Chapter 11

Power Sector Development

11.1: History of development

1. Energy is both a basic necessity for productive uses and also to raise the quality of life. Among all forms of energy, the one, which is most directly connected with regional development is electricity. In this connection, the three specific relevant characteristics of it are power generation, distribution and its pricing. Apart from the conventional sources such as thermal, hydel, diesel or naphtha based power generation, alternative non-conventional energy sources such as solar, wind, biogas and geo-thermal routes need to be examined in the context of potential and actual practices to redress the level of disparity in the state.

2. The Electricity Supply Act of 1948 provided for the constitution of State Electricity Board (KEB) in Karnataka. With the responsibility of producing and supplying electricity in the most economical and efficient manner in 1970. Karnataka Power Corporation Ltd. (KPTCL) was established exclusively and SEB was vested with the function of transmission and distribution to consumers, and to extend electricity supply to rural areas, at concessional rates if necessary. Management point of view, this was the *first step* towards reducing imbalances in electricity supply across the state.

3. The *second major step* taken in the direction of redressal of regional disparity was to take advantage of alternative energy potentials in the state. Hydel and thermal power generation potentials were identified and segregated (hydel about 37%, and thermal about 63%). Alternative energy sources such as wind and mini-hydel sources have been added. The *third major policy shift* that has been initiated is encouraging the private sector to take up both captive and commercial power generation. By the year 2001, about 528.5 MW capacity has been created in the private sector (out of total capacity of 4804.97 MW in the state).The *final step* undertaken is adding high degree of decentralization in power distribution, by adding more and more sub-stations at the district levels. As many as 677 substation are installed in the state by 2001.Total installed distribution transformers have multiplied to 148099. Against this background, what is the achievement, mainly towards redressing regional disparity in quality power supply?

4. By the year 2001, the progress at the state level production and consumption of electricity is remarkable. The per capita electricity consumption has come up to 389 units in 2001 (338 in 1996), from 64 units in 1956 in the Old Mysore state (which had dropped to 35 units after the merger of the state regions). As compared to this, power consumption in other comparable states are 332 in Andhra Pradesh, 557 in Maharashtra, 238 in Kerala. Karnataka is more or less at par with the national average. When one considers the 'Number of Villages Electrified', in almost all the districts in the state nearly 100 percent electrification is achieved (barring small deficiencies in districts such as Bangalroe ®, Ballary, Bijapur, C.R. Nagar, C.Magalore, Chitradurga, Davanagere, Gulbarga, Hasan, Kodagu, Kolar, Koppal, Mysore, Raichur, Shimoga, Tumkur, U. Kannada). At the state level, only 315 villages are yet to be electrified out of 27066 villages.

5. As of 2001,the total installed capacity of all the power plants in the state is 4804 MW, with an annual production of 21943 million units. Both at the aggregate and also at the regional levels, there are no major deficiencies, except for the peak load factors. Very recently, another work on a 250 MW thermal power plant has been commissioned at Bellary. Hopefully, this will meet backlogs if any from that backward region.

11.2: Indicators of Power Development at District Levels

6. The real issue of regional disparity opens up only when some details of the electricity distribution and pricing issues are addressed. Table 11.1 shows some details of major electrical use patterns on per thousand of population basis. Likewise, distribution of electricity for industrial and agricultural use are shown at the district levels in Table 11.2 and 11.3. The major observation that can be made are summarily shown in Table 11.4.

Table 11.1 Domestic and Socially Relevant Power Sector Indicators (as of End March 2001)[2]

District	Percentage of Hamlets Electrified (2001)[1]	Domestic Lighting Installations per Thousand Popl.	Bhagya and Kutir Jyoti Installations per Thousand Popl.	All Electrical Home Installations per thousand Popl.	No. of Street Lights per Thousand popl.
Bangalore Division	**56.10**	**117.23**	**31.23**	**48.47**	**24.24**
Bangalore (U)	44.10	110.53	3.99	106.39	29.43
Bangalore (R)	87.71	164.62	55.94	30.90	34.10
Chitradurga	58.88	92.05	50.99	7.95	17.88
Davangere	78.22	116.20	40.78	17.88	12.85
Kolar	98.05	116.13	47.96	11.89	20.61
Shimoga	21.16	106.10	39.63	18.90	23.17
Tumkur	69.75	123.26	42.25	14.34	19.77
Mysore Division	**23.44**	**109.10**	**31.55**	**21.94**	**18.88**
C. R. Nagar	55.52	106.85	44.61	6.22	20.75
C. Magalur	24.11	126.43	33.36	13.17	8.78
D. Kannada	3.96	92.30	10.02	34.81	18.99
Hassan	47.43	119.12	46.48	12.78	18.01
Kodagu	18.11	102.75	12.84	31.19	53.21
Mandya	78.41	116.41	48.27	10.79	17.04
Mysore	62.40	99.81	30.86	28.95	19.43
Udipi	4.73	119.93	16.23	33.36	13.53

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District	Percentage of Hamlets Electrified (2001)[1]	Domestic Lighting Installations per Thousand Popl.	Bhagya and Kutir Jyoti Installations per Thousand Popl.	All Electrical Home Installations per thousand Popl.	No. of Street Lights per Thousand popl.
Belgaum Division	**34.48**	**84.09**	**38.74**	**16.73**	**17.72**
Bagalkot	100.00	69.61	31.48	48.43	23.00
Belgaum	100.00	88.19	33.28	12.12	15.21
Bijapur	34.14	50.88	40.38	6.64	8.85
Dharwad	100.00	91.65	26.81	29.30	25.56
Gadag	100.00	108.02	51.44	6.17	11.32
Haveri	61.62	83.45	47.29	4.87	21.56
U.Kannada	24.13	107.91	58.39	11.09	22.17
Gulbarga Division	**45.84**	**62.68**	**39.30**	**8.32**	**12.01**
Bellary	79.74	71.11	37.04	10.86	17.78
Bidar	52.22	64.62	36.64	7.33	7.99
Gulbarga	22.24	56.02	38.09	10.24	10.88
Koppal	47.10	70.53	46.06	4.19	17.59
Raichur	38.96	57.65	41.87	5.46	6.67
N. Karnataka	**37.16**	**75.07**	**38.98**	**13.18**	**15.32**
S. Karnataka	**37.61**	**114.06**	**31.35**	**38.14**	**22.15**
State Level	**37.49**	**97.40**	**34.61**	**27.48**	**19.23**

Notes : 1: For this computation, the total number of hamlets as per 1991 Census are used, where as the hamlets electrified are based on KPTL data for the year 2001.
2. Population as per the 2001 Census is used to compute the indicators;
Source: KPTCL

7. Assured electricity supply is at all the pockets and hamlet levels is a must for improving the quality of life in a balance basis. This should be the prime objective for redressal of regional supply. Even at the state level, only about 37 percent of hamlets have been electrified, as against nearly 100 percent village wise electrification. As can be seen from the Table 11.1, in very few districts in the state, all the hamlets have been fully electrified. HPC FRRI strongly recommends electrifying all the hamlets as the prime objective for KPTCL in the coming five years. However, for lack of details of investment cost norms, it has not been possible to make any specific estimates of the costs to be involved. A rough estimate of Rs. 4000 crore is suggested however.

Table 11.2 : Industry Linked Power Indicators (as of End March 2001)[1]

District	Commercial Lighting Installations per Thousand Population.	LTP Installations per Thousand Population.	Total HTP Installations
Bangalore Division	**77.86**	**8.30**	**2188**
Bangalore (U)	173.63	12.69	1614
Bangalore (R)	22.24	10.92	237
Chitradurga	10.41	4.64	36
Davangere	29.63	3.74	65
Kolar	34.32	5.03	78
Shimoga	18.57	7.56	80
Tumkur	29.42	4.26	78
Mysore Division	**26.22**	**4.01**	**837**
C. R. Nagar	10.95	4.46	16
C. magalur	17.01	4.83	27
D. Kannada	38.69	3.11	270
Hassan	15.51	1.22	63
Kodagu	8.99	4.04	23
Mandya	23.28	5.62	40
Mysore	39.95	4.11	260
Udipi	24.85	5.86	115
Belgaum Division	**24.88**	**5.13**	**580**
Bagalkot	14.30	5.81	39
Belgaum	40.85	6.66	206
Bijapur	11.85	3.71	41
Dharwad	27.33	5.05	132
Gadag	10.62	4.12	32
Haveri	13.25	2.64	35
U.Kannada	25.25	4.88	95
Gulbarga Division	**19.98**	**3.21**	**397**
Bellary	18.85	2.96	112
Bidar	15.82	3.40	92
Gulbarga	31.38	3.78	94
Koppal	5.63	3.02	38
Raichur	13.93	2.43	61
N.Karnataka	**22.81**	**4.31**	**977**
S. Karnataka	**57.75**	**6.63**	**3025**
State Level	**42.83**	**5.64**	**4002**

Note : Population as per Census 2001 is used here.
Source : KPTCL

8. HPC made an attempt to link the power consumptions in the state with the levels of economic activities. On the basis of comparative picture of industrial development in the state shown in Table12.2, and information of irrigated area in the state (shown in Table 10.3), and the power consumption rates, the following observations can be made.

- A weighted average of various industrial development for North Karnataka is 0.28, whereas it is 0.72 for South Karnataka; In other words, North Karnataka is almost one third level below that of South Karnataka.

- Of all the irrigated area in the state, North Karnataka has about 58.31 percent, the rest being in South Karnataka;

- North Karnataka has nearly 24.21% of total minor irrigation works, the rest being in South Karnataka.

- Whereas the power consumption in North Karnataka in the year 2000-01 was 2313 million units (24.23%), and it was 7232 million units (75.77%) in South Karnataka.

9. Thus, some elements of disparity in the degree of industrialisation and development of minor irrigation are visible in North Karnataka. HPC FRRI is of the opinion that unless some rational allocation of power supply as infrastructure is carried out, industrialization and agricultural development will not follow. Therefore, it is recommended that a notional 40-50% power distribution be reserved for North Karnataka.

Table 11.3: Agriculturally Relevant Power Indicators (as of End March 2001)

District	Total Water Works ('000)	Total Irrigation Pump Sets ('000)
Bangalore (U)	2.60	27.00
Bangalore (R)	2.70	89.00
Chitradurga	1.90	50.00
Davangere	4.80	44.00
Kolar	3.90	123.00
Shimoga	0.90	24.00
Tumkur	3.60	124.00
C. R. Nagar	1.30	36.00
C. magalur	1.30	29.00
D. Kannada	1.80	45.00
Hassan	4.70	36.00
Kodagu	0.50	4.00
Mandya	2.00	40.00
Mysore	2.70	27.00
Udipi	0.90	44.00
Bagalkot	1.20	54.00
Belgaum	2.60	135.00
Bijapur	1.10	61.00
Dharwad	1.00	11.00

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District	Total Water Works ('000)	Total Irrigation Pump Sets ('000)
Gadag	0.90	17.00
Haveri	1.90	34.00
U.Kannada	1.20	29.00
Bellary	1.40	36.00
Bidar	1.50	42.00
Gulbarga	2.30	37.00
Koppal	1.00	30.00
Raichur	0.90	22.00
N. Karnataka	**17.00**	**508.00**
S. Karnataka	**35.60**	**742.00**
State Total	**52.60**	**1250.00**

Source: KPTCL

11.3 :People's Voice

10. Some of the important suggestions that came up during the district visits are listed below:

- Small hydel plants can come up in Agumbe area of Shimoga, C.R. Nagar and D.Kannada disticts.
- The Mangalore-Bangalore Gas Pipe Line can go through Hasan and Shimoga.
- Solar energy potentials can be tapped in Chitradurga district.
- Mini-power stations and gobar gas potentials in Mandya and C.magalur (C.Magalore Taluka)district be explored.
- Wind energy plants are possible in C.R. Nagar, C. magalur (along Bababudan giri), Kodagu (Bagamandala range), Gadag (in Kappadagudda), Udupi, Bagalkot (Khanapura, Hanapurthanda area) districts.
- Substations are required in C.R. Nagar (Haradalli-Hobli), (66 KV at Maddur, K.R. Pet) Mandya districts.
- One 120 MW Power Unit is required in Dharwad district for industries to come along the NH 4 Highway.
- There is a need to connect Kaiga with Narendra Plants with HT line.

11.4 : Possible Directions of Change

11. Having looked at the various aspects of power requirements, hardships and deficiencies, taluks which are lagging behind the state averages in respect of various facilities are identified and presented in Table 11.4. HPCFRRI recommends that these talukas be given special attention to meet their power requirements.

12. Karnataka state is endowed with rich sources of alternative energies. The main alternative sources are wind, hydel, gobar gas and solar. There is a need to stress on these in pockets where the conventional power does not reach. The Karnataka Renewable Energy Development Corporation has initiated some process development on these lines. They have to be streamline and pursued.

13. The fact that Indian government has initiated the process of privatization in the power sector, it is time that Karnataka government should encourage the private sectors in different backward regions of the state to undertake power generation and distribution. Particularly in the power deficient mining regions of Karnataka such as Bellary-Hospet region, potential hydel power regions of western Ghat region (districts of C.maglur, Kodagu, D.Kannada, Udupi and Uttara Kannada), private enterprises are to be invited. Though the GoK has issued the necessary order on 27the January 2000 to this effect, no progress has taken place on this so far.

14. The Power Tariff Regulation Authority should take note of the fact that there is a significant increase in T & D losses in the last two years (30 % and 38% respectively). The cost of power generation has gone up by 100 % between 1994-95 and 2000-2001. Both these burdens are not necessarily be unloaded on to the consumers, unless, there are sufficient reasons to do so. Rather, improvements in the efficiency in production and distribution need to be addressed first, before talking of transferring the effects of structural and system inefficiencies to the consumers. In any case, differential subsidy based pricing for the poor fishermen, small and marginal farmers and domestic consumers are to maintained, who have no options of passing on the tariff burden on to others. Some details of the recommendations on these are presented in the Chapter on Financial Resources for Redressal of Regional Imbalances.

15. In the course of HPC FRRI's urge to understand and analyse the extent of regional disparity in the distribution of power at the taluka levels, to the dismay, no reliable and consistent set of data were available on taluka level power consumption rates. Since, power sector is one of those highly modernized and with highly computerized commercial operations, it is desirable that such data are maintained and published regularly.

Table 11.4 : HPC FRRI's Views for Redressal of imbalances in Power Sector

Installations	Districts Below State Average	Critically Deficient Districts[1]	Comments
Hamlets Electrifed	Shimoga, D. Kannada, U. Kannada, Chikmagalur, Kodagu, Udupi, Bijapur, Gulbarga	Shimoga, D. Kannada, U. Kannada, C. magalur, Kodagu, Udupi, Gulbarga	As many as 350 hamlets are not electrified in Shomoga district, 1500 in Tumkur, about 800 in U.Kannada districts. There are also other districts in which the people and representatives of ZP, TP and GP, MLA, MLC and MPs expressed the same
Domestic Lighting	Bagalkot, Belgaum, Bellary, Bidar, Bijapur, Chitradurg, Dakshina Kannada, Dharwad, Gulbarga, Haveri, Koppal, Raichur	Bijapur, Gulbarga,Raichur, Bagalkot, Bidar, Koppal	
Bhagya Jyoti and Kutir Installations	Bangalore (U), Bagalkot, Belgaum,C.magalur, Dakshina Kannada, Dharwad, Kodagu, Mysore, Udupi	Bangalore (U), Bagalkot, Dakshina Kannada, Darwad, Kodagu, Mysore, Udupi	
All Electric Home Installations	Belgaum, Bellary, Bidar, Bijapur, C.R. Nagar, C. magalur, Chitradurg, Gadag, Gulbarga, Hassan, Haveri, Kolar, Koppal, Mandya, Raichur, Tumkur, and U. Kannada	Bidar, Bijapur, C. R. Nagar, Gadag, Haveri, Koppal, Raichur	
Street Lighting	Belgaum, Bellary, Bidar, Bijapur, C.Magalur, Chitradurg, Davangere, D. Kannada, Gadag, Gulbarga, Hassan, Koppal, Mandya, Raichur, Udupi	Raichur, Bidar, C.magalur, Bijapur, Gulbarga, Gadag, D. Kannada	

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Installations	Districts Below State Average	Critically Deficient Districts[1]	Comments
Commercial Light Installations	Bangalore (R), Bagalkot, Bellary, Bidar, Bijapur, C.R.Nagar, C.magalur, Chitradurg, Davangere, Dharward, Gadag, Hassan, Haveri, Kodagu, Koppal, Mandya, Raichur, Shimoga, Tumkur, Udupi, U.Kannada	Koppal, Kodagu, Chitradurg, Gadag, C.R.Nagar, Bijapur, Haveri	Private sector can be encouraged in this activity.
Low Tension Power Installations	Bellary, Bidar, Bijapur, Davangere, Dakshina Kannada, Gadag, Gulbarga, Hassan, Haveri, Kodagu, Koppal, Mysore, Raichur, Tumkur,	Hassan, Raichur, Haveri, Bellary, Koppal, D. Kannada, Bidar	Private sector can come in here.
HTP Installations		C. R. Nagar, Kodagu, C. magalur, Gadag, Haveri, Chitradurg, Koppal	
Water Works Installations		Kodagu, Shimoga, Raichur, Udupi, Gadag, Koppal, Dharward	Private sector can be encouraged.
Irrigation Pumpset Installations		Kodagu, Dharwad, Gadag, Raichur, Shimoga, Mysore, Bangalore (U)	Private sector can be encouraged.

Notes : 1. These are such districts which are falling in the lowest quartile among all the 27 districts.