CHAPTER 4

INFRASTRUCTURE

The performance of infrastructure sectors during the year 1990-91 has not been encouraging. Electricity generation, production of crude oil and refinery throughput showed signs of deceleration, or actual decline. However, production of coal and cargo handled at major ports achieved higher growth rates during 1990-91 compared to 1989-90. These trends suggest that infrastructural constraints may have an adverse impact on growth of output in the economy.

4.2 Power generation increased by only 7.7 per cent during 1990-91 compared with 10.8 per cent in 1989-90. The deceleration was due to decline in thermal generation. Thermal (including nuclear) power generation grew at only 5.1 per cent during 1990-91 compared with 12.1 per cent in 1989-90. The average plant load factor (PLF) for thermal units was also lower at 53.8 per cent during 1990-91 as against 56.5 per cent in 1989-90.

4.3 In the energy sector, coal production increased by 5.4 per cent during 1990-91 compared with 3.2 per cent in 1989-90; despatches of coal increased by 4.4 per cent compared with 4.3 per cent during 1989-90.

4.4 The performance of the petroleum sector has been disappointing. Domestic production of crude oil declined by 3.1 per cent during 1990-91 compared with an increase of 6.4 per cent in 1989-90. Given the disruption in supplies of crude oil imports from the Gulf, this was a cause for concern. The shortfall in the domestic production of crude oil for 1990-91 is estimated at 2.4 million tonnes, attributable in part to disturbances in Assam, which, cost us as much as Rs. 1,000 crores in foreign exchange. In terms of refinery throughput, production declined by 0.3 per cent during 1990-91, compared with an increase of 6.4 per cent in 1989-90.

TABLE 4.1

Trends in the Performance of Intrastructure Sectors

Item	Unit	1987-88	1988-89	1989-90	1990-91*	Percentage Change 1988-89 / 1987-88	Percentage Change 1989-90 / 1988-89	Percentage Change 1990-91* / 1989-90
Energy								
1. Coal								
(a) Production	Mn. tonnes	179.72	194.60	200.89	211.73	8.3	3·2	5.4
(b) Pithead stocks (year-end)	,,	33.74	33.97	37.43	42.87	0.7	10.2	14.5
(c) Despatches	,,	170.82	184.02	191.93	200.89	7.7	4.3	4.4
2. Electricity Generated (utilities only)	Bn. Kwh.	202.1	221.4	245.4	264.2	9.5	10.8	7.7
(a) Hydel	,,	47.5	57.9	62.1	71.5	21.9	7.3	15.1
(b) Thermal (incl. nuclear)	,,	154.6	163.5	183.3	192.7	5.8	12.1	5.1
3. Petroleum								
(a) Crude oil production	Mn. tonnes	30.36	32.04	34.09	33.03	5.5	6.4	—3.1
(b) Refinery throughput	,,	47.75	48.80	51.94	51.77	2.2	6.4	—0.3
Transport and Communications								
1. Railways Revenue earning goods traffic	,,	290.21	302.05	309.97	318.02	4.1	2.6	2.6
2. Cargo handled at major ports	,,	133.69	146.43	148.14	152.55	9.5	1.2	3.0
3. Telecommunications— New Telephone connections provided (DELS)	'000 Nos.	313.08	374.94	416.22	482.65	19.8	11.0	16.0

*Provisional

4.5 Revenue earning goods traffic on the railways showed the same growth rate of 2.6 per cent during 1989-90 and 1990-91. Traffic in coal, foodgrains and fertilisers increased by 3.8 per cent, 6.9 per cent and 7.9 per cent respectively during 1990-91, while traffic in iron ore, destined mostly for exports, declined by 11.0 per cent. Cargo handled at major ports increased by 3.0 per cent during 1990-91 compared with 1.2 per cent in 1989-90.

4.6 The provision for new telephone connections increased by 16.0 per cent during 1990-91 compared with 11.0 per cent in 1989-90.

ENERGY

Coal

4.7 Production of coal was about 104 million tonnes on the eve of the Sixth Five Year Plan (1980-85). It recorded an annual average growth rate of 7.2 per cent during the Sixth Plan while it was only 6.4 per cent during the Seventh Plan period. The production of coal in 1990-91 at 211.73 million tonnes showed a growth rate of 5.4 per cent compared with a production of 200.89 million tonnes in 1989-90.

4.8 Production was affected in the Singareni Collieries Company Limited (SCCL), because of strike during most of September-October 1990 as well as heavy rains, among other, factors.

4.9 Total despatches at 200.39 million tonnes in 1990-91 were 4.4 per cent higher than 191.93 million tonnes despatched during 1989-90. Despite higher despatches the pit-head stocks at 42.87 million tonnes in 1990-91 were 14.5 per cent higher than in 1989-90

TABLE 4.2

Trends in Coal Sector

(Million Tonnes)

S.No.	Item	1987-88	1988-89	1989-90	1990-91£	Percentage Change 1988-89 over 1987-88	Percentage Change 1989-90 over 1988-89	Percentage Change 1990-91£ over 1989-90
1	2	3	4	5	6	7	8	9
	Production							
	(i) CIL	159.03	171.50	178.62	189.64	7.8	4.2	6.2
	(ii) SCCL	16.40	18.61	17.80	17.71	13.5	—4.4	—0.5
	(iii) Others	4.29	4.49	4.47	4.38	4.7	-0.4	—2.0
	Total	179.72	194.60	200.89	211.73	8.3	3.2	5.4
2.	Pit-head stocks (year-end)	33.74	33.97	37.43	42.87	0.7	10.2	14.5
3.	Despatches	170.82	184.02	191.93	200.39	7.7	4.3	4.4
4.	Lignite (production)	11.16	12.40	12.80	11.76*	11.1	3.2	—8.1

£Provisional

*Production of Neyveli Lignite Corp. only.

4.10 The Coal India Limited (CIL) improved its productivity (measured in terms of output of raw coal per manshift or OMS) in 1990-91. It achieved an overall OMS of 1.31 tonnes in 1990-91 against 1.21 tonnes in 1989-90. The OMS of SCCL increased from 0.99 tonnes in 1989-90 to 1.18 tonnes during 1990-91.

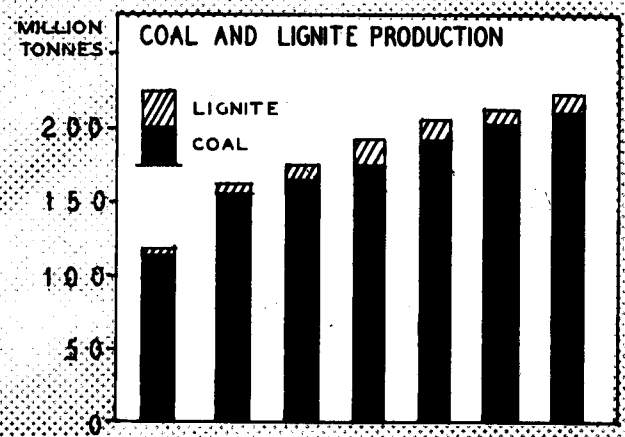
4.11 By the end of 1990-91, there were 24 projects each costing over Rs. 100 crore under implementation. Out of these 20 were in the coal sector and 4 in the lignite sector. There had been delays in case of 9 projects due to problems relating to acquisition of land, rehabilitation of land oustees as well as supply of equipment by local manufacturers.

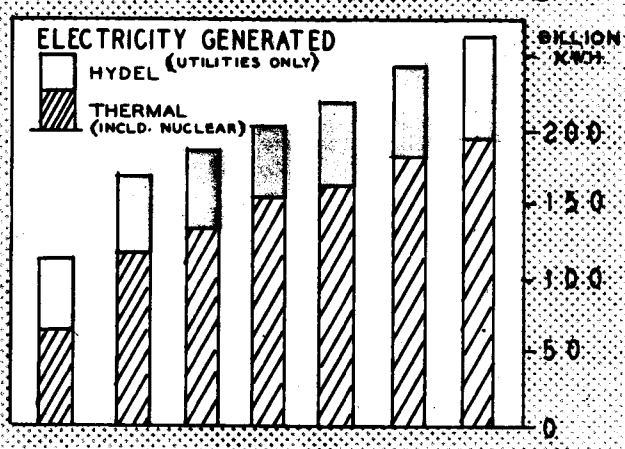
Lignite

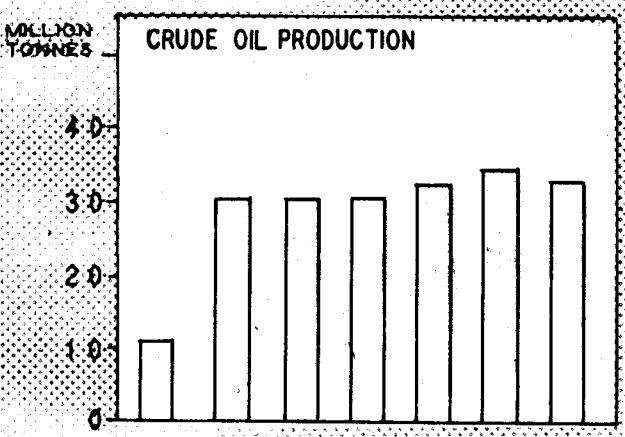
4.12 Lignite production increased on an average by 24.3 per cent annually during the Sixth Plan. The growth rate during the Seventh Plan was however only 10.6 per cent per annum. Production of lignite in Neyveli Lignite Corporation (NLC) which produces most of the lignite in the country went upto 11.76 million tonnes in

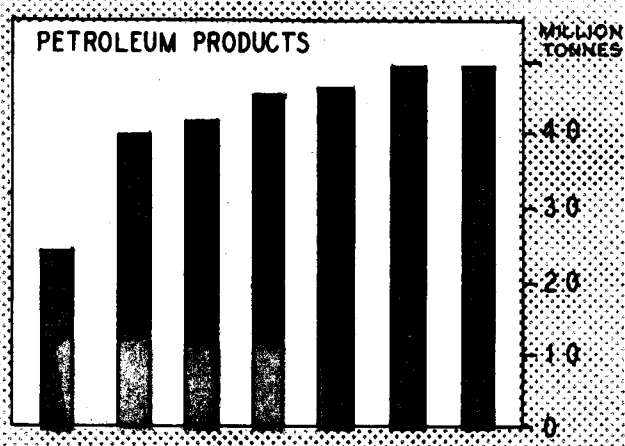
CHART 4.1

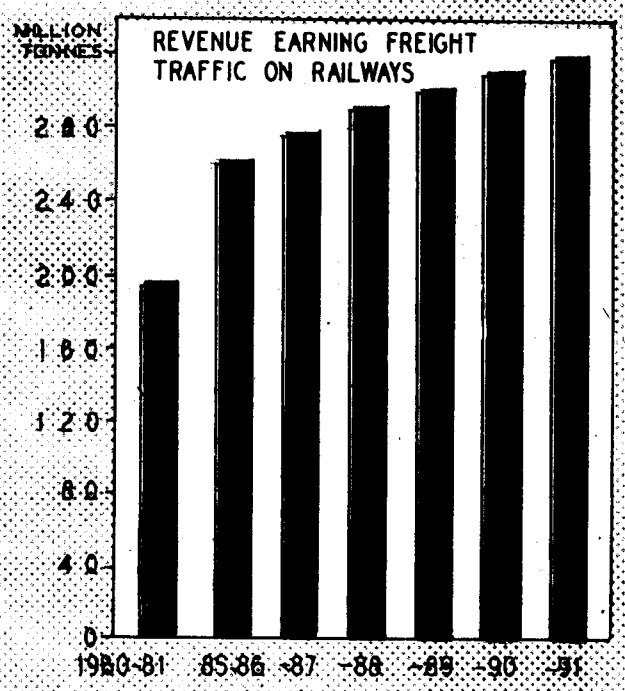
PERFORMANCE OF INFRASTRUCTURE SECTORS

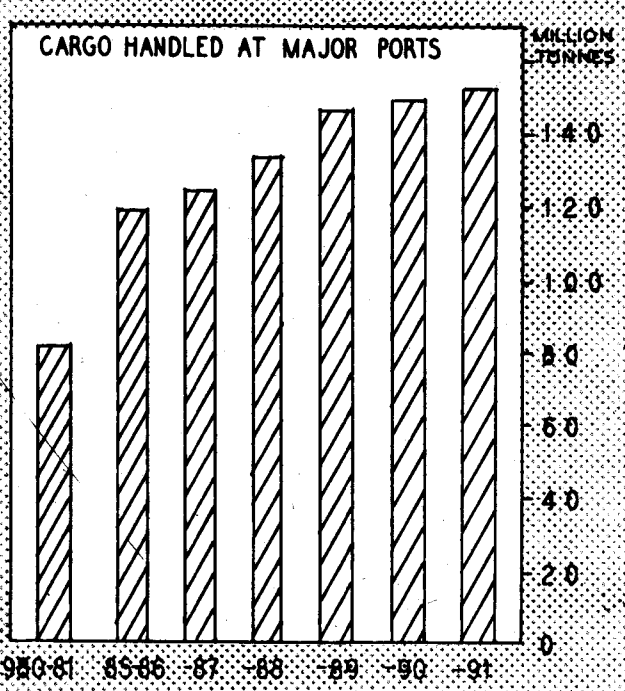












1990-91 against 11.23 million tonnes in 1989-90. Some small quantities of lignite are also produced in mines managed by the Gujarat Mineral Development Corporation (GMDC). NLC has also recorded significant achievements in the field of power generation and is functioning as a nodal agency for the exploration of lignite deposits in Rajasthan, Gujarat and Jammu & Kashmir.

Electricity

4.13 Energy generation (total utilities in terms of hydel, thermal and nuclear) recorded an annual growth rate of 8.5 per cent during the Sixth Plan. Of the total power generated, hydel power registered an annual growth rate of 3.5 per cent, thermal 12 per cent and nuclear 12.4 per cent. During the Seventh Plan, the total power generation grew at a rate of 9.4 per cent. Hydel power recorded a growth rate of 3.5 per cent, thermal power grew at a somewhat higher rate of 12.6 per cent, while nuclear power grew at a rate of 3.5 per cent per annum. The pattern of electricity consumption has also undergone a change during the two plan periods. On the eve of the Sixth Plan (1979-80) 58.9 per cent of total electricity consumption was accounted for by the industrial sector while the share of agriculture was 17.2 per cent. However during the terminal year of the Seventh Plan (1989-90), the share of agriculture has gone up to 25 per cent while that of industry has declined to 46.3 per cent.

4.14 The share of thermal power in the hydel-thermal mix has been steadily rising. At present, thermal power contributes about 69.8 per cent to the total power generated. There has been continuous improvement in the performance of thermal power stations in recent years. At the beginning of the Sixth Plan, the PLF (Plant Load Factor) of thermal power plants was 44.3 per cent. It improved to 50.1 per cent by 1984-85 and to 56.5 per cent in 1987-88. However, during 1988-89 the PLF of thermal plants declined to 55 per cent because of lower agricultural demand on account of favourable monsoon. In 1989-90, the PLF had improved once again to 56.5 per cent; it went down to 53.8 per cent in 1990-91.

4.15 The central sector PLF in 1989-90 was 62.2 per cent as against 62.6 per cent in 1988-89. The PLF of the state sector was 53 per cent compared to 51.6 per cent during the previous year. The private sector PLF during 1989-90 was 69.5 per cent compared with 63.2 per cent in 1988-89.

TABLE 4.3

Trends in the Power Sector (Utilities only)

Sl. No.	Item	1987-88	1988-89	1989-90	1990-91*	Percentage Change 1988-89 / 1987-88	1989-90 / 1988-89	1990-91* / 1989-90
1.	Power Generation (Billion KWH)	201.1	221.4	245.4	264.2	9.5	10.8	7.7
	(i) Hydel	47.5	57.9	62.1	71.5	21.9	7.3	15.1
	(ii) Thermal (incl. nuclear)	154.6	163.5	183.3	192.7	5.8	12.1	5.1
2.	Plant Load Factor of Thermal Plants (per cent)	56.5	55.0	56.5	53.8	—	—	—

*Provisional

4.16 The fall in the PLF during 1990-91 could be attributed to inadequate supplies of coal and backing down due to favourable monsoon conditions. The State Electricity Boards of Andhra Pradesh, Karnataka, Tamil Nadu, Punjab, Gujarat, Maharashtra, Madhya Pradesh, the West Bengal Power Development Corporation, the Delhi Electric Supply Undertaking (DESU) and Uttar Pradesh Electricity Board continued to maintain a PLF at more than 50 per cent during 1990-91. Private utilities achieved a PLF of 58.4 per cent during 1990-91 against the target of 58.6 per cent.

TABLE 4.4

Organisation-wise P.L.F. Targets and Actual Achievements during the year 1989-90 & 1990-91

Sl. No.	Board/Undertaking/ Sector	P.L.F. (Percentage) 1989-90 Actual	1990-91 Target	1990-91 Actual
	PLF Above 50%			
1.	Karnataka Power Corporation	76.9	63.9	76.3
2.	Andhra Pradesh State Elecy. Board	66.1	66.6	65.8
3.	Tamil Nadu State Electricity Board	64.3	59.3	58.3
4.	Maharashtra State Electricity Board	58.6	56.2	58.2
5.	Gujarat State Electricty Board	60.4	55.5	57.7
6.	West Bengal Power Development Corpn.	57.8	52.2	57.3
7.	Punjab State Electricity Board	60.8	66.0	53.0
8.	Madhya Pradesh Electricity Board	50.9	56.2	52.7
9.	Uttar Pradesh State Electy. Board	48.9	52.0	52.1
10.	Delhi Electric Supply Undertaking	55.5	59.7	50.9
	PLF 40% to 50%			
1.	Rajasthan State Electy. Board	57.7	56.2	42.8
	PLF below 40%			
1.	Haryana State Electricity Board	44.1	46.2	34.6
2.	Orissa State Electricity Board	35.6	34.7	34.0
3.	West Bengal State Elecy. Board	34.8	39.6	30.9
4.	Assam State Electricity Board	27.8	35.0	27.7
5.	Durgapur Project Ltd. (DPL)	18.1	29.3	24.5
6.	Bihar State Electricity Board	31.9	37.1	24.0
7.	Uttar Pradesh Vidyut Utpadan Nigam	—	32.6	—
	PLF CENTRAL SECTOR (TOTAL)	62.2	61.5	58.1
	PLF of Individual Units			
1.	Neyveli Lignite Corporation	68.6	64.5	69.6
2.	National Thermal Power Corporation	66.4	64.2	60.9
3.	Damodar Valley Corporation	37.8	43.8	33.3
	PLF : PRIVATE UTILITIES (TOTAL)	69.5	58.6	58.4

4.17 Thermal generation in 1989-90 was 178.7 billion KWH. This was 13.3 per cent higher than in 1988-89 but fell short of the target by 2.1 per cent. The shortfall was mainly due to reduced load demand, particularly from the agricultural sector on account of favourable monsoon conditions. Hydel power generation at 62.1 billion KWH in 1989-90 marked an improvement of 7.3 per cent over 1988-89 and was equal to the target fixed. The nuclear power generation in 1989-90 at 4.6 billion KWH was however less by 20.7 per cent than the level reached in 1988-89 on account of problems in the nuclear power reactors.

4.18. The total power generation in 1990-91 was 264.2 billion KWH recording an increase of 7.7 per cent over 1989-90 at 245.4 billion KWH. Hydel power generation was higher by 15.1 per cent at 71.5 billion KWH while thermal (including nuclear) power generation went upto 192.7 KWH showing an increase of 5.1 per cent over 1989-90.

4.19 The target for additional power generation capacity in 1990-91 was revised to 4212 MW comprising 2970.5 MW thermal and 1006.5 MW hydro-power generation. Actual capacity rolled/commissioned during 1990-91 was 2776.5 MW out of which 2331 MW was from thermal and 445.5 MW from hydel-power. A capacity addition of 22,245 MW was targeted for the Seventh Plan. Actual achievement has however been lower at 21,401.6 MW.

TABLE 4.5

Power Generation Capacity: Target/Achievements

Sector	1990-91 Programme No.	Programme Capaity (MW)	Commissioned/ Rolled No.	Commissioned/ Rolled Capacity (MW)
Thermal	34	2970.5	22	2331.0
Hydel	35	1006.5	9	445.5
Nuclear	1	235.0	—	—
TOTAL	70	4212.0	31	2776.5

4.20 Despite large investment in power sector over the four decades of planned development, there is a persistant shortage of power in the country. Given the highly capital-intensive nature of power sector and severe strain on resources, the Government has allowed private participation in power generation, distribution and supply.

CONSERVATION OF ENERGY

4.21 Consumption of energy in different sectors has shown rapid increase in recent years. Commercial sources of energy account for over 60 per cent of our total energy supply which is likely to go up to 80 per cent in the next decade and a half. Of the commercial sources of energy, coal and lignite contribute about 56 per cent, oil and

natural gas around 40 per cent, hydro-electric power about 3 per cent and nuclear 1 per cent. The share of non-commercial sources has declined very sharply over the years. Sectoral profile of consumption of energy shows that industry is the largest consumer of electricity and coal while the transport sector is the largest consumer of oil. Of all the sources of commercial energy, oil has the highest import content, at about 40 per cent of our requirement. The Gulf crisis and delicate balance of payments position has reinforced the need for energy conservation, containment of growth in consumption and imports, and search for alternatives of petroleum products.

4.22 There is considerable scope for improving efficiency in use of different sources of energy. Bulk of electricity in industrial sector is consumed by energy-intensive industries like aluminium, iron and steel, textiles, chemicals, paper and collieries. Energy consumption per unit of product does not compare favourably with other countries. Similarly, transmission and distribution losses at around 23 per cent are much higher than the losses at about 6-12 per cent in other countries. The need to reduce these losses and improving energy-efficiency of industrial sector is evident.

4.23 The area where the need for conservation is most urgent, however, is the oil sector. There is evidence that the economy has become more oil-intensive in recent years. Consequently, our dependence on oil as a source of energy has risen significantly. Since oil is used as a swing fuel, it has to fill the gap in supply of other sources of energy. Transport sector consumes about 48 per cent of petroleum products as fuel and industrial sector consumes about 32 per cent as feedstocks or fuels for fertilisers, petrochemicals, road construction and a variety of other industrial purposes. Rising rate of consumption of petroleum products in the context of depreciation of rupee and hardening of international oil prices may sharply increase the oil import bill and adversely affect the balance of payments position. It may be necessary to check the growth in demand for petroleum products through a package of price and non-price measures. Although demand for petroleum products is believed to be relatively price in elastic, a proper energy pricing policy must accompany measures on non-price front. Measures to contain petroleum consumption include prevention of wastages, leakages and losses of energy; operation of plant and equipment at optimum levels; investment in energy efficient equipments; establishment of energy conservation cells by major users and energy audit on a wider scale. Linking Government subsidies and term loans by financial institutions to adoption of appropriate energy conservation measures can help in introducing awareness of energy conservation in our country. In the transport sector, improving the fuel efficiency of vehicles, improving road conditions, transfer of long distance freight traffic from roads to railways, moderation in rate of growth of personalised forms of transport and improvement of public transport systems can result in substantial savings of petroleum products. As large amount of petroleum is used as swing fuel, if supply of electricity is improved and made more dependable, significant amounts of petroleum can be saved. These steps must necessarily be supplemented by a programme to generate awareness on merits of energy conservation. Unfortunately, measures taken to encourage-conservation of petroleum products in important sectors like transport, industry, agriculture and domestic have not met with much success while the growth of domestic consumption of petroleum products has continued to register increase.

4.24 During 1990-91, various schemes and demonstration projects were taken up by the energy Conservation Cell of the Department of Power. These included energy audits, rectification of pumpsets system improvement schemes, development of fuel-efficient body and chassis, training programme and studies among others. Petroleum Conservation Research Association under the Department of Petroleum has also taken up projects on training of drivers in the State Road Transport; State Energy Development Agencies have also taken up energy conservation programmes including compulsory audit and promotion of energy efficient devices.

Petroleum

4.25 Domestic production of crude oil during the Sixth Five Year Plan (1980-85) recorded a

growth of 21.7 per cent per annum which decelerated to 3.3 per cent per annum in the Seventh Plan (1985-90). As a consequence, imports grew at an annual rate of 7.5 per cent during the 7th Plan compared with a decline of 2.9 per cent in Sixth Plan period. The growth in refinery throughput was, however, higher in the Seventh Plan at 8.1 per cent per annum compared with 5.6 per cent in the previous plan. Domestic consumption of petroleum products recorded a higher increase of 6.8 per cent per annum during the Seventh Plan compared with 5.5 per cent in the Sixth Plan. Consumption of HSD was particularly higher at 8.6 per cent compared to about 7 per cent in the previous plan. The growth in domestic production of petroleum products was higher at 8.1 per cent per annum during the Seventh Plan compared with the growth rate of 5.5 per cent per annum registered during the Sixth Plan. During the year 1990-91, the production of petroleum products decreased by 0.3 per cent whereas the consumption increased by 0.9 per cent over the corresponding period last year.

4.26 Production of crude oil during 1989-90 was 34.1 million tonnes which was 6.4 per cent higher than previous year's level of 32 million tonnes, but it fell short of target by 0.22 million tonnes. The Oil and Natural Gas Commission (ONGC) produced 31.4 million tonnes of crude oil of which 9.7 million tonnes was from onshore area and 21.7 million tonnes from offshore area. The onshore production by the Oil India Ltd. (OIL) at 2.7 million tonnes in 1989-90 was in line with the target.

TABLE 4.6

Trends in Petroleum Sector

(Million Tonnes)

Item	1987-88	1988-89	1989-90	1990-91*	Percentage change 1988-89 / 1987-88	Percentage change 1989-90 / 1988-89	Percentage change 1990-91* / 1989-90
1	2	3	4	5	6	7	8
1. Crude Oil Production	30.36	32.04	34.09	33.03	5.5	6.4	—3.1
(i) On-shore	10.20	10.93	12.37	11.83	7.2	13.2	—4.4
(a) ONGC	7.75	8.50	9.67	9.18	9.7	13.8	—5.1
(b) OIL	2.45	2.43	2.70	2.65	—0.8	11.1	—1.9
(ii) Off-shore (ONGC)	20.16	21.11	21.72	21.20	4.7	2.9	—2.4
2. Refinery Throughput	47.75	48.80	51.94	51.77	2.2	6.4	—0.3
3. Production of Petroleum Products	44.73	45.70	48.69	48.56	2.2	6.5	—0.3
4. Natural Gas (Bn Cubic Metres)	11.47	13.22	16.99	17.98	15.3	28.5	5.8

*Provisonal

4.27 The total refinery crude throughput during 1989-90 at 51.9 million tonnes was 6.4 per cent higher than 48.8 million tonnes in 1988-89. Average capacity utilisation of refineries measured in terms of actual crude throughput as percentage of installed capacity, remained the same at 100.2 per cent as in 1988-89. Production of petroleum products in 1989-90 at 48.7 million tonnes represented an increase of 6.5 per cent over the level reached in 1988-89. Production of natural gas in 1989-90 at 17 billion cubic metres was also higher by 28.5 per cent than that in the previous year.

4.28 For the year 1990-91, the production of crude oil has fallen short of the target. The production of crude oil was 33.0 million tonnes against the target of 35.9 million tonnes representing an achievement of 92 per cent of the target. The production during the year was less by 3.1 per cent than the level of production achieved in 1989-90. The main reasons for shortfall in production during 1990-91 were agitation in Assam, problems relating to the disposal of LSHS from Koyali Refinery, Gujarat and a large number of wells becoming sick in the western region.

4.29 The refinery crude throughput of 51.8 million tonnes was slightly more than the target of 51.2 million tonnes for the year 1990-91. The target for the production of petroleum products for 1990-91 was 51.2 million tonnes and the achievement of 48.6 million tonnes works out to 95 per cent of the target. The capacity utilisation of refineries during the year 1990-91 was 99.8 per cent compared to 100.2 per cent achieved in 1989-90.

4.30 The gross import of crude oil and petroleum products during 1989-90 at 26.1 million tonnes was about 7.4 per cent higher than 24.3 million tonnes imported in 1988-89. The import of crude oil and petroleum products for the year 1990-91 was 29.3 million tonnes representing an increase of 12.3 per cent over the previous year.

Natural Gas

4.31 The production of natural gas during the year 1990-91 was 18.0 million cubic metres which is 5.8 per cent higher than the production of 17 billion cubic metres achieved during the previous year. The utilisation of gas in 1990-91 was 12.8 billion cubic metres compared to 11.2 billion cubic metres in 1989-90.

TABLE NO. 4.7

Consumption of Petroleum Products@

(Milion Tonnes)

Sl. No.	Item	1987-88	1988-89	1989-90	1990-91*	Percentage change 1988-89 / 1987-88	Percentage change 1989-90 / 1988-89	Percentage change 1990-91* / 1989-90
1.	Light Distillates : of which	**7.55**	**8.62**	**9.41**	**9.76**	**14.2**	**9.2**	**3.7**
	(a) Naphtha	2.85	3.36	3.35	3.42	17.9	—0.3	2.1
	(b) LPG	1.69	1.96	2.27	2.42	16.0	15.8	6.6
	(c) Mogas	2.81	3.05	3.49	3.54	8.5	14.4	1.4
2.	Middle Distillates: of which	**28.01**	**29.96**	**32.48**	**32.91**	**7.0**	**8.4**	**1.3**
	(a) Kerosene	7.23	7.73	8.24	8.39	6.9	6.6	1.8
	(b) High Speed Diesel Oil	17.66	18.80	20.71	21.07	6.5	10.2	1.7
3.	Heavy Ends: of which	**10.86**	**11.52**	**12.20**	**11.94**	**6.1**	**5.9**	**—2.1**
	Fuel Oil	8.14	8.46	8.82	8.78	3.9	4.3	—0.5
	Total	46.42	50.09	54.10	54.61	7.9	8.0	0.9

@Excluding RBF.
*Provisional.

4.32 Considering the importance of natural gas as an important source of fuel and feedstock in various sectors, such as fertilisers, power generation, sponge iron, LPG, ethane and propane, it is not prudent that this valuable source of energy should be wasted through flaring. During the Sixth Plan, on an average, 39 per cent of gross production of natural gas was flared. Even during the Seventh Plan, about 32 per cent of gas was flared. During the Sixth Plan, annual average growth in gross production of natural gas was 23.8 per cent but flaring of gas increased at a rate of 31.2 per cent per annum. During the Seventh Plan, gross production grew at an annual rate of 18.7 per cent while gas flaring grew at a somewhat lower rate. The Government has, therefore, formulated a policy framework for development, use and allocation of natural gas and for elimination of flaring of this valuable resource. A US $ 3 billion "Stoppage of Flaring of Gas" Project has been conceived; currently loan from the World Bank and the ADB are being negotiated for this project. It is hoped that with the implementation of this project, flaring of gas in Western offshore would come down to zero. Downstream consumers for the gas that would thus become available for use have already been identified.

Renewable Sources of Energy

4.33 The progress launched in the country for the development and utilisation of the new and renewable sources of energy (NRSE) continued to gain momentum and are poised for further stride. Major thrust areas include programmes relating to bio-energy, solar energy, wind power and micro-hydel. Over 14.02 lakh biogas plants had already been set up in the country till the end of 1990-91 under the National Project for Biogas Development. The capacity available for generation from these plants is estimated to be equivalent to about 49.54 lakh tonnes of fuelwood valued at Rs. 198 crores. The target for 1991-92 is fixed at 1.47 lakh plants. Under the National Programme for Improved *Chulhas*, about 17 lakh fuel-efficient and smokeless *Chulhas* were set up in 1990-91, bringing the total number installed to about 100 lakh *Chulhas*. These improved *Chulhas* are estimated to have the potential of saving 70 lakh tonnes of wood valued at Rs. 280 crore per year, in addition to benefits of preserving the environment.

4.34 The achievements under the solar thermal extension programme are also noteworthy. Physical achievements under this Programme for the period ending March 1991 include setting up of a total collector area of 1.72 lakh square metres for purposes such as water heating, distillation of water, timber seasoning etc. Over 1.76 lakh solar cookers have been sold so far. About 7500 village hamlets have been provided with solar photovoltaic street lighting systems and about 400 kwp capacity has been set up through experimental solar PV power plants.

4.35 Under the wind energy development and demonstration programme, 2711 wind pumps have been installed and wind farm projects of an aggregate capacity of about 37 MW have been set up in 7 states. About 760 biomass gasifier systems, which can each achieve a diesel replacement of over 65 per cent, have also been installed under a demonstration programme.

4.36 A financing institution called the Indian Renewable Energy Development Agency (IREDA) was set up by the Government in March 1987 for NRSE projects. The agency has by now sanctioned total of 125 projects relating to areas such as biomass utilisation for heat, steam and power generation, solar thermal energy, generation of biogas/power from industrial effluents, battery powered vehicles, wind energy, mini-macro hydel as well as for manufacturing equipment needed for various NRSE systems and devices. In 1990-91 IREDA sanctioned loans for 55 projects as against 31 projects in 1989-90 involving a total outlay of Rs. 2629.35 lakhs as against Rs. 582.87 lakhs in 1989-90. Out of these projects, only 9 projects have so far been commissioned. From its inception, IREDA has sanctioned a total of 125 projects, out of which 49 projects have been commissioned as on 31st March, 1991.

Transport

Railways

4.37 During the Seventh Plan period, the size of the railway network increased from 61,850 route kms to 62,211 route kms, and additional 2,812 route kms were electrified taking the total route kms electrified to 9,137. While the trunk routes Howrah-Delhi and Delhi-Bombay via Western Railway and Delhi-Madras have already been electrified, the electrification of Howrah-Bombay is expected to be completed during 1991. During the Seventh Plan, 19,623 kms of track renewal was completed compared with 9,541 kms in the Sixth Plan.

4.38 During the Seventh Plan period, the originating freight traffic tonnage recorded an increase of 26.2 per cent while freight output in tonne kms increased by 30 per cent. The originating passengers carried went up by 9.6 per cent and passenger kms increased by 23.9 per cent. As higher priority was accorded to developing capacities for meeting the demands for freight traffic, adequate passenger traffic capacities could not be built. The performance of the railways during the Seventh Plan has, by and large, been satisfactory. However, the actual track renewal was 19623 kms against the target of 21,000 kms and the actual electrification completed was for 2812 route kms against a target of 3400 route kms.

4.39 During 1989-90, the railways lifted 334.3 million tonnes of freight traffic of which 310 millon tonnes was revenue earning. The total

originating tonnage was 1.5 per cent higher than 329.5 million tonnes lifted in 1988-89. In terms of tonne kms, the output was 236.9 billion tonne kms (btkms) as against 230.1 btkms in 1988-89.

TABLE 4.8

Performance of Railway Sector

Sl. No.	Item	1987-88	1988-89	1989-90	1990-91*	Percentage Change 1988-89 / 1987-88	Percentage Change 1989-90 / 1988-89	Percentage Change 1990-91* / 1989-90
1	2	3	4	5	6	7	8	9
1.	Total revenue earning freight traffic (million tonnes)	290.21	302.05	309.97	318.02	4.1	2.6	2.6
	(i) Coal	119.84	128.01	130.15	135.06	6.8	1.7	3.8
	(ii) Raw materials for steel plants (excl. coal)	24.86	26.97	27.43	25.90	8.5	1.7	—5.6
	(iii) Pig iron & finished steel from steel plants	9.87	10.18	10.15	10.01	3.1	—0.3	—1.4
	(iv) Iron ore for export	13.04	13.64	14.76	13.14	4.6	8.2	—11.0
	(v) Cement	22.32	25.91	27.45	28.74	16.1	5.9	4.7
	(vi) Foodgrains	30.13	24.88	23.66	25.29	—17.4	—4.9	6.9
	(vii) Fertilizers	13.18	16.10	16.97	18.31	22.2	5.4	7.9
	(viii) P.O.L.	21.69	22.60	24.31	25.05	4.2	7.6	3.0
	(ix) Balance 'Other Goods'	35.28	33.76	35.09	36.50	—4.3	3.9	4.0
2.	Net tonne kilometre (billion)	222.53	222.37	229.60	235.14	—0.1	3.3	2.4
3.	Net tonne kilometre per wagon per day (BG)	1449	1453	1428	1455	0.3	—1.7	1.9
4.	Passenger traffic Originating (million)	3792	3500	3653	3744	—7.7	4.4	2.5
5.	Passenger kilometre (billion)	269.4	263.7	280.8	295.0	—2.1	6.5	5.1

*Provisional

4.40 Despite the loss of 8.3 MT of freight traffic upto December 1990 due to civil disturbance shortages of diesel and natural disasters, the Railways were able to surpass their revised target of 316.8 MT for 1990-91. The revenue earning traffic loaded increased by 2.6 per cent and touched 318 MT in 1990-91 as against 310 MT in 1989-90.

4.41 Passenger traffic in 1990-91 recorded an increase of 2.5 per cent and reached 3744 million passengers compared with 3653 million passengers carried during 1989-90. Similarly, the passenger-kilometres registered an increase of 5.1 per cent and reached 295 billion kms compared with 280.8 billion kms in 1989-90.

Ports

4.42 At the end of the Seventh Five Year Plan, cargo handling capacity at 11 major ports was assessed at 149.1 million tonnes as against 132.7 million tonnes at the end of the Sixth Plan. In the context of formulating plans for capacity augmentation during the Eighth Five Year Plan, the existing capacities at major ports were re-assessed in view of the improved berth productivities. This assessment placed the capacity at 161.3 million tonnes at the end of the Seventh Plan.

4.43 Cargo handled at major ports during 1990-91 at 152.6 million tonnes exceeded target of 151 million tonnes and was also higher than the throughput of 148.1 million tonnes handled in 1989-90. Major increases were recorded in the traffic of POL (21.8 lakh tonnes), Coal (22 lakh tonnes) and fertiliser and fertilser raw materials (9.9 lakh tonnes). However the traffic in Iron Ore and foodgrains declined in 1990–91 as compared with 1989–90. Traffic handled at Paradip, Bombay, New Mangalore and Kandla, ports crossed the target as well as the traffic handled during 1989-90

TABLE 4.9

Trends in Traffic at Major Ports

(In million tonnes)

Commodity	1987-88	1988-89	1989-90	1990-91*	Percentage Change 1988-89 / 1987-88	Percentage Change 1989-90 / 1988-89	Percentage Change 1990-91* / 1989-90
1	2	3	4	5	6	7	8
POL	63.16	64.33	63.60	65.78	1.9	—1.1	3.4
Iron Ore	28.75	32.74	33.21	31.87	13.9	1.4	—4.0
Fertiliser & Raw Material	4.52	5.15	6.74	7.73	13.9	30.9	14.7
Foodgrains	1.13	2.50	1.16	0.78	121.2	—53.6	—32.8
Coal	12.73	15.39	17.60	19.80	20.9	14.4	12.5
Vegetable Oil	2.12	1.37	0.49	0.73	—35.4	—64.2	49.0
Other Liquids	2.40	2.80	2.26	2.39	16.7	—19.3	5.8
Containerised Cargo	5.10	5.55	7.29	7.92	8.8	31.4	8.6
Others	13.78	16.60	15.79	15.55	20.5	—4.9	—1.5
TOTAL	133.69	146.43	148.14	152.55	9.5	1.2	3.0

*Provisional

4.44 The container traffic at 7.9 million tonnes in 1990-91 recorded an increase of 8.6 per cent over the level reached in 1989-90. More than 50 per cent of the containerised cargo traffic continued to be handled at Bombay port. Capacity utilisation during 1990-91 was 102 per cent as against 99 per cent in 1989-90.

Shipping

4.45 During 1990-91, acquisition of Indian shipping tonnage continued to show improvement. The fleet strength at the end of March 1991 was 418 vessels of 6.03 million GRT compared with 408 vessels of 5.98 million GRT in March 1990. The provisional figure for overseas trade during 1990-91 was about 112 million tonnes against 108.2 million tonnes during 1989-90. The share of Indian flag in the total traffic has increased marginally from 36 per cent during 1989-90 to 37 per cent during 1990-91. Coastal shipment of coal to South India via Haldia, Paradip and Visakhapatnam improved by 9 per cent and reached 7 million tonnes in 1990-91 against 6.4 million tonnes in 1989-90.

Road and Road Transport

4.46 The road network has increased steadily during the Seventh Plan. In the terminal year of the Sixth Plan (1984-85) the road network 16.9 lakh kms increased to 19.7 lakh kms in the final year of the Seventh Plan showing an increase of 17 per cent during the plan period. The total length of national highways increased from 31.7 thousand kms to 33.6 thousand kms during the same period registering a growth of about 6 per cent. The Seventh Plan witnessed spectacular growth in the number of registered vehicles. The number of such vehicles increased from 90 lakhs in 1984-85 to about 169 lakhs in 1988-89 and further to about 191 lakhs in 1989-90.

4.47 The share of road transport traffic, both passenger and freight, in total traffic continues to increase. It is estimated that at present the share of road traffic in total passenger traffic is about 80 per cent while that in total freight traffic is about 50 per cent. There are 56 road transport undertakings in the country operating roughly 34 per cent of the total buses in the country at the end of the Seventh Plan. The productivity indices of these undertakings continue to show improvement. The average fleet utilisation in these undertakings increased from 88.4 per cent in 1988-89 to 89.2 per cent in 1989-90. The vehicle utilisation increased from 251.7 kms per bus per day in 1988-89 to 258 kms in 1989-90 while the load factor improved from 70.2 per cent to 71.7 per-cent. Inspite of improvement in physical performance, however, the state road transport undertakings continued to incur losses. These

losses are estimated to be about Rs. 605.9 crore in 1989-90 compared with losses of Rs. 427.5 crore in 1988-89. The deterioration in financial performance is mainly due to heavy burden of taxes, unremunerative fares and social costs.

Civil Aviation

4.48 The Civil Aviation sector consists of two distinct segments—operational and infrastructural. On the operational side Indian Airlines and Air India provide domestic and international services. In addition, Pawan Hans was set up in 1985 to provide helicopter service to meet the requirement of ONGC and also services in inaccessible areas and difficult terrains. Infrastructural facilities are provided by the International Airports Authority of India (IAAI) and the National Airports Authority. The Indira Gandhi Rashtriya Uran Academy, set up in 1986, provides organised and intensive training programme for commercial pilots.

4.49 The capacity of *Air India* increased from 1600 million Available Tonne Kms (ATKMs) in 1980-81 to 2257 million ATKMs in 1990-91. Correspondingly, the traffic has increased from over 980 million Revenue Tonne KMs (RTKMs) in 1980-81 to 1381 Million RTKMs in 1990-91. The share of Air India in international passenger traffic has, however, shown a decline from 42 per cent in 1981 to 35 per cent at the end of 1989-90. During the year 1990-91, Air India achieved 2259 million ATKMs. This was 1.4 per cent lower in comparison to ATKMs in 1989-90. The traffic in terms of RTKMs for 1990-91 was also lower at 1381 million against 1441 million achieved during last year. The shortfall is due to discontinuance of operations to Kuwait following the Gulf crisis.

4.50 The capacity of *Indian Airlines* in terms of ATKMs has increased from 700 million in 1980-81 to 917 million in 1990-91. The traffic in terms of RTKMs has increased from 400 million in 1980-81 to 691 million in 1990-91. Compared to last year, the performance in terms of ATKMs achieved during 1990-91 is lower by 19.1 per cent and the performance in terms of RTKMs is less by 16.3 per cent. The decline in performance during 1990-91 is mainly due to continued suspension of A-320 operations with effect from 19th February 1990 as a sequel to its accident in Bangalore. The A-320 operation has now been resumed in a phased manner with effect from 28th October 1990 for international flights and with effect from 3rd December 1990 on domestic flights. Following grounding of A-320 aircraft, the financial position of Indian Airlines has been somewhat difficult during the years 1989-90 and 1990-91. It is expected to improve with gradual increase in utilisation of the A-320 fleet.

4.51 Indian Airlines took the delivery of remaining four A-320 aircraft out of the 19 A-320 aircraft during September, 1990. With this, the delivery of all 19 A-320 aircraft is complete and more flights will be added in the network in a phased manner.

4.52 *Vayudoot* was set up in 1981 to provide air transportation link to such areas, as are geographically cut off from the rest of the country and which were earlier linked by slow means of transportation and poor communication facilities. It first commenced operations by connecting 14 stations in the North-Eastern region with F-27 aircraft taken on lease from Indian Airlines. Subsequently, 23 more stations were added. During seventh Plan, there was further expansion in its operational network and number of stations increased to 105. Services were, however, subsequently withdrawn from some non-viable routes reducing the number to 75 at the end of March 1990. The number of stations were further reduced to 55 in November 1990 consequent to rationalisation of operational network.

4.53 The capacity of Vayudoot in terms of ATKMs at the end of sixth plan was 7.3 million. It went up to 33.5 million at the end of the Seventh Plan. The RTKM which was 4.9 million at the end of the Sixth Plan also went up to 19.3 million during the Seventh Plan. During 1990-91, Vayudoot achieved ATKMs of 23.0 million which was 32 per cent lower than the ATKM achieved during the year 1989-90. The RTKM achieved during the year 1990-91 was 14.7 million which was 24 per cent lower than the RTKMs during the previous year. The decline in performance is primarily due to rationalisation of operational network as a result of which services from certain loss making routes were withdrawn.

4.54 *Pawan Hans* was incorporated in October, 1985 primarily to provide support services to the oil sector. Other services like connecting inaccessible places located in difficult terrain, promotion of tourism through regular and charter services have been at limited scale only.

4.55 *International Airports Authority of India* was set up in 1972 to plan, develop, construct and maintain the international Airports of Bombay, Calcutta, Delhi and Madras. Trivendrum Aerodrome was subsequently declared as an International Airport with effect from 1-1-1991 and came under the operational charge of IAAI with effect from 1-4-1991. Aircraft movements handled at IAAI airports have increased from 1.13 lakh in 1972-73 to 1.27 lakh in 1984-85. During 1990-91, the number of flights handled at IAAI airports increased to 1.38 lakh. Similarly, cargo handled increased from 1.79 lakh tonnes in 1980-81 to 3.34 lakh tonnes in the terminal year of the Sixth Plan. It increased further to 3.75 lakh tonnes in 1990-91. Number of passengers handled also increased from 107 lakhs to 159 lakhs in the Sixth Plan and further to 177.38 lakhs in 1990-91.

4.56 *National Airports Authority* set up in June 1986 is responsible for the management of Civil Aerodromes and civil enclaves as well as for maintenance and operation of aeronautical communication systems at all the airports. There are at present 87 civil aerodromes and 28 civil enclaves under the control of the National Airports Authority.

Communications

The Post

4.57 The Post as on December 31, 1990 comprised 842 Head Post Offices, 24,645 Sub-Post Offices and 1.22 lakh extra Departmental Post Offices totalling upto 1.47 lakhs. During the Seventh Plan 4380 new Post Offices were opened. Of the total Post Offices, about 89 per cent are in rural areas. A Post Office serves, on an average, 22.2 Square Kms. or 4632 persons which is within the density recommended by the Universal Postal Union namely, 20—30 Square Kms. or 3,000—6,000 people. For collection of mail there are about 5 lakh letter boxes of which about 83 per cent are in rural areas.

4.58 India has the biggest postal network in the World. The Department of Posts has been labour intensive with about 3 lakhs regular and an equal number of part-time employees. Inspite of tariff increases in 1990 the Department is likely to face huge losses incurred by both rural as well as urban post offices. While it would continue providing postal services, regardless of its economics, it has nevertheless become necessary to consider whether the pricing policy should reflect the costs and whether the Department should be given subsidy not only to cover the costs but also to invest in its development and modernisation.

Telecommunications

4.59 The performance of telecommunications sector during the Seventh Five Year Plan in creating additional switching capacity, providing new telephone connections and production of switching equipment was satisfactory. As against a target of 16 lakh direct exchange lines (DELs) the achievement was a little higher at 16.9 lakh lines. In comparison, during the Sixth Five Year Plan achievement was only 8.8 lakh lines compared with a target of 13.1 lakh lines. Additional switching capacity created during the Seventh Plan at 19.7 lakh lines was short of the target by 21 lakh lines. The number of exchanges in the rural areas increased by over 29 per cent during the Seventh Plan which was somewhat lower than the increase in total number of exchanges by 33.4 per cent during the same period. The number of long distance public telephones (LDPTs) recorded an increase of 31.2 per cent, while the number of rural combined telegraph offices increased by about 5 per cent during 1985—90. The number of DELs in rural areas increased by about 16 per cent compared to over 58 per cent increase in total DELs.

4.60 The telecommunications sector performed well in 1989-90. It created net additional switching capacity of 4.78 lakh lines which was 2.1 per cent higher than the lines commissioned during 1988-89. Four metro districts namely Delhi, Bombay, Calcutta and Madras accounted for 30.3 per cent of this capacity expansion. The number of new telephone connections during 1989-90 was 4.2 lakh DELs which was 11 per cent higher than the previous year's level. Laying of

telephone cables during 1989-90 at 64.7 lakh conductor kilometres (CKMs) was 9.2 per cent higher than the previous year's level. There has been a substantial decline in the demand for new telex connections. As a result, there has been a decrease of 56.7 per cent in new telex capacity and 21 per cent in telex connections during 1989-90 compared to previous year.

TABLE 4.10

Performance of Telecommunication Sector

Group/Total	1987-88	1988-89	1989-90	1990-91*	Percentage Change 1988-89 / 1987-88	Percentage Change 1989-90 / 1988-89	Percentage Change 1990-91* / 1989-90
1 2	3	4	5	6	7	8	9
I. Net Additional Switching Capacity (Lakh lines)							
(1) Metro Districts	1.44	1.19	1.45	1.45	—17.4	21.8	—
(2) Others	1.96	3.49	3.33	4.13	78.1	—4.6	24.0
Total (All-India)	3.40	4.68	4.78	5.58	37.6	2.1	16.7
II. Net Telephone Connections provided (DELs) (000 Nos)							
(1) Metro Districts	114.12	102.83	122.45	132.21	—9.9	19.1	8.0
(2) Others	198.96	272.11	293.77	350.44	36.8	8.0	19.3
Total (All-India)	313.08	374.94	416.22	482.65	19.8	11.0	16.0
III Telex Service							
(1) Telex Capacity (Lines)	3342	2358	1020	1806	—29.4	—56.7	77.1
(2) Telex Connections (Nos.)	3438	3900	3080	1694	13.4	—21.0	—45.0
IV Production of Switching equipment (000 lines)							
(1) Strowger	154.2	213.2	175.8	85.8	38.3	—17.5	—51.2
(2) Crossbar	97.9	86.5	63.5	57.9	—11.6	—26.6	—8.8
(3) Electronic	259.5	483.3	735.1	800.3	86.2	52.1	8.9
Total (All-India)	511.6	783.0	974.4	944.0	53.0	24.4	—3.1
V Laying of Telephone Cable (Lakh conductor kilometres)							
(1) Metro Districts	25.07	23.36	22.37	19.47	—6.8	—4.2	—13.0
(2) Others	27.04	35.90	42.33	51.38	32.8	17.9	21.4
Total (All-India)	52.11	59.26	64.70	70.85	13.7	9.2	9.5
VI Addition in Rural Communications							
(1) No. of Exchanges	181	747	484	N/A	312.7	—35.2	—
(2) No. of LDPTs	2018	2631	1633	1742	30.4	—37.9	6.7

*Provisional

4.61 The switching equipment (Strowger, Crossbar and Electronic) produced by the Indian Telephone Industry during 1989-90 was of the production value of equipment equal to 9.7 lakh lines which is 24.4 per cent higher than the previous year's production. Total production of electronic teleprinters by Hindustan Teleprinters Limited at 5807 was 36.1 per cent higher and the production of electro-mechanical teleprinters (EMTPs) 58.4 per cent lower than during the last year.

4.62 In all, 484 exchanges were installed in rural areas during 1989-90 which is 35.2 per cent less than the exchanges provided in 1988-89. With a view to provide reliable mode of communication in rural areas more electronic type rural exchanges were planned, the production of which was not adequate during 1989-90.

4.63 A total number of LDPTs at 1,633 provided during 1989-90 was about 38 per cent less than the previous year's level. This shortfall was on account of initial difficulties experienced with regard to adoption of new technology for providing these LDPTs on reliable radio media as also in carrying out technical feasibility, installation and maintenance, among others.

4.64 Net additional switching capacity commissioned during 1990-91 at 5.58 lakh lines was higher by 16.7 per cent than that commissioned during 1989-90. A number of 4.8 lakh DELs were provided during 1990-91 recording an increase of 16 per cent over previous year's achievement. Of the total connections provided, 27.4 per cent were in four metro cities. Number of LDPTs provided during 1990-91 was 1742 which was 6.7 per cent higher than the previous year's level. Also, 70.85 lakh conductor kilometres of cables have been laid during 1990-91 as against 64.70 lakh CKMs in 1989-90.

Outlook

4.65 The performance of the infrastructure sectors, which are essential to maintain the pace of growth in the economy, has not been satisfactory during 1990—91 compared with the performance in 1989-90. It will not be possible to sustain the tempo of industrial growth unless there is a strong support provided by the physical infrastructure. The evidence available suggests that the performance of the economy is likely to be constrained by infrastructural bottlenecks. In the context of exceedingly difficult balance of payments situation., the poor performance of the petroleum sector is particularly disquitening. The pressures on the balance of payments and availability of oil resources are likely to continue for some time. Under these circumstances, the physical efficiency, productivity and capacity utilisation of basic infrastructure sectors such as coal, cement, steel and electricity must improve significantly.