms in five districts (Vaishali, Muzaffarpur, Samastipur, Darbhanga and Madhubani) have been approved for upgradation and construction of 306 bridges. The total cost of this programme is US \$ 76.23 million (INR 343.23 crore), of which US \$ 58.07 million (INR 261.44 crore) is NABARD share and US \$ 18.17 million (INR 81.79 crore) is State government share. Again, under RIDF-XIII, a total of 39 roads at a cost of US \$ 40.29 million (INR 181.42 crore) have been approved in the districts of Bhojpur, Bhabua, Rohtas, Purnea, Nalanda, Munger and Lakhisarai and the work is nearing completion.

Further, under RIDF- XIV, NABARD has approved a sum of US \$ 158.05 million (INR 711.57 crore) for construction of three high class big RCC bridges, one each in Gopalganj, West Champaran and Darbhanga districts and the work on each of them is in progress. Under RIDF-XV, 87 projects in different districts have been approved, which also include a big bridge on Koshi river in Balughat at a cost of US \$ 117.97 million (INR 531.15 crore). Besides, 13 projects in 7 districts at a total cost of US \$ 40.13 million (INR 180.70 crore) have also been approved by NABARD in 2010.

Other District and Village Roads

The other roads are of two types, viz., through Routes and link routes, also known as Other District Roads and Village Roads. All roads in the State except NH, SH, MDR are constructed and maintained by the Rural Works Department. The length of total through routes and link routes are 7,944 kms and 69,376 kms respectively. Around 14,106 kms of rural roads have been constructed at an expenditure of US \$ 1.5 billion (INR 6750 crore) during the last four years. However, a sizeable proportion of link routes are unpaved and normally become unusable during the monsoon. An effort is underway to improve the condition of such roads

Railway Over Bridges

Under the tripartite agreement reached in 2005, the construction of railway over bridges on as many as 22 railway crossings on the State owned roads have been approved by the Railways on cost sharing basis. Of these, works relating to 14 projects are being executed through IRCON International Ltd., at an estimated cost of US \$ 110.50 million (INR 497.50 crore). For the remaining 8 projects, the construction work of only link roads are being undertaken by the Bihar State Bridge Construction Corporation, while the Railway over bridges are being constructed by Indian Railways Construction Company (IRCON). The total estimated cost of these 8 projects is US \$ 53.71 million (INR 241.82 crore). For another 12 railway over bridges, the approval is under process and these are targeted to be taken up later.

Mukhya Mantri Setu Nirman Yojana (Chief Minister Bridge / Fly Over Construction Program)

In order to provide all weather road connectivity to the remote areas, particularly the rural areas, the Mukhyamantri Setu Nirman Yojana has been started in Bihar. The primary objective of this programme is to construct new bridges on the rivers and drainages, and replace damaged and dilapidated bridges falling on the roads with new ones. Under this programme, the schemes below US \$.06 million (INR .25 crore) are taken up by the district administration and those above US \$.06 million (INR .25 crore) by the Bihar

State Bridge Construction Corporation. Till date, 2,490 schemes have been selected with a total outlay of US \$ 315.08 million (INR 1,418.57 crore). Out of this, 1968 schemes were taken up by the district administration, of which 1,123 have been completed. Similarly, out of 522 schemes undertaken by the Bihar State Bridge Construction Corporation, 382 are completed. Thus, out of a total of 2,490 projects, 1,505 projects are completed and the remaining 985 schemes are under progress and expected to be completed in 2010-11. The details of the schemes are given below in the table. New schemes have been identified and are to be executed in 2010-11 after the needed approval.

**Mukhyamantri Setu Nirman Yojana
(Chief Minister Bridge / Fly Over Construction Program)**

Agency	No. of Projects	Estimated Cost (Rs in crore)	Completed Projects				Fund Utilised (Rs crore)
			2007-08	2008-09	2009-10	Total	
District Administration	1,968	392.55	128	421	574	1123	224.91
BRPNN	522	1,026.018	60	157	165	382	751.78
Total	2,490	1,418.568	188	578	739	1,505	976.69

Source: Department of Road Construction, GOB
BRPNN*- Bihar Rajya Pul Nirman Nigam

Bihar Rajya Pul Nirman Nigam Limited (BRPNN)

Bihar Rajya Pul Nirman Nigam Limited was established under a Resolution by the Road Construction Department of the State government in 1974. As per the Resolution, the Corporation is to survey, construct and maintain the bridges, cross-drainage and other works. The Corporation undertakes the survey and construction of bridges with the amount received from road tax and other sources, including loans from commercial banks. It undertakes those works for which the cost is US \$.06 million (INR .25 crore) and above.

Turnover of Bihar Rajya Pul Nirman Nigam Limited

Year	Turn Over (Rs Crore)
2004-05	42.62
2005-06	57.38
2006-07	95.88
2007-08	417.48
2008-09	768.00
2009-10	853.00

Source: Report Card, 2010, GOB

In 2005-06, the Corporation earned a profit of around US \$ 1.33 million (INR 6 crore) and is expected to earn a profit of US \$ 20.32 million (INR 91.50 crore) in 2009-10. This means that the Corporation has increased its profit by more than 15 times in a short span of 5 years.

The Status of Profit and Loss of the Corporation

(INR Lakhs)

Year	Expenditure on Projects	Total Receipts	Personnel and Administrative Expenditure	Profit/Loss
2005-06	5,738.76	1,312.75	716.24	(+) 596.41
2006-07	9,588.91	2,838.38	1,116.24	(+) 1722.41
2007-08	41,747.87	8,825.74	1,220.87	(+) 7604.87
2008-09	75,600.80	11,073.37	2,030.00	(+) 9043.36
2009-10	85,000.00	11,050.00	1,900.00	(+) 9150 (Estimated)

Source: Bihar Rajya Pul Nirman Nigam Limited, GOB

During the period 2006-07 to 2009-10 (upto December, 2010), the Corporation constructed a total of 518 bridges at an aggregated cost of around US \$ 228.77 million (INR 1,030 crore). The Corporation, within a very short period, has grown in stature and is now entrusted with the works such as building irrigation, roads, besides construction of bridges..

Number of Completed Bridges with Expenditure from 2006-07 to 2010-11

Year	No of Bridges	Expenditure (US \$ million)
2006-07	35	34.41 (INR154.94 crore)
2007-08	60	10.07 (INR 45.34 crore)
2008-09	157	40.82 (INR 183.78 crore)
2009-10	187	92.43 (INR 416.16 crore)
2010-11 (upto Dec 2010)	79	51.02 (INR 229.72 crore)
Total	518	228.75 (INR 1,029.94 crore)

Bihar State Bridge Corporation Limited, GOB

Airways

The civil aviation sector showed signs of slowdown in passenger traffic in 2008 due to steep rise in passenger fares, coupled with impact of economic slowdown. However, the signs of recovery became visible in the latter half of 2009 when the domestic traffic increased. This impact was seen in Bihar as well. In Bihar, the State capital at Patna is linked by only a few airlines like Air India, Jet Airways, Air Deccan, Kingfisher, Go Air and Indigo with their limited number of flights. While Air India and Indigo have three flights per day for Patna, airlines like Jet Airways, Air Deccan and King Fisher have 4 flights each, and Go Air has only two flights. Thus, in all there are 16 domestic flights per day from Patna. However, these flights are not regular, as sometimes the flights are cancelled, either on account of bad weather or owing to passengers shortage.

Airlines and Number of Flights, 2010 (upto Oct. 2010)

Name of Airline Operator	Number of Flight per day
Indian Airlines / Air India	3
Jet Airways	4
Air Deccan / Kingfisher	4
Go Air	2
Indigo	3
Total	16

Source: Airport Authority of India, Patna

Aircraft Movements with Number of Passengers

Year	Aircraft Movement (in no.)		Passengers (in no.)	
	International	Domestic	International	Domestic
2000-01	415	4,163	9,029	167,887
2001-02	141	4,158	2,545	153,945
2002-03	192	4,536	1,804	160,996
2003-04	24	4,142	0	159,683
2004-05	30	3,814	0	176,234
2005-06	20	4,140	0	218,824
2006-07	16	9,723	0	352,434
2007-08	0	12,604	0	444,458
2008-09	0	9,666	0	369,408
2009-10	8	10,726	0	552,542
2010-11 (upto Oct 2010)	4	9,165	0	453,276

Source: Airport Authority of India, Patna

As may be seen from the table given above, aircraft movement was the highest in the year 2007-08 (12,604), followed by 2009-10 (10,726). The lowest number of aircrafts movements was reported in 2004-05 (3,814). The number of passengers traveling by air normally depends on the number of flights operating. However, the highest number of domestic passengers (5.53 lakh) was reported in 2009-10, followed by 4.44 lakh passengers in 2007-08, when aircraft movements were comparatively less

Major airports in Bihar include Patna International Airport and an international airport at Gaya. Muzaffarpur, Raxoul and Joghani are the other domestic airports in Bihar. Thirty-nine district headquarters have air strips/aerodromes. Small air taxi/charter services are available at Patna. The State government plans to set up an air cargo complex in Patna that will be promoted by the Bihar Industrial Area Development Authority (BIADA) and the Airport Authority of India at a cost of around US \$1.6 million.

Railways

The State has an extensive and well-developed railway network providing vital links between the mining and tourism centres and important cities and ports in the country. The total rail length in the State exceeds 5,400 km. A few railway routes connecting important places like Muzaffarpur-Samastipur-Barauni-Katihar and Muzaffarpur-Chapra-Siwan have been converted into broad gauge. The main rail junctions are at Patna, Gaya, Muzaffarpur, Katihar and Samastipur. Over \$1.4 billion worth of investment has been planned by the Central Government for the modernization of railways in Bihar, including gauge conversion, doubling of lines and electrification.

Power

Power is a key sector in the development of any country or region. Power generation in the country is mainly through hydro electric, thermal and nuclear power stations. Besides domestic generation, power is also imported from Bhutan. Though the power generation in the country in 2009-10 was targeted to increase by 9 percent, during April-December, 2009 it grew by 6 percent. The generation level, which was 540 billion, KWh in April 2008, increased to 572.5 billion KWh in December 2008. During this period, thermal generation increased by 88 percent. However, hydroelectric power generation recorded a decline, which occurred mainly due to poor monsoon. The Coal based power generation constituted around 80 percent of thermal generation and around 66 percent of total generation of power. Nuclear generation is around 14 billion KWh.

It is worth mentioning that the power sector in the country is undergoing major changes with private participation and diversification of fuel mix, within a conducive policy environment. The public private partnership (PPP) in transmission and distribution system, private participation in nuclear power generation projects, demand side management, franchise in distribution system, renewable energy and many other activities in Indian power sector have been introduced during the last few years. The Electricity Act, 2003 is the corner stone legislation, and it provides an enabling legal framework for more efficient and accelerated development of power sector. The Act primarily concerns itself with unbundling of State Electricity Boards and seeks to encourage competition with appropriate regulatory intervention. As a result, the power sector is now becoming competitive and gaining efficiency in terms of supplying quality power to consumers.

Power sector is a critical infrastructure for development of Bihar and supply of reliable and quality power at reasonable and competitive rate can transform the pattern in agriculture production, village, small and micro industries development and other commercial and industrial activities.

Bihar State Electricity Board (BSEB)

The division of State in 2000 resulted in major power stations going to Jharkhand, leaving only two old thermal generating stations in present Bihar. Consequently, the State is lagging much behind other States in the country in terms of power availability and needs to purchase 90 percent of its power requirements from central utilities. At the end of 2009, BSEB had 2.96 million consumers and overall sales were at 5,325 gigawatt hours (GWh), of which 33 percent were to domestic, 27 percent to industrial and 15 percent to irrigation consumers. Sales growth was around 10 percent in the years 2006 to 2009.

Power Supply Position

The per capita power consumption in the State is around 100 units against an all India average of 717 units. No new generating unit has come up in the State in the last 25 years. The power supply position in Bihar is very poor and the deficit in relation to peak demand is ever increasing. The total installed capacity including hydel is about 600 MW, against the peak demand of 3,000 MW. The deficit, which was around 17 percent in 2006-07, increased to 31 percent in 2007-08 and to 40 percent in 2009-10. In 2010-11, the deficit is estimated to be around 45 percent. The details may be obtained from the below mentioned table.

Power Supply Position

Year	Peak Demand (MW)	Peak Availability (MW)	Deficit (MW)	Deficit (%)
2002-03	1,389	1,325	64	4.6
2003-04	973	788	185	19
2004-05	980	980	0	0
2005-06	1,314	1,116	198	15.1
2006-07	1,399	1,162	237	16.9
2007-08	1,800	1,244	556	30.88
2008-09	1,900	1,348	552	29.05
2009-10	2,500	1,508	992	39.68
2010-2011 (upto Oct 2010)	3,000	1,664	1,336	44.53

Source: Bihar State Electricity Board, GOB

Bihar's current installed generation capacity is only 584.6 MW, including renewable resources owned by the Bihar State Hydroelectric Power Corporation. The State has access to a total of 1,846 MW, including capacity allocated from central stations. This has led to severe rationing of power to meet consumer requirements. While some of the deficit can be attributed to legacy issues arising from the creation of Jharkhand, there has been no major addition to generation capacity.

BSEB's thermal generating stations at Barauni and Muzaffarpur have undergone major renovation and modernization. Rapid augmentation of generation capacity is a prime priority for the State government, which intends to set up joint ventures (3 X 660 MW at Nabinagar), expand existing plants, catalyze Independent Power Producer (IPPs) projects at Banka (4 x 660 MW), Pirpainty (2,000 MW) and Kahalgaon (2 x 660 MW) and seek allocations from central sector plants to ensure that the State is not required endure the 66 percent peak deficit in 2012, as forecast by the Central Electricity Authority.

The State has to depend entirely on the central sector to meet its power requirements. As per the meter readings, the State government gets 1746-1791 MW power from the central sector. It gets around 40 percent share from each of Talcher STPS and Kahalgaon STPS-I. However, from Kahalgaon STPS-II, it gets only around 7 percent. The overall share of Bihar from central power stations is around 26 percent.

Power from Central Power Stations

Name of Stations	Capacity (MW)	Bihar's Share	
		MW	Percentage
Farakka STPS	1,600	454-475	28.38-29.70
Talcher STPS	1,000	390-403	39.02-40.34
Kahalgaon STPS - I	840	332-342	39.54-40.83
Kahalgaon STPS - II	1,500	100	6.67
Tala HPS	1,020	260	25.5
Chukha HPS	270	80	29.63
Rangit HPS	60	21	35
Teesta HPS	510	108	21.25
Total	6,800	1,745 – 1,789	25.66 - 26.31

Source: Bihar State Electricity Board, GOB

The supply and consumption pattern of energy in Bihar is not satisfactory since, even after purchase of power from the central government sector, the energy shortage was 45.33 percent in 2009-10 and increased to 55.40 percentage points in 2010-11 (upto October 2010).

Supply and Consumption Pattern of Energy (MW)

Drawal / Consumption	2008-09	2009-10	2010-11 (upto Oct 2010)
Drawal from Central Sector	8133.46	9060.36	5997.12
BSEB Generation after Auxiliary Consumption	90.21	226.6	86.69
KBUNL Generation to BSEB	189.72	397.72	191.25
Others	44.50	20.75	13.91 (upto Sept.2010)
Sugar Mill to BSEB	10.53	11.13	NIL
Demand Met	8468.42	9716.58	6293.59
Energy Requirement	12800	17773	14101
Energy Shortage	4331.58	8056.42	7807.41
Energy shortage (Percentage)	33.84	45.33	55.37

Source: Bihar State Electricity Board, GOB

Improvements in Transmission System

The Bihar State Electricity Board has constructed a total of 14 transmission lines of 220KV with circuit km. length of 1127 kms and 80 transmission lines of 132 KV with circuit km length of 4350 kms in the State in last three years. Under Bihar Sub-Transmission Scheme, major strengthening of sub-transmission is underway through RSVY. Under Phase-I, 18 new grid substations (GSS) and 876 kms of new transmission lines have been completed. Under Phase II- Part I, 10 new grid sub-stations and 523 kms of transmission lines are completed by December 2010. The capacity augmentation work of 19 and repair and maintenance of old grid sub-stations is also to be completed. Similarly, under Phase II-Part II, construction of 17 new grid sub-stations (GSS) and augmentation of 12 GSS with new transmission lines of 1513 kms are expected to be completed by September, 2011. The Power Grid Corporation of India is supporting the implementation of this scheme.

Transmission and Distribution Losses

Current power distribution in Bihar is characterized by around 40 percent of system losses, far higher than the national target of 15 percent. The losses are even higher when one takes

into consideration cash realization. Such a situation calls for a change in the way electricity distribution is managed. The fact is that the Board is not able to measure the actual T&D losses in the absence of measuring system. During 2006-07, the T&D losses were estimated to be as high as 57.6 percent.

Transmission and Distribution Losses

Year	Transmission and Distribution Losses (%)
2002-03	39.00
2003-04	37.00
2004-05	35.90
2005-06	40.00
2006-07	42.61
2007-08	39.06
2008-09	37.98
2009-10	38.32

Source: Bihar State Electricity Board, GOB

Power Scenario in the State

The power scenario in the State is grim and as per the BSEB forecast, even in 2011-12, there will be energy deficit of around 46 percent. In 2014-15, the peak energy load will be 5000 MW and the energy requirement would be 33,288 MU, almost double the level compared to 2010-11.

Power Scenario (2011-12)

Peak	2011-12
Peak Demand (MW)	3607
Peak Met (MW)	1769
Peak Deficit (-) / surplus (+) MW	-1838
Peak Deficit / Surplus (%)	-50.95
Energy	
Energy Requirement (MU)	19905
Energy Availability (MU)	10789
Energy Deficit (-)/ Surplus (+)	-9116
Energy Deficit/ Surplus(%)	-45.79

Source: Bihar State Electricity Board, GOB

Renewable Energy

Cogeneration from biogases and generation from biomass has a potential of more than 600 MW in the State, which can be tapped immediately. There are several success stories of village electrification, including power for agricultural and lighting purposes, and this needs to be replicated. Bihar is favourably placed for harnessing solar power on decentralized basis. This immense potential in the State can be utilised for meeting its power requirement, particularly in rural areas. Such power can be generated without any gestation period.

Bihar lies in a low wind zone. A few places like Nepal boarder areas, riverbank areas, and some advantageous hill formation to tunnelise wind velocity, have some potential for small wind power generation. C-Wet is carrying out wind measurement at different places like Adhoura, Lalganj, Simultala, Raxaul, Bodh Gaya, etc. The actual wind resources can be known only after such survey is done. But there is potential for low velocity wind pumps of improved design.

To promote renewable energy in the State, the regulations are framed on Renewable Power Purchase Obligations, its compliance and REC Framework Implementation. Under these Renewable Purchase Obligations, the Board shall have to purchase 1.5 percent of its total energy consumption (total energy input, less the T&D loss) during 2010-11. Further, 0.25 percent of the specified renewable purchase obligation shall be procured from power generation, based on solar energy. The Bihar Renewable Energy Development Agency is

also designated as State Agency for accreditation and recommending the renewable energy projects for registration.

Rural Electrification

Rajiv Gandhi Rural Electrification Programme: The programme was initiated with the following objectives:

- Electrifying all villages and habitations.
- Providing access to electricity to all rural households.
- Providing electricity connection to Below Poverty Line families free of charge.

(An electrified village is one where at least 10% of the households are electrified; of a total of 39015 villages in Bihar, almost 12000 villages have been electrified)

Initiatives undertaken by the Government of Bihar

To meet the demand for power, the State Government is implementing new power projects through Joint Venture and Public Private Partnership

Area of Investment

Renewable Energy

With a view to promote power generation from New and Renewable Energy sources, the Government of Bihar formulated 'Policy Guidelines for Private Sector Participation for Developing Non – conventional Energy Sources' in 2003.

Bihar has a considerable potential for New and Renewable Energy sources, which is yet to be harnessed. The Government issued a revised policy for promotion of power generation from New and Renewable sources. The policy will be applicable for the development of energy from biomass and biogas based projects, cogeneration projects, mini / micro / small hydro projects (upto 25 Mega Watts), wind power project, solar projects, municipal solid waste based projects and any other renewable resource based source.

The State has the highest potential for hydropower projects and 92 potential sites with an aggregate capacity of 195 Mega Watts have been identified. Six hydropower projects with a capacity of 46 Mega Watts have been already installed. Biomass based power projects could have a potential to generate 200 Mega Watts and it is being observed that rice based husk biomass gasification and combustion technology for industrial applications could be an important source of energy.

The Bihar Renewable Energy Development Agency (BREDA) is the nodal agency responsible for the development of renewable energy in the State

Solar energy finds application in streetlights and solar lights. Under the Border Area Development Scheme, solar lights are being installed in districts bordering Nepal

Investment in the Power and Fuel sector (2008 – 10)

To help improve power generation capability, some new projects are already being processed by the Bihar State Electricity Boards. They are as follows –

Name of Investor	Details	Approximate Investment (US \$ Million)	Commissioning Date
Global Powmin Ltd.	2640 MW Thermal Power Project-Nawada	3311.27	2014 (January)
Essar Power	1800 MW Thermal Power Plant - Bhagalpur	1821.044	Progress not reported.
Fox Petroleum Ltd.	30 MW Power Plant based on Dual Fuel (gas & alternative fuel) - All Districts.	1754.61	Progress not reported.
Nalanda Power Company & CESC	1800 MW Thermal Power Plant - Bhagalpur	1619.16	12th Plan (2012 - 2017)
Arisson Power Ltd.	1320 MW Thermal Power Plant-Banka	1612.5	Progress not reported.

Source: State Investment Proposal Board

Name of Investor	Details	Approximate Investment (US \$ Million)	Commissioning Date
Adhunik Power & Natural Resources	1320 MW Thermal Power Plant-Bhagalpur	1665.81	12th Plan (2012 - 2017)
Lakhisarai Bijlee Company (P) Ltd	1320 MW Thermal Power Project-Lakhisarai	1512.57	12th Plan (2012 - 2017)
Buxar Bijlee Company Pvt.Ltd.	1320 MW Thermal Power Project-Buxar	1508.41	12th Plan (2012 - 2017)
Triton Energy Limited	1320 MW Thermal Power Plant-Aurgangabad	1469.74	Progress not reported.
Krishak Bharti Cooperative Ltd.	1320 MW Thermal Power Project-Buxar	1390.88	Progress not reported.
Usha Martin Ltd.	1200-1320 MW Thermal Power Project-Bhagalpur	1332.65	Progress not reported.
Subhas Projects & Marketing Ltd (SPML)	1200MW Plant-Lakhisarai	1118.44	Progress not reported.
East West Power Generation Company Ltd.	1000 MW Thermal Power Plant-Bhagalpur	1118.44	Progress not reported.
Astonfield Renewable Resources Ltd.	300 MW Solar Power Plant-Patna	999.48	Progress not reported.
Sarvottam Infrastructure Pvt Ltd	540 MW Thermal Power Plant-Bhagalpur	499.74	Progress not reported.
I L & FS Renewable Energy Ltd	12 MW Biomass Power Plant-Banka	11.14	Progress not reported.

Source: State Investment Proposal Board

Name of Investor	Details	Approximate Investment (US \$ Million)	Commissioning Date
PTC Bermaco Green Energy Systems Ltd.	12 MW Biomass Power Plant-Rohtas	11.14	Progress not reported.
Astonfield Renewable Resources Pvt. Ltd.	100 MW Biomass based Power Plant-10 districts	132.82	Progress not reported.
Emergent Ventures India Pvt. Ltd	12 MW biomass based Power Plant-Gaya	125.71	Progress not reported.
SREI Infrastructure Finance Ltd	5 MW Grid Interactive Solar Power Plant - Jamalpur	25.76	Progress not reported.
India Power Corporation	1650MW Thermal Power Plant-East Champaran	1616.94	2014-15

Source: State Investment Proposal Board

Telecommunication

There has been a fast growth in Bihar in service related infrastructure, such as, personal computers and telecommunications. The 11th Plan has laid emphasis on a world class telecommunication infrastructure as a vehicle for inclusive growth. A digital divide has emerged in terms of internet and broadband connectivity between urban and rural India and a policy may be formulated to address this issue. With convergence of technologies, it is now possible to provide multiple services on a single platform and on a single device. The telecommunication also holds greater potential in disseminating knowledge and awareness of the rural sector, particularly the farm sector. This technology can improve productivity and income through the adoption of better farm practices, greater awareness of the market situation and prices, and more information about the pest management and weather constraints.

The opening of the telecom sector has not only led to rapid growth in subscriber base, it has also helped a great deal towards maximization of consumer benefits. The number of telephone subscribers registered a phenomenal increase in 2009 (430 million) over 2003 (55 million) at all India level. The increase has been entirely due to spectacular increase in wireless connections at an annual growth rate of 60 percent since 2004.

Bihar too did not remain an exception to this trend and registered around ten fold increase in 2010-11, when the total number of connections increased to 41.5 million, compared to only 4.2 million in 2005-06. This substantial jump in number of connections is owing to a phenomenal increase in mobile connections, which registered a growth of more than 17 times during the period. The number of landline connections, which declined considerably in 2006-07 over 2005-06, remained nearly same thereafter. The WLL connections registered a slower growth rate and simply doubled in 2010-11 over 2005-06. The details may be understood from given below table.

Number of Connections

Particulars	No. of Connection (in million)					
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11 (upto Oct 2010)
Landline Connections	1.74	0.99	0.97	0.96	0.96	0.96
Mobile Connections	2.36	4.69	8.19	15.18	28.34	40.26
WLL Connections	0.13	0.153	0.19	0.24	0.28	0.28
Gross Total	4.22	5.83	9.36	16.38	29.58	41.50
Annual Growth (%)		38.08	60.44	75.08	80.62	40.29

Source: Bharat Sanchar Nigam Limited (BSNL) and Cellular Operators Association of India (COAI)

There are a number of public and private players in the telecommunication sector in Bihar. Besides BSNL in public sector, the important private players are Vodafone, Bharati, Idea, Aircel, Reliance, Tata, etc. and altogether they provided a little over 40 million connections as in June 2010.

Wireless / Wireline Subscribers Base in Bihar 2010, (upto June, 2010)

Wireless Subscriber Base	
Operator	Connection
Vodafone (GSM)	3,791,641
Bharti (GSM)	12,001,986
Idea (GSM)	3,433,890
Aircel/Dishnet (GSM)	3,663,155
Reliance (GSM)	3,814,873
Reliance (CDMA)	3,360,971
Tata (GSM)	1,701,763
Tata (CDMA)	2,351,892
BSNL (GSM)	4,477,074
BSNL (CDMA)	397,740
Sistema (CDMA)	380,093
Stel (GSM)	614,554
Unitech (GSM)	800,203
Etisalat (GSM)	1,092
Total	40,790,927
Wireline Subscriber Base	
Reliance	3,354
Tata	7,398
BSNL	1,363,086
Total	1,373,838

Source: Telecom Regulatory Authority of India
GSM - Global System for Mobile Communications
CDMA - Code Division Multiple Access

From the above table, it is observed that among wireless subscribers, Bharti (GSM) had the highest number of subscribers of 12 million on June 10, 2010. Next to this was Reliance (GSM), Vodafone (GSM) and Aircel (GSM), each of which was having more than 3.5 million connections.

As regards wireline subscribers base, there are only a few players, major among them being BSNL with 1.363 million connections. Tata and Reliance had 7.4 thousand and 3.4 thousand connections respectively.

It is worth mentioning that the opening of the telecom sector has not only led to rapid growth in number of subscribers, it has also helped a great deal towards maximization of consumers benefit, particularly in terms of price discovery and lowering of tariffs, both by public and private companies. It has been noticed that while the number of wireless connections registered a spectacular increase in recent years, the wireline connections registered a decline. However, there is no denying the fact that, with the penetration of mobile services and flourishing of private service providers, rural telephone connections have gone up substantially, particularly during the last 5 years. During 2008-09, the growth of rural telephone connections was around 60 percent, as against around 35 percent in urban telephone connections. It may be observed from below table that, in Bihar, Bharti Airtel performed better in terms of growth; the number of connections of this operator grew significantly to 13.7 million in 2010-11, compared to only 1.8 million in 2006-07. Next to this was a connection for BSNL, which jumped almost five times over the period.

Growth in Mobile Connections

Operators	(in million)				
	2006-07	2007-08	2008-09	2009-10	2010-11 (upto Nov 2010)
BSNL	1.15	1.42	2.25	3.54	5.16
Bharti Airtel	1.83	3.65	6.66	10.05	13.71
Reliance Telecom	0.95	1.55	2.64	3.55	NA
Dishnet Wireless		0.50	1.25	2.77	4.11
ABTL (IDEA)			0.27	2.50	4.09
Vodafone Essar			0.18	2.60	4.42
Stel				0.06	1.00
				0.13	1.96

Source: Cellular Operators Association of India (COAI)

Teledensity

Teledensity means the number of landline telephones in use for every 100 individuals living within an area. Teledensity greater than 100 means there are more telephones than people. It is an important indicator of telecom penetration in any area or region. Looking from this angle, it appears that Bihar is still far behind other States with a teledensity of around 33 in June 2010, and there still exists a vast gap between the rural and urban

teledensity. The teledensity was around 139 in urban Bihar, compared to 16 in rural Bihar. Obviously, the wireless connections had a significant share with rural and urban density being 134 and 16 respectively. Admittedly, the private players in the sector have contributed crucially to the increase in rural telephones by providing around 80 percent of connections

Tele Density in Bihar upto 30th June 2010

Category	Rural	Urban	Total
Service Area Wise	16.16	139.44	32.94
Wireless Teledensity	15.71	134.37	31.86
Wireline Teledensity	0.44	5.07	1.07

Source: Telecom Regulatory Authority of India

Note: Teledensity refers to the no. of telephone per 100 population

Information Technology

Bihar has been catching up fast in the field of IT and related services in recent years. Several initiatives have been made to promote IT and allied projects to facilitate e-governance in the State. To make Bihar one of the top five e-governed, IT enabled and e-literate States by 2012, the State government has formulated its Information Technology Policy in 2008. With a view to making Bihar a preferred destination for IT business and industry, the State government has also decided to offer a special package of incentives to attract them to the State and another Draft Information Technology Policy is under consideration. The importance of IT may also be gauged from the fact that the total plan outlay for IT department, which was US \$ 13.22 million (INR 59.52 crore) in 2009-10 has been increased to more than three times in 2010-11. Various e-governance schemes have been undertaken up in Bihar.

Sec LAN

Under the Secretariat Local Area Scheme, all secretariat offices and Chief Minister's residence are connected in a fiber optic Local Area Network (LAN). An outlay of US \$ 2.22 million (INR 10 crore) has been planned for the project in 2010-11. All the planned 3,300 Data Points have been completed successfully.

Bihar State Wide-Area Networking (BSWAN)

Under this scheme, there are a total of 533 points of presence (PoPs)-I in the State, 37 at the district and 495 at block levels. The total project outlay is US \$ 56.91 million (INR 256.24 crore), with the State share of US \$ 21.58 million (INR 97.17 crore), towards bandwidth cost and site preparation for PoPs and horizontal offices. In 2010-11, an outlay of US \$ 2 million (INR 9 crore) has been earmarked for BSWAN. During 2010-11, out of 533 PoPs, 484 have been established till October 2010. The remaining 49 PoPs will be completed during this financial year.

Common Service Centre (CSC)

The State government has already taken action to create a network of Common Service Centre christened ' Vasudha' in all 8,463 Panchayats of the State as outlets for various services. Of these, 5538 Vasudha Kendras have so far been established.

E-District

The project is wholly sponsored by the central government. A total of 94 Common Facilities Centre (CFC) under e-district plan are to be established, out of which 67 CFCs have been established and the remaining 27 will be established during the financial year 2010-11.

E-Governance

During the financial year 2010-11, the total outlay for the e-governance is US \$ 3.11 million (INR 14 crore). The Department of Information Technology is executing GIS mapping through NIC, Beltron, IWDMS, Regional Institute of e-learning and Information Technology for DOEACC Society.

E-Procurement

The State government has decided to launch e-Procurement system to purchase goods and services through open tenders so that the value of money is ensured. Initially, e-Procurement project has been started as a pilot project for schemes above Rs. 25 lakh in certain departments like Road Construction, Bridge Construction, PHED, Building Construction and the Department of Information Technology and Beltron. During the financial year 2010-11, a total of 1008 tenders has been put up for disposal, whereas 636 have been disposed.

State Data Centre

The centrally sponsored State Data Centre (SDC) Project is to be implemented by the State government. The proposal for this project has been finalized by the central government. Outlay for the State Data Centre during the financial year 2010-11 is US \$ 1.11 million (INR 5 crore).

Other projects

For other relevant projects of IT department, including Knowledge City, IT Park, IT Academy, the planned outlay is US \$ 1.11 million (INR 5 crore) and, for IT Bhawan, the outlay is US \$ 1.11 million (INR 5 crore). During the financial year 2010-11, for IT fairs and conferences and other capacity building measures, an outlay of US \$ 1.11 million (INR 5.8 crore) has been made.